
Wand Documentation

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Wand is a `ctypes`-based simple `ImageMagick` binding for Python.

```
from wand.image import Image
from wand.display import display

with Image(filename='mona-lisa.png') as img:
    print(img.size)
    for r in 1, 2, 3:
        with img.clone() as i:
            i.resize(int(i.width * r * 0.25), int(i.height * r * 0.25))
            i.rotate(90 * r)
            i.save(filename='mona-lisa-{}.png'.format(r))
            display(i)
```

You can install it from `PyPI` (and it requires `MagickWand` library):

```
$ apt-get install libmagickwand-dev
$ pip install Wand
```


CHAPTER 1

Why just another binding?

There are already many MagickWand API bindings for Python, however they are lacking something we need:

- Pythonic and modern interfaces
- Good documentation
- Binding through `ctypes` (not C API) — we are ready to go PyPy!
- Installation using **`pip`**

CHAPTER 2

Requirements

- Python 2.6 or higher
 - CPython 2.6 or higher
 - CPython 3.2 or higher
 - PyPy 1.5 or higher
- MagickWand library
 - `libmagickwand-dev` for APT on Debian/Ubuntu
 - `imagemagick` for MacPorts/Homebrew on Mac
 - `ImageMagick-devel` for Yum on CentOS

3.1 What's new in Wand 0.4?

This guide doesn't cover all changes in 0.4. See also the full list of changes in *Version 0.4.0*.

3.1.1 Complete Drawing API

Although Wand 0.3 introduced some basic facilities to draw *Lines* or *Texts*, these were incomplete.

Since Wand 0.4 *wand.drawing* it became almost complete. For more detail example, see the drawing guide:

- *Arc*
- *Bezier*
- *Circle*
- *Color & Matte*
- *Composite*
- *Ellipse*
- *Paths*
- *Point*
- *Polygon*
- *Polyline*
- *Push & Pop*
- *Rectangles*

Eric McConville did whole of the work alone ([#194](#)), huge thanks for his effort!

3.2 Installation

Wand itself can be installed from [PyPI](#) using `pip`:

```
$ pip install Wand
```

Wand is a Python binding of [ImageMagick](#), so you have to install it as well:

- [Debian/Ubuntu](#)
- [Fedora/CentOS](#)
- [Mac](#)
- [Windows](#)
- [Explicitly link to specific ImageMagick](#)

Note: Wand yet doesn't support ImageMagick 7 which has several incompatible APIs with previous versions. For more details, see the issue [#287](#).

Or you can simply install Wand and its entire dependencies using the package manager of your system (it's way convenient but the version might be outdated):

- [Debian/Ubuntu](#)
- [Fedora](#)
- [FreeBSD](#)

3.2.1 Install ImageMagick on Debian/Ubuntu

If you're using Linux distributions based on Debian like Ubuntu, it can be easily installed using APT:

```
$ sudo apt-get install libmagickwand-dev
```

If you need SVG, WMF, OpenEXR, DjVu, and Graphviz support you have to install `libmagickcore5-extra` as well:

```
$ sudo apt-get install libmagickcore5-extra
```

3.2.2 Install ImageMagick on Fedora/CentOS

If you're using Linux distributions based on Redhat like Fedora or CentOS, it can be installed using Yum:

```
$ yum update
$ yum install ImageMagick-devel
```

3.2.3 Install ImageMagick on Mac

You need one of [Homebrew](#) or [MacPorts](#) to install ImageMagick.

Homebrew

```
$ brew install imagemagick
```

If *seam carving* (`Image.liquid_rescale()`) is needed you have install `liblqr` as well:

```
$ brew install imagemagick --with-liblqr
```

MacPorts

```
$ sudo port install imagemagick
```

If your Python is not installed using MacPorts, you have to export `MAGICK_HOME` path as well. Because Python that is not installed using MacPorts doesn't look up `/opt/local`, the default path prefix of MacPorts packages.

```
$ export MAGICK_HOME=/opt/local
```

3.2.4 Install ImageMagick on Windows

You could build ImageMagick by yourself, but it requires a build tool chain like Visual Studio to compile it. The easiest way is simply downloading a prebuilt binary of ImageMagick for your architecture (win32 or win64).

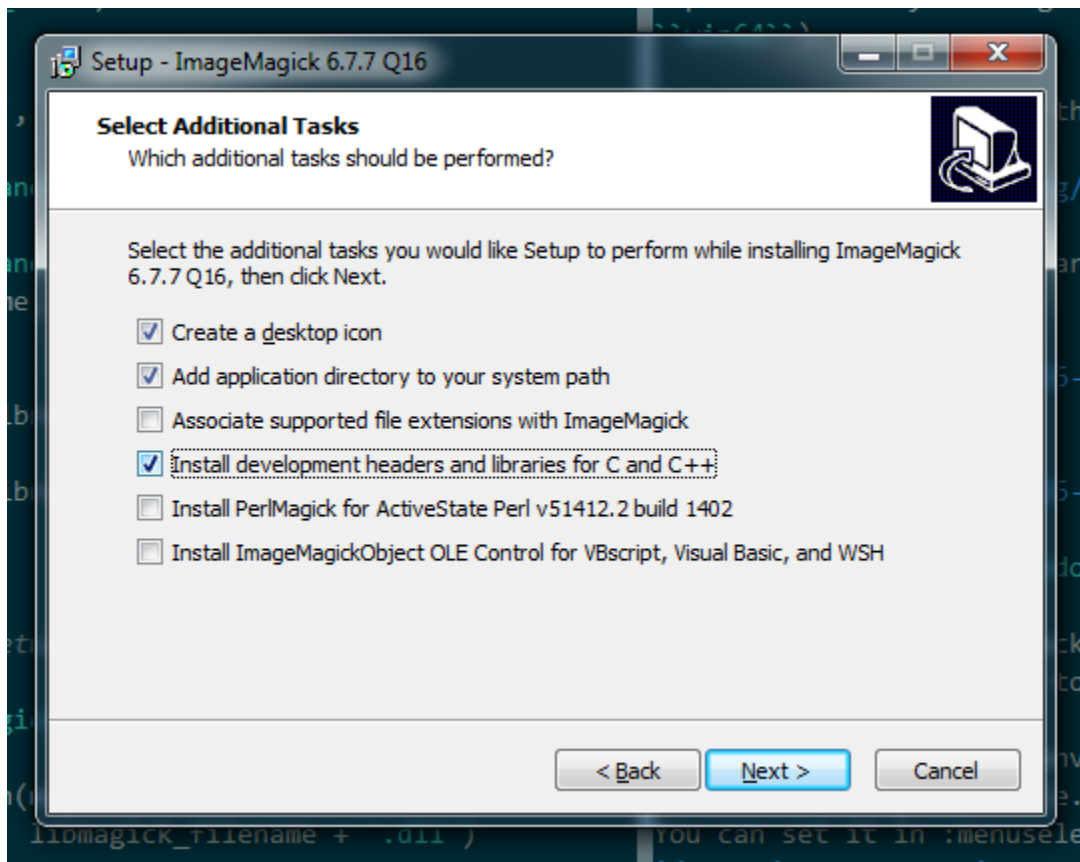
You can download it from the following link:

<http://legacy.imagemagick.org/script/binary-releases.php#windows>

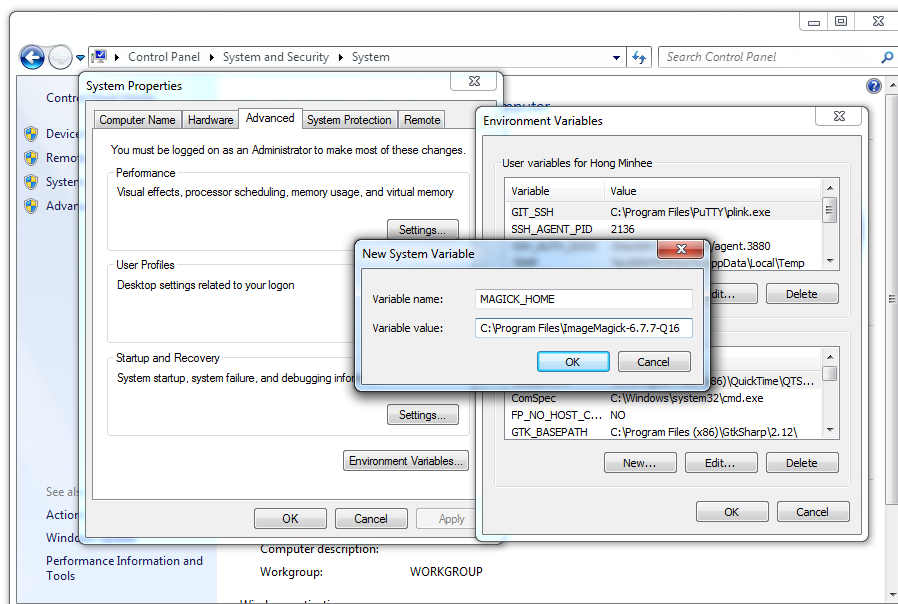
Choose a binary for your architecture:

Windows 32-bit ImageMagick-6.9.x-x-Q16-x86-dll.exe

Windows 64-bit ImageMagick-6.9.x-x-Q16-x64-dll.exe



Note that you have to check *Install development headers and libraries for C and C++* to make Wand able to link to it.



Lastly you have to set `MAGICK_HOME` environment variable to the path of ImageMagick (e.g. `C:\Program Files\ImageMagick-6.9.3-Q16`). You can set it in *Computer* → *Properties* → *Advanced system settings* → *Advanced* → *Environment Variables*...

3.2.5 Explicitly link to specific ImageMagick

Although Wand tries searching operating system's standard library paths for a ImageMagick installation, sometimes you need to explicitly specify the path of ImageMagick installation.

In that case, you can give the path to Wand by setting `MAGICK_HOME`. Wand respects `MAGICK_HOME`, the environment variable which has been reserved by ImageMagick.

3.2.6 Install Wand on Debian/Ubuntu

Wand itself is already packaged in Debian/Ubuntu APT repository: `python-wand`. You can install it using `apt-get` command:

```
$ sudo apt-get install python-wand
```

3.2.7 Install Wand on Fedora

Wand itself is already packaged in Fedora package DB: `python-wand`. You can install it using `dnf` command:

```
$ dnf install python-wand      # Python 2
$ dnf install python3-wand    # Python 3
```

3.2.8 Install Wand on FreeBSD

Wand itself is already packaged in FreeBSD ports collection: `py-wand`. You can install it using `pkg_add` command:

```
$ pkg_add -r py-wand
```

3.3 Reading images

There are several ways to open images:

- *To open an image file*
- *To read a input stream (file-like object) that provides an image binary*
- *To read a binary string that contains image*
- *To copy an existing image object*
- *To open an empty image*

All of these operations are provided by the constructor of `Image` class.

3.3.1 Open an image file

The most frequently used way is just to open an image by its filename. `Image`'s constructor can take the parameter named `filename`:

```
from __future__ import print_function
from wand.image import Image

with Image(filename='pikachu.png') as img:
    print('width =', img.width)
    print('height =', img.height)
```

Note: It must be passed by keyword argument exactly. Because the constructor has many parameters that are exclusive to each other.

There is a keyword argument named `file` as well, but don't confuse it with `filename`. While `filename` takes a string of a filename, `file` takes a input stream (file-like object).

3.3.2 Read a input stream

If an image to open cannot be located by a filename but can be read through input stream interface (e.g. opened by `os.popen()`, contained in `StringIO`, read by `urllib2.urlopen()`), it can be read by `Image` constructor's `file` parameter. It takes all file-like objects which implements `read()` method:

```
from __future__ import print_function
from urllib2 import urlopen
from wand.image import Image

response = urlopen('https://stylesha.re/minhee/29998/images/100x100')
try:
    with Image(file=response) as img:
        print('format =', img.format)
        print('size =', img.size)
finally:
    response.close()
```

In the above example code, `response` object returned by `urlopen()` function has `read()` method, so it also can be used as an input stream for a downloaded image.

3.3.3 Read a blob

If you have just a binary string (`str`) of the image, you can pass it into `Image` constructor's `blob` parameter to read:

```
from __future__ import print_function
from wand.image import Image

with open('pikachu.png') as f:
    image_binary = f.read()

with Image(blob=image_binary) as img:
    print('width =', img.width)
    print('height =', img.height)
```

It is a way of the lowest level to read an image. There will probably not be many cases to use it.

3.3.4 Clone an image

If you have an image already and have to copy it for safe manipulation, use `clone()` method:

```
from wand.image import Image

with Image(filename='pikachu.png') as original:
    with original.clone() as converted:
        converted.format = 'png'
        # operations on a converted image...
```

For some operations like format converting or cropping, there are safe methods that return a new image of manipulated result like `convert()` or slicing operator. So the above example code can be replaced by:

```
from wand.image import Image

with Image(filename='pikachu.png') as original:
    with original.convert('png') as converted:
        # operations on a converted image...
```

3.3.5 Hint file format

When it's read from a binary string or a file object, you can explicitly give the hint which indicates file format of an image to read — optional `format` keyword is for that:

```
from wand.image import Image

with Image(blob=image_binary, format='ico') as image:
    print(image.format)
```

New in version 0.2.1: The `format` parameter to `Image` constructor.

3.3.6 Open an empty image

To open an empty image, you have to set its width and height:

```
from wand.image import Image

with Image(width=200, height=100) as img:
    img.save(filename='200x100-transparent.png')
```

Its background color will be transparent by default. You can set `background` argument as well:

```
from wand.color import Color
from wand.image import Image

with Color('red') as bg:
    with Image(width=200, height=100, background=bg) as img:
        img.save(filename='200x100-red.png')
```

New in version 0.2.2: The `width`, `height`, and `background` parameters to `Image` constructor.

3.4 Writing images

You can write an *Image* object into a file or a byte string buffer (blob) as format what you want.

3.4.1 Convert images to JPEG

If you wonder what is image's format, use *format* property.

```
>>> image.format
'JPEG'
```

The *format* property is writable, so you can convert images by setting this property.

```
from wand.image import Image

with Image(filename='pikachu.png') as img:
    img.format = 'jpeg'
    # operations to a jpeg image...
```

If you want to convert an image without any changes of the original, use *convert()* method instead:

```
from wand.image import Image

with Image(filename='pikachu.png') as original:
    with original.convert('jpeg') as converted:
        # operations to a jpeg image...
    pass
```

Note: Support for some of the formats are delegated to libraries or external programs. To get a complete listing of which image formats are supported on your system, use **identify** command provided by ImageMagick:

```
$ identify -list format
```

3.4.2 Save to file

In order to save an image to a file, use *save()* method with the keyword argument *filename*:

```
from wand.image import Image

with Image(filename='pikachu.png') as img:
    img.format = 'jpeg'
    img.save(filename='pikachu.jpg')
```

Note: The image format does not effect the file being saved, to save with a given colorspace use:

```
from wand.image import Image

with Image(filename='pikachu.jpg') as img:
    img.format = 'jpeg'
    img.save(filename='PNG24:pikachu.png')
```

3.4.3 Save to stream

You can write an image into a output stream (file-like object which implements `write()` method) as well. The parameter `file` takes a such object (it also is the first positional parameter of `save()` method).

For example, the following code converts `pikachu.png` image into JPEG, gzips it, and then saves it to `pikachu.jpg.gz`:

```
import gzip
from wand.image import Image

gz = gzip.open('pikachu.jpg.gz')
with Image(filename='pikachu.png') as img:
    img.format = 'jpeg'
    img.save(file=gz)
gz.close()
```

3.4.4 Get binary string

Want just a binary string of the image? Use `make_blob()` method so:

```
from wand.image import Image

with Image(filename='pikachu.png') as img:
    img.format = 'jpeg'
    jpeg_bin = img.make_blob()
```

There's the optional `format` parameter as well. So the above example code can be simpler:

```
from wand.image import Image

with Image(filename='pikachu.png') as img:
    jpeg_bin = img.make_blob('jpeg')
```

3.5 Resizing and cropping

Creating thumbnails (by resizing images) and cropping are most frequent works about images. This guide explains ways to deal with sizes of images.

Above all, to get the current size of the image check `width` and `height` properties:

```
>>> from urllib.request import urlopen
>>> from wand.image import Image
>>> f = urlopen('http://pbs.twimg.com/profile_images/712673855341367296/WY6aLbBV_
↳normal.jpg')
>>> with Image(file=f) as img:
...     width = img.width
...     height = img.height
...
>>> f.close()
>>> width
48
>>> height
48
```

If you want the pair of (*width*, *height*), check *size* property also.

Note: These three properties are all readonly.

3.5.1 Resize images

It scales an image into a desired size even if the desired size is larger than the original size. ImageMagick provides so many algorithms for resizing. The constant `FILTER_TYPES` contains names of filtering algorithms.

See also:

ImageMagick Resize Filters Demonstrates the results of resampling three images using the various resize filters and blur settings available in ImageMagick, and the file size of the resulting thumbnail images.

`Image.resize()` method takes width and height of a desired size, optional filter ('undefined' by default which means IM will try to guess best one to use) and optional blur (default is 1). It returns nothing but resizes itself in-place.

```
>>> img.size
(500, 600)
>>> img.resize(50, 60)
>>> img.size
(50, 60)
```

3.5.2 Sample images

Although `Image.resize()` provides many filter options, it's relatively slow. If speed is important for the job, you'd better use `Image.sample()` instead. It works in similar way to `Image.resize()` except it doesn't provide filter and blur options:

```
>>> img.size
(500, 600)
>>> img.sample(50, 60)
>>> img.size
(50, 60)
```

3.5.3 Crop images

To extract a sub-rectangle from an image, use the `crop()` method. It crops the image in-place. Its parameters are left, top, right, bottom in order.

```
>>> img.size
(200, 300)
>>> img.crop(10, 20, 50, 100)
>>> img.size
(40, 80)
```

It can also take keyword arguments `width` and `height`. These parameters replace `right` and `bottom`.

```
>>> img.size
(200, 300)
>>> img.crop(10, 20, width=40, height=80)
```

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```
>>> img.size
(40, 80)
```

There is another way to crop images: slicing operator. You can crop an image by [left:right, top:bottom] with maintaining the original:

```
>>> img.size
(300, 300)
>>> with img[10:50, 20:100] as cropped:
...     print(cropped.size)
...
(40, 80)
>>> img.size
(300, 300)
```

Specifying gravity along with width and height keyword arguments allows a simplified cropping alternative.

```
>>> img.size
(300, 300)
>>> img.crop(width=40, height=80, gravity='center')
>>> img.size
(40, 80)
```

3.5.4 Transform images

Use this function to crop and resize an image at the same time, using ImageMagick geometry strings. Cropping is performed first, followed by resizing.

For example, if you want to crop your image to 300x300 pixels and then scale it by 2x for a final size of 600x600 pixels, you can call:

```
img.transform('300x300', '200%')
```

Other example calls:

```
# crop top left corner
img.transform('50%')

# scale height to 100px and preserve aspect ratio
img.transform(resize='x100')

# if larger than 640x480, fit within box, preserving aspect ratio
img.transform(resize='640x480>')

# crop a 320x320 square starting at 160x160 from the top left
img.transform(crop='320+160+160')
```

See also:





ImageMagick Geometry Specifications Cropping and resizing geometry for the `transform` method are specified according to ImageMagick's geometry string format. The ImageMagick documentation provides more information about geometry strings.

3.5.5 Seam carving (also known as *content-aware resizing*)

New in version 0.3.0.

Seam carving is an algorithm for image resizing that functions by establishing a number of *seams* (paths of least importance) in an image and automatically removes seams to reduce image size or inserts seams to extend it.

In short: you can magickally resize images without distortion! See the following examples:

Original	Resized
	
Cropped	Seam carving
	

You can easily rescale images with seam carving using Wand: use `Image.liquid_rescale()` method:

```
>>> image = Image(filename='seam.jpg')
>>> image.size
(320, 234)
>>> with image.clone() as resize:
```

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```
...     resize.resize(234, 234)
...     resize.save(filename='seam-resize.jpg')
...     resize.size
...
(234, 234)
>>> with image[:234, :] as crop:
...     crop.save(filename='seam-crop.jpg')
...     crop.size
...
(234, 234)
>>> with image.clone() as liquid:
...     liquid.liquid_rescale(234, 234)
...     liquid.save(filename='seam-liquid.jpg')
...     liquid.size
...
(234, 234)
```

Note: It may raise *MissingDelegateError* if your ImageMagick is configured `--without-lqr` option. In this case you should recompile ImageMagick.

See also:

Seam carving — **Wikipedia** The article which explains what seam carving is on Wikipedia.

Note: The image `seam.jpg` used in the above example is taken by [D. Sharon Pruitt](#) and licensed under [CC-BY-2.0](#). It can be found the [original photography from Flickr](#).

3.6 Transformation

Note: The image `transform.jpg` used in this docs is taken by [Megan Trace](#), and licensed under [CC BY-NC 2.0](#). It can be found the [original photography from Flickr](#).

3.6.1 Rotation

New in version 0.1.8.

Image object provides a simple method to rotate images: `rotate()`. It takes a degree which can be 0 to 359. (Actually you can pass 360, 361, or more but it will be the same to 0, 1, or more respectively.)

For example, where the given image `transform.jpg`:



The below code makes the image rotated 90° to right:

```
from wand.image import Image

with Image(filename='transform.jpg') as image:
    with image.clone() as rotated:
        rotated.rotate(90)
        rotated.save(filename='transform-rotated-90.jpg')
```

The generated image `transform-rotated-90.jpg` looks like:



If degree is not multiples of 90, the optional parameter background will help (its default is transparent):

```
from wand.color import Color
from wand.image import Image

with Image(filename='transform.jpg') as image:
    with image.clone() as rotated:
        rotated.rotate(135, background=Color('rgb(229,221,112)'))
        rotated.save(filename='transform-rotated-135.jpg')
```

The generated image `transform-rotated-135.jpg` looks like:



3.6.2 Flip and flop

New in version 0.3.0.

You can make a mirror image by reflecting the pixels around the central x- or y-axis. For example, where the given image `transform.jpg`:



The following code flips the image using `Image.flip()` method:

```
from wand.image import Image

with Image(filename='transform.jpg') as image:
    with image.clone() as flipped:
        flipped.flip()
        flipped.save(filename='transform-flipped.jpg')
```

The image `transform-flipped.jpg` generated by the above code looks like:



As like `flip()`, `flop()` does the same thing except it doesn't make a vertical mirror image but horizontal:

```
from wand.image import Image

with Image(filename='transform.jpg') as image:
    with image.clone() as flopped:
        flopped.flop()
```

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```
flopped.save(filename='transform-flopped.jpg')
```

The image `transform-flopped.jpg` generated by the above code looks like:



3.7 Drawing

New in version 0.3.0.

The `wand.drawing` module provides some basic drawing functions. `wand.drawing.Drawing` object buffers instructions for drawing shapes into images, and then it can draw these shapes into zero or more images.

It's also callable and takes an `Image` object:

```
from wand.drawing import Drawing
from wand.image import Image

with Drawing() as draw:
    # does something with ``draw`` object,
    # and then...
    with Image(filename='wandtests/assets/beach.jpg') as image:
        draw(image)
```

3.7.1 Arc

New in version 0.4.0.

Arcs can be drawn by using `arc()` method. You'll need to define three pairs of (x, y) coordinates. First & second pair of coordinates will be the minimum bounding rectangle, and the last pair define the starting & ending degree.

An example:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color
```

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```

with Drawing() as draw:
    draw.stroke_color = Color('black')
    draw.stroke_width = 2
    draw.fill_color = Color('white')
    draw.arc(( 25, 25), # Starting point
             ( 75, 75), # Ending point
             (135,-45)) # From bottom left around to top right
    with Image(width=100,
               height=100,
               background=Color('lightblue')) as img:
        draw.draw(img)
        img.save(filename='draw-arc.gif')

```

3.7.2 Bezier

New in version 0.4.0.

You can draw bezier curves using `bezier()` method. This method requires at least four points to determine a bezier curve. Given as a list of (x, y) coordinates. The first & last pair of coordinates are treated as start & end, and the second & third pair of coordinates act as controls.

For example:

```

from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_color = Color('black')
    draw.stroke_width = 2
    draw.fill_color = Color('white')
    points = [(10,50), # Start point
              (50,10), # First control
              (50,90), # Second control
              (90,50)] # End point
    draw.bezier(points)
    with Image(width=100,
               height=100,
               background=Color('lightblue')) as image:
        draw(image)

```

Control width & color of curve with the drawing properties:

- `stroke_color`
- `stroke_width`

3.7.3 Circle

New in version 0.4.0.

You can draw circles using `circle()` method. Circles are drawn by defining two pairs of (x, y) coordinates. First coordinate for the center “origin” point, and a second pair for the outer perimeter. For example, the following code draws a circle in the middle of the image:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_color = Color('black')
    draw.stroke_width = 2
    draw.fill_color = Color('white')
    draw.circle((50, 50), # Center point
               (25, 25)) # Perimeter point
    with Image(width=100, height=100, background=Color('lightblue')) as image:
        draw(image)
```

3.7.4 Color & Matte

New in version 0.4.0.

You can draw with colors directly on the coordinate system of an image. Define which color to set by setting `fill_color`. The behavior of `color()` is controlled by setting one of `PAINT_METHOD_TYPES` paint methods.

- 'point' alters a single pixel.
- 'replace' swaps on color for another. Threshold is influenced by fuzz.
- 'floodfill' fills area of a color influenced by fuzz.
- 'filltoborder' fills area of a color until border defined by `border_color`.
- 'reset' replaces the whole image to a single color.

Example fill all to green boarder:

```
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.border_color = Color('green')
    draw.fill_color = Color('blue')
    draw.color(15, 25, 'filltoborder')
```

The `matte()` method is identical to the `color()` method above, but alters the alpha channel of the color area selected. Colors can be manipulated, but not replaced.

```
with Drawing() as draw:
    draw.fill_color = None # or Color('none')
    draw.matte(15, 25, 'floodfill')
```

3.7.5 Composite

New in version 0.4.0.

Similar to `composite_channel()`, this `composite()` method will render a given image on top of the drawing subject image following the `COMPOSITE_OPERATORS` options. An compositing image must be given with a destination top, left, width, and height values.

```
from wand.image import Image, COMPOSITE_OPERATORS
from wand.drawing import Drawing
from wand.display import display

wizard = Image(filename='wizard:')
rose = Image(filename='rose:')

for o in COMPOSITE_OPERATORS:
    w = wizard.clone()
    r = rose.clone()
    with Drawing() as draw:
        draw.composite(operator=o, left=175, top=250,
                       width=r.width, height=r.height, image=r)

    draw(w)
    display(w)
```

3.7.6 Ellipse

New in version 0.4.0.

Ellipse can be drawn by using the `ellipse()` method. Like drawing circles, the ellipse requires a origin point, however, a pair of (x, y) radius are used in relationship to the origin coordinate. By default a complete “closed” ellipse is drawn. To draw a partial ellipse, provide a pair of starting & ending degrees as the third parameter.

An example of a full ellipse:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_color = Color('black')
    draw.stroke_width = 2
    draw.fill_color = Color('white')
    draw.ellipse((50, 50), # Origin (center) point
                 (40, 20)) # 80px wide, and 40px tall
    with Image(width=100, height=100, background=Color('lightblue')) as image:
        draw(image)
```

Same example as above, but with a half-partial ellipse defined by the third parameter:

```
draw.ellipse((50, 50), # Origin (center) point
             (40, 20), # 80px wide, and 40px tall
             (90, -90)) # Draw half of ellipse from bottom to top
```

3.7.7 Lines

You can draw lines using `line()` method. It simply takes two (x, y) coordinates for start and end of a line. For example, the following code draws a diagonal line into the image:

```
draw.line((0, 0), image.size)
draw(image)
```

Or you can turn this diagonal line upside down:

```
draw.line((0, image.height), (image.width, 0))
draw(image)
```

The line color is determined by `fill_color` property, and you can change this of course. The following code draws a red diagonal line into the image:

```
from wand.color import Color

with Color('red') as color:
    draw.fill_color = color
    draw.line((0, 0), image.size)
    draw(image)
```

3.7.8 Paths

New in version 0.4.0.

Paths can be drawn by using any collection of path functions between `path_start()` and `path_finish()` methods. The available path functions are:

- `path_close()` draws a path from last point to first.
- `path_curve()` draws a cubic bezier curve.
- `path_curve_to_quadratic_bezier()` draws a quadratic bezier curve.
- `path_elliptic_arc()` draws an elliptical arc.
- `path_horizontal_line()` draws a horizontal line.
- `path_line()` draws a line path.
- `path_move()` adjust current point without drawing.
- `path_vertical_line()` draws a vertical line.

Each path method expects a destination point, and will draw from the current point to the new point. The destination point will become the new current point for the next applied path method. Destination points are given in the form of (x, y) coordinates to the `to` parameter, and can be relative or absolute to the current point by setting the `relative` flag. The `path_curve()` and `path_curve_to_quadratic_bezier()` expect additional control points, and can complement previous drawn curves by setting a `smooth` flag. When the `smooth` flag is set to `True` the first control point is assumed to be the reflection of the last defined control point.

For example:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_width = 2
    draw.stroke_color = Color('black')
    draw.fill_color = Color('white')
    draw.path_start()
```

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```

# Start middle-left
draw.path_move(to=(10, 50))
# Curve accross top-left to center
draw.path_curve(to=(40, 0),
                controls=[(10, -40), (30,-40)],
                relative=True)
# Continue curve accross bottom-right
draw.path_curve(to=(40, 0),
                controls=(30, 40),
                smooth=True,
                relative=True)
# Line to top-right
draw.path_vertical_line(10)
# Diagonal line to bottom-left
draw.path_line(to=(10, 90))
# Close first & last points
draw.path_close()
draw.path_finish()
with Image(width=100, height=100, background=Color('lightblue')) as image:
    draw(image)

```

3.7.9 Point

New in version 0.4.0.

You can draw points by using `point()` method. It simply takes two x, y arguments for the point coordinate.

The following example will draw points following a math function across a given image:

```

from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color
import math

with Drawing() as draw:
    for x in xrange(0, 100):
        y = math.tan(x) * 4
        draw.point(x, y + 50)
    with Image(width=100, height=100, background=Color('lightblue')) as image:
        draw(image)

```

Color of the point can be defined by setting the following property

- `fill_color`

3.7.10 Polygon

New in version 0.4.0.

Complex shapes can be created with the `polygon()` method. You can draw a polygon by given this method a list of points. Stroke line will automatically close between first & last point.

For example, the following code will draw a triangle into the image:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_width = 2
    draw.stroke_color = Color('black')
    draw.fill_color = Color('white')
    points = [(25, 25), (75, 50), (25, 75)]
    draw.polygon(points)
    with Image(width=100, height=100, background=Color('lightblue')) as image:
        draw(image)
```

Control the fill & stroke with the following properties:

- *stroke_color*
- *stroke_dash_array*
- *stroke_dash_offset*
- *stroke_line_cap*
- *stroke_line_join*
- *stroke_miter_limit*
- *stroke_opacity*
- *stroke_width*
- *fill_color*
- *fill_opacity*
- *fill_rule*

3.7.11 Polyline

New in version 0.4.0.

Identical to *polygon()*, except *polyline()* will not close the stroke line between the first & last point.

For example, the following code will draw a two line path on the image:

```
from wand.image import Image
from wand.drawing import Drawing
from wand.color import Color

with Drawing() as draw:
    draw.stroke_width = 2
    draw.stroke_color = Color('black')
    draw.fill_color = Color('white')
    points = [(25, 25), (75, 50), (25, 75)]
    draw.polyline(points)
    with Image(width=100, height=100, background=Color('lightblue')) as image:
        draw(image)
```

Control the fill & stroke with the following properties:

- `stroke_color`
- `stroke_dash_array`
- `stroke_dash_offset`
- `stroke_line_cap`
- `stroke_line_join`
- `stroke_miter_limit`
- `stroke_opacity`
- `stroke_width`
- `fill_color`
- `fill_opacity`
- `fill_rule`

3.7.12 Push & Pop

New in version 0.4.0.

When working with complex vector graphics, you can use ImageMagick's internal graphic-context stack to manage different styles & operations. The methods `push()`, `push_clip_path()`, `push_defs()`, and `push_pattern()` are used to mark the beginning of a sub-routine. The clip path & pattern methods take a name based identifier argument, and can be referenced at a latter point with `clip_path`, or `set_fill_pattern_url()` / `set_stroke_pattern_url()` respectively. With stack management, `pop()` is used to mark the end of a sub-routine, and return the graphical context to its pervious state before `push()` was invoked. Methods `pop_clip_path()`, `pop_defs()`, and `pop_pattern()` exist to match there pop counterparts.

```
from wand.color import Color
from wand.image import Image
from wand.drawing import Drawing
from wand.compat import nested
from math import cos, pi, sin

with nested(Color('lightblue'),
            Color('transparent'),
            Drawing()) as (bg, fg, draw):
    draw.stroke_width = 3
    draw.fill_color = fg
    for degree in range(0, 360, 15):
        draw.push() # Grow stack
        draw.stroke_color = Color('hsl({0}%, 100%, 50%)'.format(degree * 100 / 360))
        t = degree / 180.0 * pi
        x = 35 * cos(t) + 50
        y = 35 * sin(t) + 50
        draw.line((50, 50), (x, y))
        draw.pop() # Restore stack
    with Image(width=100, height=100, background=Color('lightblue')) as img:
        draw(img)
```

3.7.13 Rectangles

New in version 0.3.6.

Changed in version 0.4.0.

If you want to draw rectangles use `rectangle()` method. It takes left/top coordinate, and right/bottom coordinate, or width and height. For example, the following code draws a square on the image:

```
draw.rectangle(left=10, top=10, right=40, bottom=40)
draw(image)
```

Or using width and height instead of right and bottom:

```
draw.rectangle(left=10, top=10, width=30, height=30)
draw(image)
```

Support for rounded corners was added in version 0.4.0. The `radius` argument sets corner rounding.

```
draw.rectangle(left=10, top=10, width=30, height=30, radius=5)
draw(image)
```

Both horizontal & vertical can be set independently with `xradius` & `yradius` respectively.

```
draw.rectangle(left=10, top=10, width=30, height=30, xradius=5, yradius=3)
draw(image)
```

Note that the stroke and the fill are determined by the following properties:

- `stroke_color`
- `stroke_dash_array`
- `stroke_dash_offset`
- `stroke_line_cap`
- `stroke_line_join`
- `stroke_miter_limit`
- `stroke_opacity`
- `stroke_width`
- `fill_color`
- `fill_opacity`
- `fill_rule`

3.7.14 Texts

Drawing object can write texts as well using its `text()` method. It takes x and y coordinates to be drawn and a string to write:

```
draw.font = 'wandtests/assets/League_Gothic.otf'
draw.font_size = 40
draw.text(image.width / 2, image.height / 2, 'Hello, world!')
draw(image)
```

As the above code shows you can adjust several settings before writing texts:

- `font`
- `font_family`
- `font_resolution`
- `font_size`
- `font_stretch`
- `font_style`
- `font_weight`
- `gravity`
- `text_alignment`
- `text_antialias`
- `text_decoration`
- `text_direction`
- `text_interline_spacing`
- `text_interword_spacing`
- `text_kerning`
- `text_under_color`

3.8 Colorspace

3.8.1 Image types

Every *Image* object has *type* property which identifies its colorspace. The value can be one of *IMAGE_TYPES* enumeration, and set of its available values depends on its *format* as well. For example, 'grayscale' isn't available on JPEG.

```
>>> from wand.image import Image
>>> with Image(filename='wandtests/assets/bilevel.gif') as img:
...     img.type
...
'bilevel'
>>> with Image(filename='wandtests/assets/sasha.jpg') as img2:
...     img2.type
...
'truecolor'
```

You can change this value:

```
with Image(filename='wandtests/assets/bilevel.gif') as img:
    img.type = 'truecolor'
    img.save(filename='truecolor.gif')
```

See also:

-type — **ImageMagick: command-line-Options** Corresponding command-line option of **convert** program.

3.8.2 Enable alpha channel

You can find whether an image has alpha channel and change it to have or not to have the alpha channel using `alpha_channel` property, which is preserving a `bool` value.

```
>>> with Image(filename='wandtests/assets/sasha.jpg') as img:
...     img.alpha_channel
...
False
>>> with Image(filename='wandtests/assets/croptest.png') as img:
...     img.alpha_channel
...
True
```

It's a writable property:

```
with Image(filename='wandtests/assets/sasha.jpg') as img:
    img.alpha_channel = True
```

3.9 Color Enhancement

3.9.1 Evaluate Expression

New in version 0.4.1.

Pixel channels can be manipulated by applying a arithmetic, relational, or logical expression. See [EVALUATE_OPS](#) for a list of valid operations.

For example, when given image `enhancement.jpg`:



We can reduce the amount of data in the blue channel by applying the right-shift binary operator, and increase data in the right channel with left-shift operator:

```
from wand.image import Image

with Image(filename='enhancement.jpg') as img:
    # B >> 1
    img.evaluate(operator='rightshift', value=1, channel='blue')
    # R << 1
    img.evaluate(operator='leftshift', value=1, channel='red')
```



3.9.2 Function Expression

New in version 0.4.1.

Similar to `evaluate()`, `function()` applies a multi-argument function to pixel channels. See [FUNCTION_TYPES](#) for a list of available function formulas.

For example, when given image `enhancement.jpg`:



We can apply a **Sinusoid** function with the following:

```
from wand.image import Image

with Image(filename='enhancement.jpg') as img:
    frequency = 3
    phase_shift = -90
    amplitude = 0.2
    bias = 0.7
    img.function('sinusoid', [frequency, phase_shift, amplitude, bias])
```



3.9.3 FX Expressions

New in version 0.4.1.

FX special effects are a powerful “micro” language to work with. Simple functions & operators offer a unique way to access & manipulate image data. The `fx()` method applies a FX expression, and generates a new *Image* instance.

For example, when given image `enhancement.jpg`:



We can create a custom DIY filter that will turn the image black & white, except colors with a hue between 195° & 252°:

```
from wand.image import Image

fx_filter='(hue > 0.55 && hue < 0.7) ? u : lightness'

with Image(filename='enhancement.jpg') as img:
    with img.fx(fx_filter) as filtered_img:
        filtered_img.save(filename='enhancement-fx.jpg')
```



3.9.4 Gamma

New in version 0.4.1.

Gamma correction allows you to adjust the luminance of an image. Resulting pixels are defined as $\text{pixel}^{(1/\text{gamma})}$. The value of `gamma` is typically between 0.8 & 2.3 range, and value of 1.0 will not affect the resulting image.

The `level()` method can also adjust gamma value.

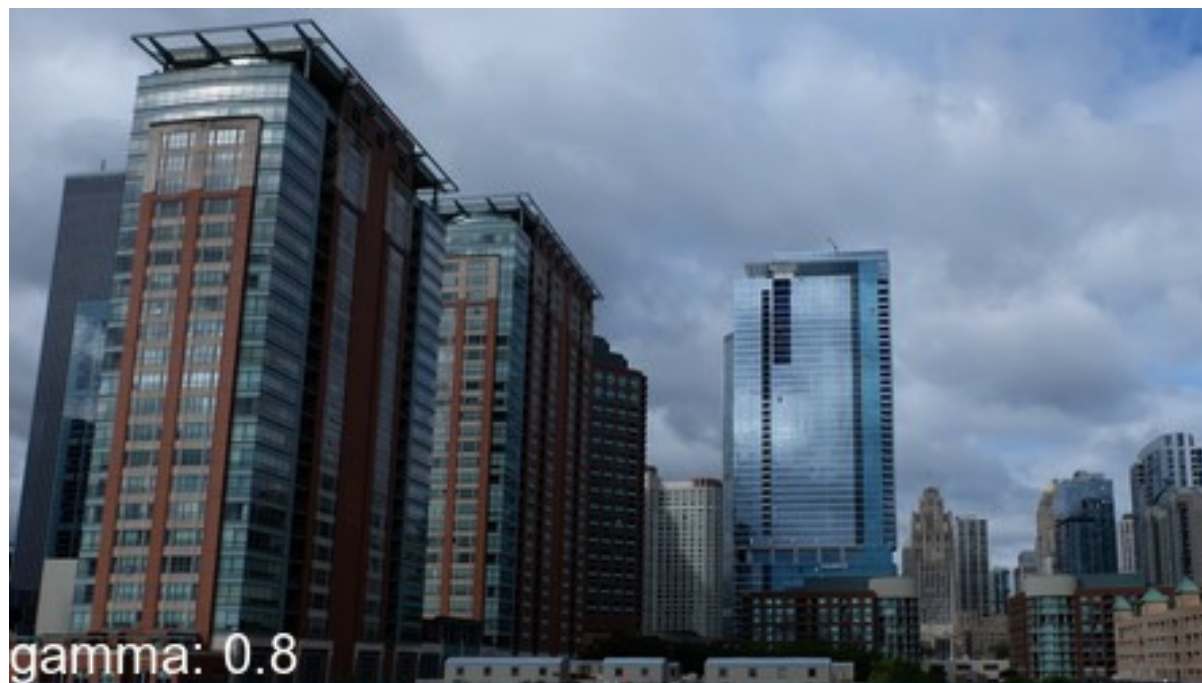
For example, when given image `enhancement.jpg`:



We can step through 4 pre-configured gamma correction values with the following:

```
from wand.image import Image

with Image(filename='enhancement.jpg') as img_src:
    for Y in [0.8, 0.9, 1.33, 1.66]:
        with Image(img_src) as img_cpy:
            img_cpy.gamma(Y)
```

3.9.5 Level

New in version 0.4.1.

Black & white boundaries of an image can be controlled with `level()` method. Similar to the `gamma()` method, mid-point levels can be adjusted with the `gamma` keyword argument.

The `black` and `white` point arguments are expecting values between 0.0 & 1.0 which represent percentages.

For example, when given image `enhancement.jpg`:



We can adjust the level range between 20% & 90% with slight mid-range increase:

```
from wand.image import Image

with Image(filename='enhancement.jpg') as img:
    img.level(0.2, 0.9, gamma=1.1)
    img.save(filename='enhancement-level.jpg')
```



3.10 Reading EXIF

New in version 0.3.0.

Image.metadata contains metadata of the image including EXIF. These are prefixed by 'exif:' e.g. 'exif:ExifVersion', 'exif:Flash'.

Here's a straightforward example to access EXIF of an image:

```
exif = {}
with Image(filename='wandtests/assets/beach.jpg') as image:
    exif.update((k[5:], v) for k, v in image.metadata.items()
                if k.startswith('exif:'))
```

Note: You can't write into *Image.metadata*.

3.11 Sequence

Note: The image `sequence-animation.gif` used in this docs has been released into the public domain by its author, [C6541](#) at [Wikipedia](#) project. This applies worldwide. ([Source](#))

New in version 0.3.0.

Some images may actually consist of two or more images. For example, animated *image/gif* images consist of multiple frames. Some *image/ico* images have different sizes of icons.

For example, the above image `sequence-animation.gif` consists of the following frames (actually it has 60 frames, but we sample only few frames to show here):

3.11.1 `sequence` is a Sequence

If we *open* this image, `Image` object has `sequence`. It's a list-like object that maintain its all frames.

For example, `len()` for this returns the number of frames:

```
>>> from wand.image import Image
>>> with Image(filename='sequence-animation.gif') as image:
...     len(image.sequence)
...
60
```

You can get an item by index from `sequence`:

```
>>> with Image(filename='sequence-animation.gif') as image:
...     image.sequence[0]
...
<wand.sequence.SingleImage: ed84c1b (256x256)>
```

Or slice it:

```
>>> with Image(filename='sequence-animation.gif') as image:
...     image.sequence[5:10]
...
[<wand.sequence.SingleImage: 0f49491 (256x256)>,
 <wand.sequence.SingleImage: 8eba0a5 (256x256)>,
 <wand.sequence.SingleImage: 98c10fa (256x256)>,
 <wand.sequence.SingleImage: b893194 (256x256)>,
 <wand.sequence.SingleImage: 181ce21 (256x256)>]
```

3.11.2 `Image` versus `SingleImage`

Note that each item of `sequence` is a `SingleImage` instance, not `Image`.

`Image` is a container that directly represents *image files* like `sequence-animation.gif`, and `SingleImage` is a single image that represents *frames* in animations or *sizes* in *image/ico* files.

They both inherit `BaseImage`, the common abstract class. They share the most of available operations and properties like `resize()` and `size`, but some are not. For example, `save()` and `mimetype` are only provided by `Image`. `delay` and `index` are only available for `SingleImage`.

In most cases, images don't have multiple images, so it's okay if you think that `Image` and `SingleImage` are the same, but be careful when you deal with animated *image/gif* files or *image/ico* files that contain multiple icons.

3.12 Resource management

See also:

wand.resource — Global resource management There is the global resource to manage in MagickWand API. This module implements automatic global resource management through reference counting.

Objects Wand provides are resources to be managed. It has to be closed (destroyed) after using like file or database connection. You can deal with it using `with` very easily and explicitly:

```
with Image(filename='') as img:
    # deal with img...
```

Or you can call its `destroy()` (or `close()` if it is an `Image` instance) method manually:

```
try:
    img = Image(filename='')
    # deal with img...
finally:
    img.destroy()
```

Note: It also implements the destructor that invokes `destroy()`, and if your program runs on CPython (which does reference counting instead of ordinary garbage collection) most of resources are automatically deallocated.

However it's just depending on CPython's implementation detail of memory management, so it's not a good idea. If your program runs on PyPy (which implements garbage collector) for example, invocation time of destructors is not determined, so the program would be broken.

3.13 Running tests

Wand has unit tests and regression tests. It can be run using `setup.py` script:

```
$ python setup.py test
```

It uses `pytest` as its testing library. The above command will automatically install `pytest` as well if it's not installed yet.

Or you can manually install `pytest` and then use `py.test` command. It provides more options:

```
$ pip install pytest
$ py.test
```

3.13.1 Skipping tests

There are some time-consuming tests. You can skip these tests using `--skip-slow` option:

```
$ py.test --skip-slow
```

You can run only tests you want using `-k` option.

```
$ py.test -k image
```

3.13.2 Using tox

Wand should be compatible with various Python implementations including CPython 2.6, 2.7, PyPy. `tox` is a testing software that helps Python packages to test on various Python implementations at a time.

It can be installed using `pip`:


```
$ pip install tox
```

If you type just **tox** at Wand directory it will be tested on multiple Python interpreters:

```
$ tox
GLOB sdist-make: /Users/emconville/Desktop/wand/setup.py
py26 create: /Users/emconville/Desktop/wand/.tox/py26
py26 installdeps: pytest
py26 sdist-inst: /Users/emconville/Desktop/wand/.tox/dist/Wand-0.2.2.zip
py26 runtests: commands[0]
...
```

You can use a double `--` to pass options to pytest:

```
$ tox -- -k sequence
```

3.13.3 Continuous Integration

Travis CI automatically builds and tests every commit and pull request. The above banner image shows the current status of Wand build. You can see the detail of the current status from the following URL:

<https://travis-ci.org/emconville/wand>

3.13.4 Code Coverage

Coveralls support tracking Wand's test coverage. The above banner image shows the current status of Wand coverage. You can see the details of the current status from the following URL:

<https://coveralls.io/r/emconville/wand>

3.14 Roadmap

3.14.1 Version 0.5

Image layers (#22) Wand 0.5 will be able to deal with layers of an image.

Its branch name will be `layer`.

3.14.2 Very future versions

CFFI Wand 0.5 will move to CFFI from ctypes.

PIL compatibility layer PIL has very long history and the most of Python projects still depend on it. We will work on PIL compatibility layer using Wand. It will provide two ways to emulate PIL:

- Module-level compatibility which can be used by changing `import`:

```
try:
    from wand.pilcompat import Image
except ImportError:
    from PIL import Image
```

- Global monkeypatcher which changes `sys.modules`:

```
from wand.pilcompat.monkey import patch; patch()
import PIL.Image # it imports wand.pilcompat.Image module
```

CLI (covert command) to Wand compiler (#100) Primary interface of ImageMagick is **convert** command. It provides a small *parameter language*, and many answers on the Web contain code using this. The problem is that you can't simply copy-and-paste these code to utilize Wand.

This feature is to make these CLI codes possible to be used with Wand.

Supporting `__array_interface__()` for NumPy (#65) It makes `numpy.asarray()` able to take *Image* object to deal with its pixels as matrix.

Its branch name will be `numpy`.

3.15 Wand Changelog

3.15.1 0.4 series

Version 0.4.5

To be released.

- Improve library searching when `MAGICK_HOME` environment variable is set. [#320 by Chase Anderson]
- Fixed misleading *TypeError: object of type 'NoneType' has no len()* during destroy routines. [#346 by Carey Metcalfe]
- Added `Image.blur()` method (`MagickBlurImage()`). [#311 by Alexander Karpinsky]
- Added `Image.extent()` method (`MagickExtentImage()`). [#233 by Jae-Myoung Yu]
- Added `Image.resample()` method (`MagickResampleImage()`). [#244 by Zio Tibia]

Version 0.4.4

Released on October 22, 2016.

- Added `BaseError`, `BaseWarning`, and `BaseFatalError`, base classes for domains. [#292]
- Fixed `TypeError` during parsing version caused by format change of ImageMagick version string (introduced by 6.9.6.2). [#310, Debian bug report #841548]
- Properly fixed again memory-leak when accessing images constructed in `Image.sequence[]`. It had still leaked memory in the case an image is not closed using `with` but manual `wand.resource.Resource.destroy()/wand.image.Image.close()` method call. [#237]

Version 0.4.3

Released on June 1, 2016.

- Fixed `repr()` for empty *Image* objects. [#265]
- Added `Image.compare()` method (`MagickCompareImages()`). [#238, #268 by Gyusun Yeom]
- Added `Image.page` and related properties for virtual canvas handling. [#284 by Dan Harrison]
- Added `Image.merge_layers()` method (`MagickMergeImageLayers()`). [#281 by Dan Harrison]

- Fixed `OSError` during import `libc.dylib` due to El Capitan's SIP protection. [#275 by Ramesh Dharan]

Version 0.4.2

Released on November 30, 2015.

- Fixed `ImportError` on MSYS2. [#257 by Eon Jeong]
- Added `Image.quantize()` method (`MagickQuantizeImage()`). [#152 by Kang Hyojun, #262 by Jeong YunWon]
- Added `Image.transform_colorspace()` `quantize` (`MagickTransformImageColorspace()`). [#152 by Adrian Jung, #262 by Jeong YunWon]
- Now ImageMagick DLL can be loaded on Windows even if its location is stored in the registry. [#261 by Roeland Schoukens]
- Added `depth` parameter to `Image` constructor. The `depth`, `width` and `height` parameters can be used with the `filename`, `file` and `blob` parameters to load raw pixel data. [#261 by Roeland Schoukens]

Version 0.4.1

Released on August 3, 2015.

- Added `Image.auto_orient()` that fixes orientation by checking EXIF tags.
- Added `Image.transverse()` method (`MagickTransverseImage()`).
- Added `Image.transpose()` method (`MagickTransposeImage()`).
- Added `Image.evaluate()` method.
- Added `Image.frame()` method.
- Added `Image.function()` method.
- Added `Image.fx()` expression method.
- Added gravity options in `Image.crop()` method. [#222 by Eric McConville]
- Added `Image.matte_color` property.
- Added `Image.virtual_pixel` property.
- Added `Image.distort()` method.
- Added `Image.contrast_stretch()` method.
- Added `Image.gamma()` method.
- Added `Image.linear_stretch()` method.
- Additional support for `Image.alpha_channel`.
- Additional query functions have been added to `wand.version` API. [#120]
 - Added `configure_options()` function.
 - Added `fonts()` function.
 - Added `formats()` function.
- Additional IPython support. [#117]
 - Render RGB `Color` preview.

- Display each frame in image *Sequence*.
- Fixed memory-leak when accessing images constructed in `Image.sequence()`. [#237 by Eric McConville]
- Fixed Windows memory-deallocate errors on `wand.drawing` API. [#226 by Eric McConville]
- Fixed `ImportError` on FreeBSD. [#252 by Pellaeon Lin]

Version 0.4.0

Released on February 20, 2015.

See also:

What's new in Wand 0.4? This guide introduces what's new in Wand 0.4.

- Complete `wand.drawing` API. The whole work was done by Eric McConville. Huge thanks for his effort! [#194 by Eric McConville]
 - Added `Drawing.arc()` method (*Arc*).
 - Added `Drawing.bezier()` method (*Bezier*).
 - Added `Drawing.circle()` method (*Circle*).
 - *Color & Matte*
 - * Added `wand.drawing.PAINT_METHOD_TYPES` constant.
 - * Added `Drawing.color()` method.
 - * Added `Drawing.matte()` method.
 - Added `Drawing.composite()` method (*Composite*).
 - Added `Drawing.ellipse()` method (*Ellipse*).
 - *Paths*
 - * Added `path_start()` method.
 - * Added `path_finish()` method.
 - * Added `path_close()` method.
 - * Added `path_curve()` method.
 - * Added `path_curve_to_quadratic_bezier()` method.
 - * Added `path_elliptic_arc()` method.
 - * Added `path_horizontal_line()` method.
 - * Added `path_line()` method.
 - * Added `path_move()` method.
 - * Added `path_vertical_line()` method.
 - Added `Drawing.point()` method (*Point*).
 - Added `Drawing.polygon()` method (*Polygon*).
 - Added `Drawing.polyline()` method (*Polyline*).
 - *Push & Pop*
 - * Added `push()` method.

- * Added `push_clip_path()` method.
- * Added `push_defs()` method.
- * Added `push_pattern()` method.
- * Added `clip_path` property.
- * Added `set_fill_pattern_url()` method.
- * Added `set_stroke_pattern_url()` method.
- * Added `pop()` method.
- Added `Drawing.rectangle()` method (*Rectangles*).
- Added `stroke_dash_array` property.
- Added `stroke_dash_offset` property.
- Added `stroke_line_cap` property.
- Added `stroke_line_join` property.
- Added `stroke_miter_limit` property.
- Added `stroke_opacity` property.
- Added `stroke_width` property.
- Added `fill_opacity` property.
- Added `fill_rule` property.
- Error message of `MissingDelegateError` raised by `Image.liquid_rescale()` became nicer.

3.15.2 0.3 series

Version 0.3.9

Released on December 20, 2014.

- Added 'pdf:use-cropbox' option to `Image.options` dictionary (and `OPTIONS` constant). [#185 by Christoph Neuroth]
- Fixed a bug that exception message was `bytes` instead of `str` on Python 3.
- The `size` parameter of `Font` class becomes optional. Its default value is 0, which means *autosized*. [#191 by Cha, Hojeong]
- Fixed a bug that `Image.read()` had tried using `MagickReadImageFile()` even when the given file object has no `mode` attribute. [#205 by Stephen J. Fuhry]

Version 0.3.8

Released on August 3, 2014.

- Fixed a bug that transparent background becomes filled with white when SVG is converted to other bitmap image format like PNG. [#184]
- Added `Image.negate()` method. [#174 by Park Joon-Kyu]
- Fixed a segmentation fault on `Image.modulate()` method. [#173 by Ted Fung, #158]
- Added suggestion to install freetype also if Homebrew is used. [#141]

- Now `image/x-gif` also is determined as animation. [#181 by Juan-Pablo Scaletti]

Version 0.3.7

Released on March 25, 2014.

- A hotfix of debug prints made at 0.3.6.

Version 0.3.6

Released on March 23, 2014.

- Added `Drawing.rectangle()` method. *Now you can draw rectangles.* [#159]
- Added `Image.compression` property. [#171]
- Added `contextlib.nested()` function to `wand.compat` module.
- Fixed `UnicodeEncodeError` when `Drawing.text()` method gives Unicode text argument in Python 2. [#163]
- Now it now allows to use Wand when Python is invoked with the `-OO` flag. [#169 by Samuel Maudo]

Version 0.3.5

Released on September 13, 2013.

- Fix segmentation fault on `Image.save()` method. [#150]

Version 0.3.4

Released on September 9, 2013.

- Added `Image.modulate()` method. [#134 by Dan P. Smith]
- Added `Image.colorspace` property. [#135 by Volodymyr Kuznetsov]
- Added `Image.unsharp_mask()` method. [#136 by Volodymyr Kuznetsov]
- Added 'jpeg:sampling-factor' option to `Image.options` dictionary (and `OPTIONS` constant). [#137 by Volodymyr Kuznetsov]
- Fixed ImageMagick shared library resolution on Arch Linux. [#139, #140 by Sergey Tereschenko]
- Added `Image.sample()` method. [#142 by Michael Allen]
- Fixed a bug that `Image.save()` preserves only one frame of the given animation when file-like object is passed. [#143, #145 by Michael Allen]
- Fixed searching of ImageMagick shared library with HDR support enabled. [#148, #149 by Lipin Dmitriy]

Version 0.3.3

Released on August 4, 2013. It's author's birthday.

- Added `Image.gaussian_blur()` method.
- Added `Drawing.stroke_color` property. [#129 by Zeray Rice]

- Added `Drawing.stroke_width` property. [#130 by Zeray Rice]
- Fixed a memory leak of `Color` class. [#127 by Wieland Morgenstern]
- Fixed a bug that `Image.save()` to stream truncates data. [#128 by Michael Allen]
- Fixed broken `display()` on Python 3. [#126]

Version 0.3.2

Released on July 11, 2013.

- Fixed incorrect encoding of filenames. [#122]
- Fixed key type of `Image.metadata` dictionary to `str` from `bytes` in Python 3.
- Fixed CentOS compatibility [#116, #124 by Pierre Vanliefland]
 - Made `DrawSetTextInterlineSpacing()` and `DrawGetTextInterlineSpacing()` optional.
 - Added exception in drawing API when trying to use `DrawSetTextInterlineSpacing()` and `DrawGetTextInterlineSpacing()` functions when they are not available.
 - Added `WandLibraryVersionError` class for library versions issues.

Version 0.3.1

Released on June 23, 2013.

- Fixed `ImportError` on Windows.

Version 0.3.0

Released on June 17, 2013.

See also:

whatsnew/0.3 This guide introduces what's new in Wand 0.3.

- Now also works on Python 2.6, 2.7, and 3.2 or higher.
- Added `wand.drawing` module. [#64 by Adrian Jung]
- Added `Drawing.get_font_metrics()` method. [#69, #71 by Cha, Hojeong]
- Added `Image.caption()` method. [#74 by Cha, Hojeong]
- Added optional `color` parameter to `Image.trim()` method.
- Added `Image.border()` method. [2496d37f75d75e9425f95dde07033217dc8afefc by Jae-Myoung Yu]
- Added resolution parameter to `Image.read()` method and the constructor of `Image`. [#75 by Andrey Antukh]
- Added `Image.liquid_rescale()` method which does *seam carving*. See also *Seam carving (also known as content-aware resizing)*.
- Added `Image.metadata` immutable mapping attribute and `Metadata` mapping type for it. [#56 by Michael Elovsikh]
- Added `Image.channel_images` immutable mapping attribute and `ChannelImageDict` mapping for it.

- Added `Image.channel_depths` immutable mapping attribute and `ChannelDepthDict` mapping for it.
- Added `Image.composite_channel()` method.
- Added `Image.read()` method. [#58 by Piotr Florczyk]
- Added `Image.resolution` property. [#58 by Piotr Florczyk]
- Added `Image.blank()` method. [#60 by Piotr Florczyk]
- Fixed several memory leaks. [#62 by Mitch Lindgren]
- Added `ImageProperty` mixin class to maintain a weak reference to the parent image.
- Renamed `wand.image.COMPOSITE_OPS` to `COMPOSITE_OPERATORS`.
- Now it shows helpful error message when ImageMagick library cannot be found.
- Added IPython-specialized formatter.
- Added `QUANTUM_DEPTH` constant.
- Added these properties to `Color` class:
 - `red_quantum`
 - `green_quantum`
 - `blue_quantum`
 - `alpha_quantum`
 - `red_int8`
 - `green_int8`
 - `blue_int8`
 - `alpha_int8`
- Added `Image.normalize()` method. [#95 by Michael Curry]
- Added `Image.transparent_color()` method. [#98 by Lionel Koenig]
- Started supporting resizing and cropping of GIF images. [#88 by Bear Dong, #112 by Taeho Kim]
- Added `Image.flip()` method.
- Added `Image.flop()` method.
- Added `Image.orientation` property. [88574468a38015669dae903185fb328abdd717c0 by Taeho Kim]
- `wand.resource.DestroyedResourceError` becomes a subtype of `wand.exceptions.WandException`.
- `Color` is now hashable, so can be used as a key of dictionaries, or an element of sets. [#114 by klutzy]
- `Color` has `normalized_string` property.
- `Image` has `histogram` dictionary.
- Added optional fuzz parameter to `Image.trim()` method. [#113 by Evaldo Junior]

3.15.3 0.2 series

Version 0.2.4

Released on May 28, 2013.

- Fix `NameError` in `Resource.resource` setter. [#89 forwarded from Debian bug report #699064 by Jakub Wilk]
- Fix the problem of library loading for Mac with Homebrew and Arch Linux. [#102 by Roel Gerrits, #44]

Version 0.2.3

Released on January 25, 2013.

- Fixed a bug that `Image.transparentize()` method (and `Image.watermark()` method which internally uses it) didn't work.
- Fixed segmentation fault occurred when `Color.red`, `Color.green`, or `Color.blue` is accessed.
- Added `Color.alpha` property.
- Fixed a bug that format converting using `Image.format` property or `Image.convert()` method doesn't correctly work to save blob.

Version 0.2.2

Released on September 24, 2012.

- A compatibility fix for FreeBSD. [Patch by Olivier Duchateau]
- Now `Image` can be instantiated without any opening. Instead, it can take width/height and background. [#53 by Michael Elovskikh]
- Added `Image.transform()` method which is a convenience method accepting geometry strings to perform cropping and resizing. [#50 by Mitch Lindgren]
- Added `Image.units` property. [#45 by Piotr Florczyk]
- Now `Image.resize()` method raises a proper error when it fails for any reason. [#41 by Piotr Florczyk]
- Added `Image.type` property. [#33 by Yauhen Yakimovich, #42 by Piotr Florczyk]

Version 0.2.1

Released on August 19, 2012. Beta version.

- Added `Image.trim()` method. [#26 by Jökull Sólberg Auðunsson]
- Added `Image.depth` property. [#31 by Piotr Florczyk]
- Now `Image` can take an optional format hint. [#32 by Michael Elovskikh]
- Added `Image.alpha_channel` property. [#35 by Piotr Florczyk]
- The default value of `Image.resize()`'s `filter` option has changed from `'triangle'` to `'undefined'`. [#37 by Piotr Florczyk]
- Added version data of the linked ImageMagick library into `wand.version` module:
 - `MAGICK_VERSION` (`GetMagickVersion()`)
 - `MAGICK_VERSION_INFO` (`GetMagickVersion()`)
 - `MAGICK_VERSION_NUMBER` (`GetMagickVersion()`)
 - `MAGICK_RELEASE_DATE` (`GetMagickReleaseDate()`)
 - `MAGICK_RELEASE_DATE_STRING` (`GetMagickReleaseDate()`)

Version 0.2.0

Released on June 20, 2012. Alpha version.

- Added `Image.transparentize()` method. [#19 by Jeremy Axmacher]
- Added `Image.composite()` method. [#19 by Jeremy Axmacher]
- Added `Image.watermark()` method. [#19 by Jeremy Axmacher]
- Added `Image.quantum_range` property. [#19 by Jeremy Axmacher]
- Added `Image.reset_coords()` method and `reset_coords` option to `Image.rotate()` method. [#20 by Juan Pablo Scaletti]
- Added `Image.strip()` method. [#23 by Dmitry Vukolov]
- Added `Image.compression_quality` property. [#23 by Dmitry Vukolov]
- Now the current version can be found from the command line interface: `python -m wand.version`.

3.15.4 0.1 series

Version 0.1.10

Released on May 8, 2012. Still alpha version.

- So many Windows compatibility issues are fixed. [#14 by John Simon]
- Added `wand.api.libmagick`.
- Fixed a bug that raises `AttributeError` when it's trying to warn. [#16 by Tim Dettrick]
- Now it throws `ImportError` instead of `AttributeError` when the shared library fails to load. [#17 by Kieran Spear]
- Fixed the example usage on index page of the documentation. [#18 by Jeremy Axmacher]

Version 0.1.9

Released on December 23, 2011. Still alpha version.

- Now `wand.version.VERSION_INFO` becomes `tuple` and `wand.version.VERSION` becomes a string.
- Added `Image.background_color` property.
- Added `==` operator for `Image` type.
- Added `hash()` support of `Image` type.
- Added `Image.signature` property.
- Added `wand.display` module.
- Changed the theme of Sphinx documentation.
- Changed the start example of the documentation.

Version 0.1.8

Released on December 2, 2011. Still alpha version.

- Wrote some guide documentations: *Reading images*, *Writing images* and *Resizing and cropping*.
- Added `Image.rotate()` method for in-place rotation.
- Made `Image.crop()` to raise proper `ValueError` instead of `IndexError` for invalid width/height arguments.
- Changed the type of `Image.resize()` method's `blur` parameter from `numbers.Rational` to `numbers.Real`.
- Fixed a bug of raising `ValueError` when invalid `filter` has passed to `Image.resize()` method.

Version 0.1.7

Released on November 10, 2011. Still alpha version.

- Added `Image.mimetype` property.
- Added `Image.crop()` method for in-place crop.

Version 0.1.6

Released on October 31, 2011. Still alpha version.

- Removed a side effect of `Image.make_blob()` method that changes the image format silently.
- Added `Image.format` property.
- Added `Image.convert()` method.
- Fixed a bug about Python 2.6 compatibility.
- Use the internal representation of `PixelWand` instead of the string representation for `Color` type.

Version 0.1.5

Released on October 28, 2011. Slightly mature alpha version.

- Now `Image` can read Python file objects by `file` keyword argument.
- Now `Image.save()` method can write into Python file objects by `file` keyword argument.
- `Image.make_blob()`'s `format` argument becomes omissible.

Version 0.1.4

Released on October 27, 2011. Hotfix of the malformed Python package.

Version 0.1.3

Released on October 27, 2011. Slightly mature alpha version.

- Pixel getter for `Image`.
- Row getter for `Image`.

- Mac compatibility.
- Windows compatibility.
- 64-bit processor compatibility.

Version 0.1.2

Released on October 16, 2011. Still alpha version.

- *Image* implements iterable interface.
- Added *wand.color* module.
- Added the abstract base class of all Wand resource objects: *wand.resource.Resource*.
- *Image* implements slicing.
- Cropping *Image* using its slicing operator.

Version 0.1.1

Released on October 4, 2011. Still alpha version.

- Now it handles errors and warnings properly and in natural way of Python.
- Added *Image.make_blob()* method.
- Added *blob* parameter into *Image* constructor.
- Added *Image.resize()* method.
- Added *Image.save()* method.
- Added *Image.clone()* method.
- Drawed the pretty logo picture (thanks to Hyojin Choi).

Version 0.1.0

Released on October 1, 2011. Very alpha version.

3.16 Talks and Presentations

3.16.1 Talks in 2012

- Lightning talk at Python Korea November 2012

4.1 wand — Simple MagickWand API binding for Python

4.1.1 wand.image — Image objects

Opens and manipulates images. Image objects can be used in `with` statement, and these resources will be automatically managed (even if any error happened):

```
with Image(filename='pikachu.png') as i:
    print('width =', i.width)
    print('height =', i.height)
```

`wand.image.ALPHA_CHANNEL_TYPES = ('undefined', 'activate', 'background', 'copy', 'deactivate', 'extract', 'opaque', 'reset', 'set', 'shape', 'transparent', 'flatten')` The list of alpha channel types

- 'undefined'
- 'activate'
- 'background'
- 'copy'
- 'deactivate'
- 'extract'
- 'opaque'
- 'reset'
- 'set'
- 'shape'
- 'transparent'
- 'flatten'

- 'remove'

See also:

ImageMagick Image Channel Describes the SetImageAlphaChannel method which can be used to modify alpha channel. Also describes AlphaChannelType

wand.image.CHANNELS = {'all_channels': 134217727, 'alpha': 8, 'black': 32, 'blue': 4, 'cyan': 4, 'green': 4, 'gray': 4, 'index': 4, 'magenta': 4, 'red': 4, 'sync_channels': 4, 'undefined': 4, 'yellow': 4} (dict) The dictionary of channel types.

- 'undefined'
- 'red'
- 'gray'
- 'cyan'
- 'green'
- 'magenta'
- 'blue'
- 'yellow'
- 'alpha'
- 'opacity'
- 'black'
- 'index'
- 'composite_channels'
- 'all_channels'
- 'true_alpha'
- 'rgb_channels'
- 'gray_channels'
- 'sync_channels'
- 'default_channels'

See also:

ImageMagick Color Channels Lists the various channel types with descriptions of each

wand.image.COLORSPACE_TYPES = ('undefined', 'rgb', 'gray', 'transparent', 'ohta', 'lab', 'xyz') (tuple) The list of colorspaces.

- 'undefined'
- 'rgb'
- 'gray'
- 'transparent'
- 'ohta'
- 'lab'
- 'xyz'

- 'ycbcr'
- 'ycc'
- 'yiq'
- 'ypbpr'
- 'yuv'
- 'cmyk'
- 'srgb'
- 'hsb'
- 'hsl'
- 'hwb'
- 'rec601luma'
- 'rec601ycbcr'
- 'rec709luma'
- 'rec709ycbcr'
- 'log'
- 'cmy'
- 'luv'
- 'hcl'
- 'lch'
- 'lms'
- 'lchab'
- 'lchuv'
- 'scrgb'
- 'hsi'
- 'hsv'
- 'hclp'
- 'ydbdr'

See also:

ImageMagick Color Management Describes the ImageMagick color management operations

New in version 0.3.4.

`wand.image.COMPARE_METRICS = ('undefined', 'absolute', 'mean_absolute', 'mean_error_per_pixel')` The list of compare metric types

- 'undefined'
- 'absolute'
- 'mean_absolute'
- 'mean_error_per_pixel'

- 'mean_squared'
- 'normalized_cross_correlation'
- 'peak_absolute'
- 'peak_signal_to_noise_ratio'
- 'perceptual_hash'
- 'root_mean_square'

See also:

[ImageMagick Compare Operations](#)

New in version 0.4.3.

`wand.image.COMPOSITE_OPERATORS = ('undefined', 'no', 'add', 'atop', 'blend', 'bumpmap', 'clear')`
(tuple) The list of composition operators

- 'undefined'
- 'no'
- 'add'
- 'atop'
- 'blend'
- 'bumpmap'
- 'change_mask'
- 'clear'
- 'color_burn'
- 'color_dodge'
- 'colorize'
- 'copy_black'
- 'copy_blue'
- 'copy'
- 'copy_cyan'
- 'copy_green'
- 'copy_magenta'
- 'copy_opacity'
- 'copy_red'
- 'copy_yellow'
- 'darken'
- 'dst_atop'
- 'dst'
- 'dst_in'
- 'dst_out'

- 'dst_over'
- 'difference'
- 'displace'
- 'dissolve'
- 'exclusion'
- 'hard_light'
- 'hue'
- 'in'
- 'lighten'
- 'linear_light'
- 'luminize'
- 'minus'
- 'modulate'
- 'multiply'
- 'out'
- 'over'
- 'overlay'
- 'plus'
- 'replace'
- 'saturate'
- 'screen'
- 'soft_light'
- 'src_atop'
- 'src'
- 'src_in'
- 'src_out'
- 'src_over'
- 'subtract'
- 'threshold'
- 'xor'
- 'divide'

Changed in version 0.3.0: Renamed from `COMPOSITE_OPS` to `COMPOSITE_OPERATORS`.

See also:

Compositing Images **ImageMagick v6 Examples** Image composition is the technique of combining images that have, or do not have, transparency or an alpha channel. This is usually performed using the IM **composite** command. It may also be performed as either part of a larger sequence of operations or internally by other image operators.

ImageMagick Composition Operators Demonstrates the results of applying the various composition composition operators.

`wand.image.COMPRESSION_TYPES = ('undefined', 'b44a', 'b44', 'bzip', 'dxt1', 'dxt3', 'dxt5',`
(tuple) The list of *Image.compression* types.

New in version 0.3.6.

`wand.image.EVALUATE_OPS = ('undefined', 'add', 'and', 'divide', 'leftshift', 'max', 'min',`
(tuple) The list of evaluation operators

- 'undefined'
- 'add'
- 'and'
- 'divide'
- 'leftshift'
- 'max'
- 'min'
- 'multiply'
- 'or'
- 'rightshift'
- 'set'
- 'subtract'
- 'xor'
- 'pow'
- 'log'
- 'threshold'
- 'thresholdblack'
- 'thresholdwhite'
- 'gaussiannoise'
- 'impulsenoise'
- 'laplaciannoise'
- 'multiplicativenoise'
- 'poissonnoise'
- 'uniformnoise'
- 'cosine'
- 'sine'
- 'addmodulus'
- 'mean'
- 'abs'
- 'exponential'

- 'median'
- 'sum'

See also:

ImageMagick Image Evaluation Operators Describes the `MagickEvaluateImageChannel` method and lists the various evaluations operators

`wand.image.FILTER_TYPES = ('undefined', 'point', 'box', 'triangle', 'hermite', 'hanning',
(tuple) The list of filter types.`

- 'undefined'
- 'point'
- 'box'
- 'triangle'
- 'hermite'
- 'hanning'
- 'hamming'
- 'blackman'
- 'gaussian'
- 'quadratic'
- 'cubic'
- 'catrom'
- 'mitchell'
- 'jinc'
- 'sinc'
- 'sincfast'
- 'kaiser'
- 'welsh'
- 'parzen'
- 'bohman'
- 'bartlett'
- 'lagrange'
- 'lanczos'
- 'lanczossharp'
- 'lanczos2'
- 'lanczos2sharp'
- 'robidoux'
- 'robidouxsharp'
- 'cosine'

- 'spline'
- 'sentinel'

See also:

ImageMagick Resize Filters Demonstrates the results of resampling images using the various resize filters and blur settings available in ImageMagick.

`wand.image.GRAVITY_TYPES = ('forget', 'north_west', 'north', 'north_east', 'west', 'center')`
(tuple) The list of *gravity* types.

New in version 0.3.0.

`wand.image.IMAGE_TYPES = ('undefined', 'bilevel', 'grayscale', 'grayscalematte', 'palette', 'palettematte', 'truecolor', 'truecolormatte', 'colorseparation', 'colorseparationmatte', 'optimize', 'palettebilevelmatte')`
(tuple) The list of image types

- 'undefined'
- 'bilevel'
- 'grayscale'
- 'grayscalematte'
- 'palette'
- 'palettematte'
- 'truecolor'
- 'truecolormatte'
- 'colorseparation'
- 'colorseparationmatte'
- 'optimize'
- 'palettebilevelmatte'

See also:

ImageMagick Image Types Describes the `MagickSetImageType` method which can be used to set the type of an image

`wand.image.ORIENTATION_TYPES = ('undefined', 'top_left', 'top_right', 'bottom_right', 'bottom_left')`
(tuple) The list of *orientation* types.

New in version 0.3.0.

`wand.image.UNIT_TYPES = ('undefined', 'pixelsperinch', 'pixelspercentimeter')`
(tuple) The list of resolution unit types.

- 'undefined'
- 'pixelsperinch'
- 'pixelspercentimeter'

See also:

ImageMagick Image Units Describes the `MagickSetImageUnits` method which can be used to set image units of resolution

`wand.image.FUNCTION_TYPES = ('undefined', 'polynomial', 'sinusoid', 'arcsin', 'arctan')`
 (tuple) The list of `Image`.function types.

- 'undefined'
- 'polynomial'
- 'sinusoid'
- 'arcsin'
- 'arctan'

class `wand.image.BaseImage(wand)`

The abstract base of `Image` (container) and `SingleImage`. That means the most of operations, defined in this abstract classs, are possible for both `Image` and `SingleImage`.

New in version 0.3.0.

alpha_channel

(bool) Get state of image alpha channel. It can also be used to enable/disable alpha channel, but with different behavior new, copied, or existing.

Behavior of setting `alpha_channel` is defined with the following values:

- **'activate', 'on', or True will enable an images** alpha channel. Existing alpha data is preserved.
- **'deactivate', 'off', or False will disable an images** alpha channel. Any data on the alpha will be preserved.
- **'associate' & 'disassociate' toggle alpha channel flag in** certain image-file specifications.
- **'set'** enables and resets any data in an images alpha channel.
- **'opaque'** enables alpha/matte channel, and forces full opaque image.
- **'transparent'** enables alpha/matte channel, and forces full transparent image.
- **'extract'** copies data in alpha channel across all other channels, and disables alpha channel.
- **'copy'** calculates the gray-scale of RGB channels, and applies it to alpha channel.
- **'shape'** is identical to **'copy'**, but will color the resulting image with the value defined with `background_color`.
- **'remove'** will composite `background_color` value.
- **'background'** replaces full-transparent color with background color.

New in version 0.2.1.

Changed in version 0.4.1: Support for additional setting values. However `Image.alpha_channel` will continue to return `bool` if the current alpha/matte state is enabled.

animation

(bool) Whether the image is animation or not. It doesn't only mean that the image has two or more images (frames), but all frames are even the same size. It's about image format, not content. It's `False` even if `image/ico` consits of two or more images of the same size.

For example, it's `False` for `image/jpeg`, `image/gif`, `image/ico`.

If `image/gif` has two or more frames, it's `True`. If `image/gif` has only one frame, it's `False`.

New in version 0.3.0.

Changed in version 0.3.8: Became to accept *image/x-gif* as well.

background_color

(*wand.color.Color*) The image background color. It can also be set to change the background color.

New in version 0.1.9.

blur (*args, **kwargs)

Blurs the image. We convolve the image with a gaussian operator of the given *radius* and standard deviation (*sigma*). For reasonable results, the *radius* should be larger than *sigma*. Use a *radius* of 0 and *blur()* selects a suitable *radius* for you.

Parameters

- **radius** (*numbers.Real*) – the radius of the, in pixels, not counting the center pixel
- **sigma** (*numbers.Real*) – the standard deviation of the, in pixels

New in version 0.4.5.

caption (*args, **kwargs)

Writes a caption *text* into the position.

Parameters

- **text** (*basestring*) – text to write
- **left** (*numbers.Integral*) – x offset in pixels
- **top** (*numbers.Integral*) – y offset in pixels
- **width** (*numbers.Integral*) – width of caption in pixels. default is *width* of the image
- **height** (*numbers.Integral*) – height of caption in pixels. default is *height* of the image
- **font** (*wand.font.Font*) – font to use. default is *font* of the image
- **gravity** (*basestring*) – text placement gravity. uses the current *gravity* setting of the image by default

New in version 0.3.0.

clone ()

Clones the image. It is equivalent to call *Image* with *image* parameter.

```
with img.clone() as cloned:
    # manipulate the cloned image
    pass
```

Returns the cloned new image

Return type *Image*

New in version 0.1.1.

colorspace

(*basestring*) The image colorspace.

Defines image colorspace as in *COLORSPACE_TYPES* enumeration.

It may raise *ValueError* when the colorspace is unknown.

New in version 0.3.4.

```
compare (image, metric='undefined')
```

Compares an image to a reconstructed image.

Parameters

- **image** (*wand.image.Image*) – The reference image
- **metric** (basestring) – The metric type to use for comparing.

Returns The difference image (`wand.image.Image`), the computed distortion between the images (`numbers.Integral`)

Return type `tuple`

```
..versionadded:: 0.4.3
```

composite (**args, **kwargs*)

Places the supplied `image` over the current image, with the top left corner of `image` at coordinates `left`, `top` of the current image. The dimensions of the current image are not changed.

Parameters

- **image** (*wand.image.Image*) – the image placed over the current image
- **left** (*numbers.Integral*) – the x-coordinate where *image* will be placed
- **top** (*numbers.Integral*) – the y-coordinate where *image* will be placed

New in version 0.2.0.

```
composite_channel(*args, **kwargs)
```

Composite two images using the particular channel.

Parameters

- **channel** – the channel type. available values can be found in the [CHANNELS](#) mapping
- **image** (*Image*) – the composited source image. (the receiver image becomes the destination)
- **operator** – the operator that affects how the composite is applied to the image. available values can be found in the [COMPOSITE_OPERATORS](#) list
- **left** (*numbers.Integral*) – the column offset of the composited source image
- **top** (*numbers.Integral*) – the row offset of the composited source image

Raises `ValueError` – when the given channel or operator is invalid

New in version 0.3.0.

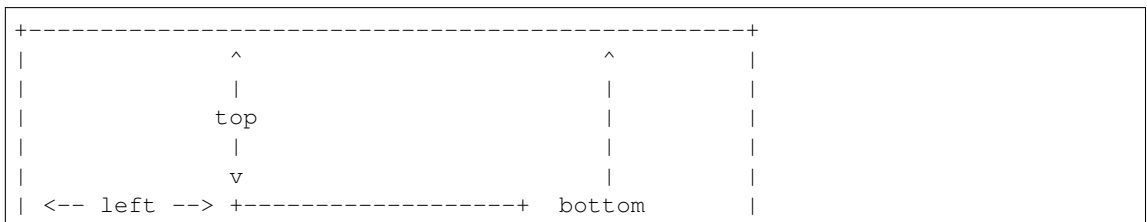
```
compression_quality
```

(numbers.Integer) Compression quality of this image.

New in version 0.2.0.

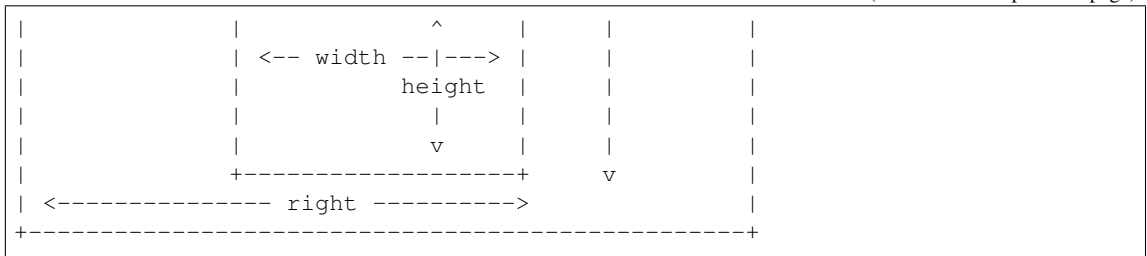
crop (*args, **kwargs)

Crops the image in-place.



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**Parameters**

- **left** (`numbers.Integral`) – x-offset of the cropped image. default is 0
- **top** (`numbers.Integral`) – y-offset of the cropped image. default is 0
- **right** (`numbers.Integral`) – second x-offset of the cropped image. default is the `width` of the image. this parameter and `width` parameter are exclusive each other
- **bottom** (`numbers.Integral`) – second y-offset of the cropped image. default is the `height` of the image. this parameter and `height` parameter are exclusive each other
- **width** (`numbers.Integral`) – the `width` of the cropped image. default is the `width` of the image. this parameter and `right` parameter are exclusive each other
- **height** (`numbers.Integral`) – the `height` of the cropped image. default is the `height` of the image. this parameter and `bottom` parameter are exclusive each other
- **reset_coords** (`bool`) – optional flag. If set, after the rotation, the coordinate frame will be relocated to the upper-left corner of the new image. By default is `True`.
- **gravity** (`GRAVITY_TYPES`) – optional flag. If set, will calculate the `top` and `left` attributes. This requires both `width` and `height` parameters to be included.

Raises **ValueError** – when one or more arguments are invalid

Note: If you want to crop the image but not in-place, use slicing operator.

Changed in version 0.4.1: Added `gravity` option. Using `gravity` along with `width` & `height` to auto-adjust `left` & `top` attributes.

Changed in version 0.1.8: Made to raise `ValueError` instead of `IndexError` for invalid `width/height` arguments.

New in version 0.1.7.

depth

(`numbers.Integral`) The depth of this image.

New in version 0.2.1.

dirty = None

(`bool`) Whether the image is changed or not.

distort (`*args, **kwargs`)

Distorts an image using various distorting methods.

Parameters

- **method** (`basestring`) – Distortion method name from `DISTORTION_METHODS`

- **arguments** (`collections.Sequence`) – List of distorting float arguments unique to distortion method
- **best_fit** (`bool`) – Attempt to resize resulting image fit distortion. Defaults False

New in version 0.4.1.

equalize (**args, **kwargs*)
Equalizes the image histogram

New in version 0.3.10.

evaluate (**args, **kwargs*)
Apply arithmetic, relational, or logical expression to an image.

Percent values must be calculated against the quantum range of the image:

```
fifty_percent = img.quantum_range * 0.5
img.evaluate(operator='set', value=fifty_percent)
```

Parameters

- **operator** (`EVALUATE_OPS`) – Type of operation to calculate
- **value** (`numbers.Real`) – Number to calculate with operator
- **channel** (`CHANNELS`) – Optional channel to apply operation on.

Raises

- **TypeError** – When `value` is not numeric.
- **ValueError** – When `operator`, or `channel` are not defined in constants.

New in version 0.4.1.

extent (**args, **kwargs*)
extends the image as defined by the geometry, gravity, and wand background color. Set the (x,y) offset of the geometry to move the original wand relative to the extended wand.

Parameters

- **width** (`numbers.Integral`) – the *width* of the extended image. default is the *width* of the image.
- **height** (`numbers.Integral`) – the *height* of the extended image. default is the *height* of the image.
- **x** (`numbers.Integral`) – the x offset of the extended image. default is 0
- **y** (`numbers.Integral`) – the y offset of the extended image. default is 0

New in version 0.4.5.

flip (**args, **kwargs*)
Creates a vertical mirror image by reflecting the pixels around the central x-axis. It manipulates the image in place.

New in version 0.3.0.

flop (**args, **kwargs*)
Creates a horizontal mirror image by reflecting the pixels around the central y-axis. It manipulates the image in place.

New in version 0.3.0.

font

(*wand.font.Font*) The current font options.

font_path

(*basestring*) The path of the current font. It also can be set.

font_size

(*numbers.Real*) The font size. It also can be set.

frame (*args, **kwargs)

Creates a bordered frame around image. Inner & outer bevel can simulate a 3D effect.

Parameters

- **matte** (*wand.color.Color*) – color of the frame
- **width** (*numbers.Integral*) – total size of frame on x-axis
- **height** (*numbers.Integral*) – total size of frame on y-axis
- **inner_bevel** (*numbers.Real*) – inset shadow length
- **outer_bevel** (*numbers.Real*) – outset highlight length

New in version 0.4.1.

function (*args, **kwargs)

Apply an arithmetic, relational, or logical expression to an image.

Defaults entire image, but can isolate affects to single color channel by passing *CHANNELS* value to channel parameter.

Note: Support for function methods added in the following versions of ImageMagick.

- 'polynomial' >= 6.4.8-8
 - 'sinusoid' >= 6.4.8-8
 - 'arcsin' >= 6.5.3-1
 - 'arctan' >= 6.5.3-1
-

Parameters

- **function** (*basestring*) – a string listed in *FUNCTION_TYPES*
- **arguments** (*collections.Sequence*) – a sequence of doubles to apply against function
- **channel** (*basestring*) – optional *CHANNELS*, defaults all

Raises

- **ValueError** – when a function, or channel is not defined in there respected constant
- **TypeError** – if arguments is not a sequence

New in version 0.4.1.

fx (*args, **kwargs)

Manipulate each pixel of an image by given expression.

FX will preserve current wand instance, and return a new instance of *Image* containing affected pixels.

Defaults entire image, but can isolate affects to single color channel by passing `CHANNELS` value to `channel` parameter.

See also:

The anatomy of FX expressions can be found at <http://www.imagemagick.org/script/fx.php>

Parameters

- **expression** (basestring) – The entire FX expression to apply
- **channel** (`CHANNELS`) – Optional channel to target.

Returns A new instance of an image with expression applied

Return type `Image`

New in version 0.4.1.

gaussian_blur (*args, **kwargs)

Blurs the image. We convolve the image with a gaussian operator of the given radius and standard deviation (sigma). For reasonable results, the radius should be larger than sigma. Use a radius of 0 and `blur()` selects a suitable radius for you.

Parameters

- **radius** (`numbers.Real`) – the radius of the, in pixels, not counting the center pixel
- **sigma** (`numbers.Real`) – the standard deviation of the, in pixels

New in version 0.3.3.

gravity

(basestring) The text placement gravity used when annotating with text. It's a string from `GRAVITY_TYPES` list. It also can be set.

height

(`numbers.Integral`) The height of this image.

histogram

(`HistogramDict`) The mapping that represents the histogram. Keys are `Color` objects, and values are the number of pixels.

New in version 0.3.0.

liquid_rescale (*args, **kwargs)

Rescales the image with `seam carving`, also known as image retargeting, content-aware resizing, or liquid rescaling.

Parameters

- **width** (`numbers.Integral`) – the width in the scaled image
- **height** (`numbers.Integral`) – the height in the scaled image
- **delta_x** (`numbers.Real`) – maximum seam transversal step. 0 means straight seams. default is 0
- **rigidity** (`numbers.Real`) – introduce a bias for non-straight seams. default is 0

Raises `wand.exceptions.MissingDelegateError` – when ImageMagick isn't configured `--with-lqr` option.

Note: This feature requires ImageMagick to be configured `--with-lqr` option. Or it will raise `MissingDelegateError`:

See also:

Seam carving — Wikipedia The article which explains what seam carving is on Wikipedia.

matte_color

(`wand.color.Color`) The color value of the matte channel. This can also be set.

..versionadded:: 0.4.1

merge_layers (*args, **kwargs)

Composes all the image layers from the current given image onward to produce a single image of the merged layers.

The initial canvas's size depends on the given `ImageLayerMethod`, and is initialized using the first images background color. The images are then composited onto that image in sequence using the given composition that has been assigned to each individual image. The method must be set with a value from `IMAGE_LAYER_METHOD` that is acceptable to this operation. (See ImageMagick documentation for more details.)

Parameters `method` (basestring) – the method of selecting the size of the initial canvas.

New in version 0.4.3.

modulate (*args, **kwargs)

Changes the brightness, saturation and hue of an image. We modulate the image with the given brightness, saturation and hue.

Parameters

- **brightness** (`numbers.Real`) – percentage of brightness
- **saturation** (`numbers.Real`) – percentage of saturation
- **hue** (`numbers.Real`) – percentage of hue rotation

Raises `ValueError` – when one or more arguments are invalid

New in version 0.3.4.

negate (grayscale=False, channel=None)

Negate the colors in the reference image.

Parameters

- **grayscale** (`bool`) – if set, only negate grayscale pixels in the image.
- **channel** (basestring) – the channel type. available values can be found in the `CHANNELS` mapping. If `None`, negate all channels.

New in version 0.3.8.

options = None

(`OptionDict`) The mapping of internal option settings.

New in version 0.3.0.

Changed in version 0.3.4: Added 'jpeg:sampling-factor' option.

Changed in version 0.3.9: Added 'pdf:use-cropbox' option.

orientation

(`basestring`) The image orientation. It's a string from `ORIENTATION_TYPES` list. It also can be set.
New in version 0.3.0.

page

The dimensions and offset of this Wand's page as a 4-tuple: (`width`, `height`, `x`, `y`).

Note that since it is based on the virtual canvas, it may not equal the dimensions of an image. See the ImageMagick documentation on the virtual canvas for more information.

New in version 0.4.3.

page_height

(`numbers.Integral`) The height of the page for this wand.

New in version 0.4.3.

page_width

(`numbers.Integral`) The width of the page for this wand.

New in version 0.4.3.

page_x

(`numbers.Integral`) The X-offset of the page for this wand.

New in version 0.4.3.

page_y

(`numbers.Integral`) The Y-offset of the page for this wand.

New in version 0.4.3.

quantize (**args, **kwargs*)

quantize analyzes the colors within a sequence of images and chooses a fixed number of colors to represent the image. The goal of the algorithm is to minimize the color difference between the input and output image while minimizing the processing time.

Parameters

- **number_colors** (`numbers.Integral`) – the number of colors.
- **colorspace_type** (`basestring`) – `colorspace_type`. available value can be found in the `COLORSPACE_TYPES`
- **treedepth** (`numbers.Integral`) – normally, this integer value is zero or one. a zero or one tells *quantize()* to choose a optimal tree depth of $\log_4(\text{number_colors})$. a tree of this depth generally allows the best representation of the reference image with the least amount of memory and the fastest computational speed. in some cases, such as an image with low color dispersion (a few number of colors), a value other than $\log_4(\text{number_colors})$ is required. to expand the color tree completely, use a value of 8
- **dither** (`bool`) – a value other than zero distributes the difference between an original image and the corresponding color reduced algorithm to neighboring pixels along a Hilbert curve
- **measure_error** (`bool`) – a value other than zero measures the difference between the original and quantized images. this difference is the total quantization error. The error is computed by summing over all pixels in an image the distance squared in RGB space between each reference pixel value and its quantized value

New in version 0.4.2.

quantum_range

(`int`) The maximum value of a color channel that is supported by the imagemagick library.

New in version 0.2.0.

resample (*args, **kwargs)

Adjust the number of pixels in an image so that when displayed at the given Resolution or Density the image will still look the same size in real world terms.

Parameters

- **x_res** (`numbers.Real`) – the X resolution (density) in the scaled image. default is the original resolution.
- **y_res** (`numbers.Real`) – the Y resolution (density) in the scaled image. default is the original resolution.
- **filter** (basestring, `numbers.Integral`) – a filter type to use for resizing. choose one in `FILTER_TYPES`. default is 'undefined' which means IM will try to guess best one to use.
- **blur** (`numbers.Real`) – the blur factor where > 1 is blurry, < 1 is sharp. default is 1

New in version 0.4.5.

reset_coords ()

Reset the coordinate frame of the image so to the upper-left corner is (0, 0) again (crop and rotate operations change it).

New in version 0.2.0.

resize (*args, **kwargs)

Resizes the image.

Parameters

- **width** (`numbers.Integral`) – the width in the scaled image. default is the original width
- **height** (`numbers.Integral`) – the height in the scaled image. default is the original height
- **filter** (basestring, `numbers.Integral`) – a filter type to use for resizing. choose one in `FILTER_TYPES`. default is 'undefined' which means IM will try to guess best one to use
- **blur** (`numbers.Real`) – the blur factor where > 1 is blurry, < 1 is sharp. default is 1

Changed in version 0.2.1: The default value of filter has changed from 'triangle' to 'undefined' instead.

Changed in version 0.1.8: The blur parameter changed to take `numbers.Real` instead of `numbers.Rational`.

New in version 0.1.1.

resolution

(`tuple`) Resolution of this image.

New in version 0.3.0.

rotate (*args, **kwargs)

Rotates the image right. It takes a background color for degree that isn't a multiple of 90.

Parameters

- **degree** (`numbers.Real`) – a degree to rotate. multiples of 360 affect nothing
- **background** (`wand.color.Color`) – an optional background color. default is transparent
- **reset_coords** (`bool`) – optional flag. If set, after the rotation, the coordinate frame will be relocated to the upper-left corner of the new image. By default is *True*.

New in version 0.2.0: The `reset_coords` parameter.

New in version 0.1.8.

sample (`*args, **kwargs`)

Resizes the image by sampling the pixels. It's basically quicker than `resize()` except less quality as a tradeoff.

Parameters

- **width** (`numbers.Integral`) – the width in the scaled image. default is the original width
- **height** (`numbers.Integral`) – the height in the scaled image. default is the original height

New in version 0.3.4.

sequence = None

(`collections.Sequence`) The list of *SingleImages* that the image contains.

New in version 0.3.0.

signature

(`str`) The SHA-256 message digest for the image pixel stream.

New in version 0.1.9.

size

(`tuple`) The pair of (*width*, *height*).

threshold (`*args, **kwargs`)

Changes the value of individual pixels based on the intensity of each pixel compared to threshold. The result is a high-contrast, two color image. It manipulates the image in place.

Parameters

- **threshold** (`numbers.Real`) – threshold as a factor of quantum
- **channel** (`basestring`) – the channel type. available values can be found in the *CHANNELS* mapping. If None, threshold all channels.

New in version 0.3.10.

transform (`*args, **kwargs`)

Transforms the image using `MagickTransformImage()`, which is a convenience function accepting geometry strings to perform cropping and resizing. Cropping is performed first, followed by resizing. Either or both arguments may be omitted or given an empty string, in which case the corresponding action will not be performed. Geometry specification strings are defined as follows:

A geometry string consists of a size followed by an optional offset. The size is specified by one of the options below, where **bold** terms are replaced with appropriate integer values:

scale% Height and width both scaled by specified percentage

scale-x%*x*scale-y% Height and width individually scaled by specified percentages. Only one % symbol is needed.

width Width given, height automatically selected to preserve aspect ratio.

xheight Height given, width automatically selected to preserve aspect ratio.

widthxheight Maximum values of width and height given; aspect ratio preserved.

widthxheight! Width and height emphatically given; original aspect ratio ignored.

widthxheight> Shrinks images with dimension(s) larger than the corresponding width and/or height dimension(s).

widthxheight< Enlarges images with dimensions smaller than the corresponding width and/or height dimension(s).

area@ Resize image to have the specified area in pixels. Aspect ratio is preserved.

The offset, which only applies to the cropping geometry string, is given by `{+-}x{+-}y`, that is, one plus or minus sign followed by an `x` offset, followed by another plus or minus sign, followed by a `y` offset. Offsets are in pixels from the upper left corner of the image. Negative offsets will cause the corresponding number of pixels to be removed from the right or bottom edge of the image, meaning the cropped size will be the computed size minus the absolute value of the offset.

For example, if you want to crop your image to 300x300 pixels and then scale it by 2x for a final size of 600x600 pixels, you can call:

```
image.transform('300x300', '200%')
```

This method is a fairly thin wrapper for the C API, and does not perform any additional checking of the parameters except insofar as verifying that they are of the correct type. Thus, like the C API function, the method is very permissive in terms of what it accepts for geometry strings; unrecognized strings and trailing characters will be ignored rather than raising an error.

Parameters

- **crop** (basestring) – A geometry string defining a subregion of the image to crop to
- **resize** (basestring) – A geometry string defining the final size of the image

See also:

ImageMagick Geometry Specifications Cropping and resizing geometry for the `transform` method are specified according to ImageMagick's geometry string format. The ImageMagick documentation provides more information about geometry strings.

New in version 0.2.2.

transform_colorspace (*args, **kwargs)

Transform image's colorspace.

Parameters **colorspace_type** (basestring) – colorspace_type. available value can be found in the [COLORSPACE_TYPES](#)

New in version 0.4.2.

transparent_color (*args, **kwargs)

Makes the color `color` a transparent color with a tolerance of fuzz. The `alpha` parameter specifies the transparency level and the parameter `fuzz` specifies the tolerance.

Parameters

- **color** ([wand.color.Color](#)) – The color that should be made transparent on the image, color object

- **alpha** (`numbers.Real`) – the level of transparency: 1.0 is fully opaque and 0.0 is fully transparent.
- **fuzz** (`numbers.Integral`) – By default target must match a particular pixel color exactly. However, in many cases two colors may differ by a small amount. The fuzz member of image defines how much tolerance is acceptable to consider two colors as the same. For example, set fuzz to 10 and the color red at intensities of 100 and 102 respectively are now interpreted as the same color for the color.
- **invert** (`bool`) – Boolean to tell to paint the inverse selection.

New in version 0.3.0.

transparentize (`*args, **kwargs`)

Makes the image transparent by subtracting some percentage of the black color channel. The transparency parameter specifies the percentage.

Parameters **transparency** (`numbers.Real`) – the percentage fade that should be performed on the image, from 0.0 to 1.0

New in version 0.2.0.

type

(`basestring`) The image type.

Defines image type as in `IMAGE_TYPES` enumeration.

It may raise `ValueError` when the type is unknown.

New in version 0.2.2.

units

(`basestring`) The resolution units of this image.

unsharp_mask (`*args, **kwargs`)

Sharpens the image using unsharp mask filter. We convolve the image with a Gaussian operator of the given radius and standard deviation (`sigma`). For reasonable results, `radius` should be larger than `sigma`. Use a radius of 0 and `unsharp_mask()` selects a suitable radius for you.

Parameters

- **radius** (`numbers.Real`) – the radius of the Gaussian, in pixels, not counting the center pixel
- **sigma** (`numbers.Real`) – the standard deviation of the Gaussian, in pixels
- **amount** (`numbers.Real`) – the percentage of the difference between the original and the blur image that is added back into the original
- **threshold** (`numbers.Real`) – the threshold in pixels needed to apply the difference amount

New in version 0.3.4.

virtual_pixel

(`basestring`) The virtual pixel of image. This can also be set with a value from `VIRTUAL_PIXEL_METHOD`... versionadded:: 0.4.1

wand

Internal pointer to the `MagickWand` instance. It may raise `ClosedImageError` when the instance has destroyed already.

watermark (`*args, **kwargs`)

Transparentized the supplied image and places it over the current image, with the top left corner of

image at coordinates `left`, `top` of the current image. The dimensions of the current image are not changed.

Parameters

- **image** (*wand.image.Image*) – the image placed over the current image
- **transparency** (*numbers.Real*) – the percentage fade that should be performed on the image, from 0.0 to 1.0
- **left** (*numbers.Integral*) – the x-coordinate where *image* will be placed
- **top** (*numbers.Integral*) – the y-coordinate where *image* will be placed

New in version 0.2.0.

width

(*numbers.Integral*) The width of this image.

class *wand.image.ChannelDepthDict* (*image*)

The mapping table of channels to their depth.

Parameters **image** (*Image*) – an image instance

Note: You don't have to use this by yourself. Use *Image.channel_depths* property instead.

New in version 0.3.0.

class *wand.image.ChannelImageDict* (*image*)

The mapping table of separated images of the particular channel from the image.

Parameters **image** (*Image*) – an image instance

Note: You don't have to use this by yourself. Use *Image.channel_images* property instead.

New in version 0.3.0.

exception *wand.image.ClosedImageError*

An error that rises when some code tries access to an already closed image.

class *wand.image.HistogramDict* (*image*)

Specialized mapping object to represent color histogram. Keys are colors, and values are the number of pixels.

Parameters **image** (*BaseImage*) – the image to get its histogram

New in version 0.3.0.

class *wand.image.Image* (*image=None, blob=None, file=None, filename=None, format=None, width=None, height=None, depth=None, background=None, resolution=None*)

An image object.

Parameters

- **image** (*Image*) – makes an exact copy of the image
- **blob** (*bytes*) – opens an image of the blob byte array
- **file** (*file object*) – opens an image of the file object
- **filename** (*basestring*) – opens an image of the filename string

- **format** (basestring) – forces filename to buffer. format to help imagemagick detect the file format. Used only in blob or file cases
- **width** (numbers.Integral) – the width of new blank image or an image loaded from raw data.
- **height** (numbers.Integral) – the height of new blank image or an image loaded from raw data.
- **depth** (numbers.Integral) – the depth used when loading raw data.
- **background** (wand.color.Color) – an optional background color. default is transparent
- **resolution** (collections.Sequence, numbers.Integral) – set a resolution value (dpi), useful for vectorial formats (like pdf)

New in version 0.1.5: The file parameter.

New in version 0.1.1: The blob parameter.

New in version 0.2.1: The format parameter.

New in version 0.2.2: The width, height, background parameters.

New in version 0.3.0: The resolution parameter.

New in version 0.4.2: The depth parameter.

Changed in version 0.4.2: The depth, width and height parameters can be used with the filename, file and blob parameters to load raw pixel data.

[left:right, top:bottom]

Crops the image by its left, right, top and bottom, and then returns the cropped one.

```
with img[100:200, 150:300] as cropped:
    # manipulated the cropped image
    pass
```

Like other subscriptable objects, default is 0 or its width/height:

```
img[:, :]      #--> just clone
img[:100, 200:] #--> equivalent to img[0:100, 200:img.height]
```

Negative integers count from the end (width/height):

```
img[-70:-50, -20:-10]
#--> equivalent to img[width-70:width-50, height-20:height-10]
```

Returns the cropped image

Rtype *Image*

New in version 0.1.2.

auto_orient (*args, **kwargs)

Adjusts an image so that its orientation is suitable for viewing (i.e. top-left orientation). If available it uses `MagickAutoOrientImage()` (was added in ImageMagick 6.8.9+) if you have an older magick library, it will use `_auto_orient()` method for fallback.

New in version 0.4.1.

blank (*width, height, background=None*)

Creates blank image.

Parameters

- **width** (`numbers.Integral`) – the width of new blank image.
- **height** (`numbers.Integral`) – the height of new blank image.
- **background** (`wand.color.Color`) – an optional background color. default is transparent

Returns blank image

Return type `Image`

New in version 0.3.0.

border (*color, width, height*)

Surrounds the image with a border.

Parameters

- **bordercolor** – the border color pixel wand
- **width** (`numbers.Integral`) – the border width
- **height** (`numbers.Integral`) – the border height

New in version 0.3.0.

channel_depths = None

(`ChannelDepthDict`) The mapping of channels to their depth. Read only.

New in version 0.3.0.

channel_images = None

(`ChannelImageDict`) The mapping of separated channels from the image.

```
with image.channel_images['red'] as red_image:
    display(red_image)
```

clear()

Clears resources associated with the image, leaving the image blank, and ready to be used with new image.

New in version 0.3.0.

close()

Closes the image explicitly. If you use the image object in `with` statement, it was called implicitly so don't have to call it.

Note: It has the same functionality of `destroy()` method.

compression

(`basestring`) The type of image compression. It's a string from `COMPRESSION_TYPES` list. It also can be set.

New in version 0.3.6.

contrast_stretch (**args, **kwargs*)

Enhance contrast of image by adjusting the span of the available colors.

If only `black_point` is given, match the CLI behavior by assuming the `white_point` has the same delta percentage off the top e.g. contrast stretch of 15% is calculated as `black_point = 0.15` and `white_point = 0.85`.

Parameters

- **`black_point`** (`numbers.Real`) – black point between 0.0 and 1.0. default is 0.0
- **`white_point`** (`numbers.Real`) – white point between 0.0 and 1.0. default value of 1.0 minus `black_point`
- **`channel`** (`CHANNELS`) – optional color channel to apply contrast stretch

Raises **`ValueError`** – if `channel` is not in `CHANNELS`

New in version 0.4.1.

`convert` (*format*)

Converts the image format with the original image maintained. It returns a converted image instance which is new.

```
with img.convert('png') as converted:
    converted.save(filename='converted.png')
```

Parameters **`format`** (basestring) – image format to convert to

Returns a converted image

Return type `Image`

Raises **`ValueError`** – when the given `format` is unsupported

New in version 0.1.6.

`destroy` ()

Manually remove `SingleImage`'s in the `Sequence`, allowing it to be properly garbage collected after using a `with Image()` context manager.

`format`

(basestring) The image format.

If you want to convert the image format, just reset this property:

```
assert isinstance(img, wand.image.Image)
img.format = 'png'
```

It may raise **`ValueError`** when the format is unsupported.

See also:

ImageMagick Image Formats ImageMagick uses an ASCII string known as *magick* (e.g. GIF) to identify file formats, algorithms acting as formats, built-in patterns, and embedded profile types.

New in version 0.1.6.

`gamma` (*args, **kwargs)

Gamma correct image.

Specific color channels can be correct individual. Typical values range between 0.8 and 2.3.

Parameters

- **`adjustment_value`** (`numbers.Real`) – value to adjust gamma level

- **channel** (basestring) – optional channel to apply gamma correction

Raises

- **TypeError** – if `gamma_point` is not a `numbers.Real`
- **ValueError** – if `channel` is not in `CHANNELS`

New in version 0.4.1.

level (*black=0.0, white=None, gamma=1.0, channel=None*)

Adjusts the levels of an image by scaling the colors falling between specified black and white points to the full available quantum range.

If only `black` is given, `white` will be adjusted inward.

Parameters

- **black** (`numbers.Real`) – Black point, as a percentage of the system’s quantum range. Defaults to 0.
- **white** (`numbers.Real`) – White point, as a percentage of the system’s quantum range. Defaults to 1.0.
- **gamma** (`numbers.Real`) – Optional gamma adjustment. Values > 1.0 lighten the image’s midtones while values < 1.0 darken them.
- **channel** (`CHANNELS`) – The channel type. Available values can be found in the `CHANNELS` mapping. If `None`, normalize all channels.

New in version 0.4.1.

linear_stretch (**args, **kwargs*)

Enhance saturation intensity of an image.

Parameters

- **black_point** (`numbers.Real`) – Black point between 0.0 and 1.0. Default 0.0
- **white_point** (`numbers.Real`) – White point between 0.0 and 1.0. Default 1.0

New in version 0.4.1.

make_blob (*format=None*)

Makes the binary string of the image.

Parameters **format** (basestring) – the image format to write e.g. 'png', 'jpeg'. it is omittable

Returns a blob (bytes) string

Return type `bytes`

Raises **ValueError** – when `format` is invalid

Changed in version 0.1.6: Removed a side effect that changes the image `format` silently.

New in version 0.1.5: The `format` parameter became optional.

New in version 0.1.1.

metadata = None

(*Metadata*) The metadata mapping of the image. Read only.

New in version 0.3.0.

mimetype

(*basestring*) The MIME type of the image e.g. 'image/jpeg', 'image/png'.

New in version 0.1.7.

normalize (*channel=None*)

Normalize color channels.

Parameters **channel** (*basestring*) – the channel type. available values can be found in the [CHANNELS](#) mapping. If *None*, normalize all channels.

read (*file=None, filename=None, blob=None, resolution=None*)

Read new image into Image() object.

Parameters

- **blob** (*bytes*) – reads an image from the *blob* byte array
- **file** (*file object*) – reads an image from the *file* object
- **filename** (*basestring*) – reads an image from the *filename* string
- **resolution** (*collections.Sequence, numbers.Integral*) – set a resolution value (DPI), useful for vectorial formats (like PDF)

New in version 0.3.0.

save (*file=None, filename=None*)

Saves the image into the *file* or *filename*. It takes only one argument at a time.

Parameters

- **file** (*file object*) – a file object to write to
- **filename** (*basestring*) – a filename string to write to

New in version 0.1.5: The *file* parameter.

New in version 0.1.1.

strip ()

Strips an image of all profiles and comments.

New in version 0.2.0.

transpose (**args, **kwargs*)

Creates a vertical mirror image by reflecting the pixels around the central x-axis while rotating them 90-degrees.

New in version 0.4.1.

transverse (**args, **kwargs*)

Creates a horizontal mirror image by reflecting the pixels around the central y-axis while rotating them 270-degrees.

New in version 0.4.1.

trim (*color=None, fuzz=0*)

Remove solid border from image. Uses top left pixel as a guide by default, or you can also specify the *color* to remove.

Parameters

- **color** (*Color*) – the border color to remove. if it's omitted top left pixel is used by default

- **fuzz** (`numbers.Integral`) – Defines how much tolerance is acceptable to consider two colors as the same.

New in version 0.3.0: Optional `color` and `fuzz` parameters.

New in version 0.2.1.

class `wand.image.ImageProperty` (*image*)

The mixin class to maintain a weak reference to the parent *Image* object.

New in version 0.3.0.

image

(*Image*) The parent image.

It ensures that the parent *Image*, which is held in a weak reference, still exists. Returns the dereferenced *Image* if it does exist, or raises a *ClosedImageError* otherwise.

Exc *ClosedImageError* when the parent Image has been destroyed

class `wand.image.Iterator` (*image=None, iterator=None*)

Row iterator for *Image*. It shouldn't be instantiated directly; instead, it can be acquired through *Image* instance:

```
assert isinstance(image, wand.image.Image)
iterator = iter(image)
```

It doesn't iterate every pixel, but rows. For example:

```
for row in image:
    for col in row:
        assert isinstance(col, wand.color.Color)
        print(col)
```

Every row is a `collections.Sequence` which consists of one or more *wand.color.Color* values.

Parameters *image* (*Image*) – the image to get an iterator

New in version 0.1.3.

clone ()

Clones the same iterator.

class `wand.image.Metadata` (*image*)

Class that implements dict-like read-only access to image metadata like EXIF or IPTC headers.

Parameters *image* (*Image*) – an image instance

Note: You don't have to use this by yourself. Use *Image.metadata* property instead.

New in version 0.3.0.

class `wand.image.OptionDict` (*image*)

Mutable mapping of the image internal options. See available options in `OPTIONS` constant.

New in version 0.3.0.

`wand.image.manipulative` (*function*)

Mark the operation manipulating itself instead of returning new one.

4.1.2 wand.color — Colors

New in version 0.1.2.

class `wand.color.Color` (*string=None, raw=None*)
Color value.

Unlike any other objects in Wand, its resource management can be implicit when it used outside of `with` block. In these case, its resource are allocated for every operation which requires a resource and destroyed immediately. Of course it is inefficient when the operations are much, so to avoid it, you should use color objects inside of `with` block explicitly e.g.:

```
red_count = 0
with Color('#f00') as red:
    with Image(filename='image.png') as img:
        for row in img:
            for col in row:
                if col == red:
                    red_count += 1
```

Parameters `string` (basestring) – a color name string e.g. 'rgb(255, 255, 255)', '#fff', 'white'. see [ImageMagick Color Names](#) doc also

Changed in version 0.3.0: `Color` objects become hashable.

See also:

ImageMagick Color Names The color can then be given as a color name (there is a limited but large set of these; see below) or it can be given as a set of numbers (in decimal or hexadecimal), each corresponding to a channel in an RGB or RGBA color model. HSL, HSLA, HSB, HSBA, CMYK, or CMYKA color models may also be specified. These topics are briefly described in the sections below.

== (other)
Equality operator.

Param other a color another one

Type color `Color`

Returns True only if two images equal.

Rtype `bool`

alpha
(`numbers.Real`) Alpha value, from 0.0 to 1.0.

alpha_int8
(`numbers.Integral`) Alpha value as 8bit integer which is a common style. From 0 to 255.

New in version 0.3.0.

alpha_quantum
(`numbers.Integral`) Alpha value. Scale depends on `QUANTUM_DEPTH`.

New in version 0.3.0.

blue
(`numbers.Real`) Blue, from 0.0 to 1.0.

blue_int8
(`numbers.Integral`) Blue as 8bit integer which is a common style. From 0 to 255.

New in version 0.3.0.

blue_quantum

(`numbers.Integral`) Blue. Scale depends on `QUANTUM_DEPTH`.

New in version 0.3.0.

static c_equals (*a*, *b*)

Raw level version of equality test function for two pixels.

Parameters

- **a** (`ctypes.c_void_p`) – a pointer to PixelWand to compare
- **b** (`ctypes.c_void_p`) – a pointer to PixelWand to compare

Returns True only if two pixels equal

Return type `bool`

Note: It's only for internal use. Don't use it directly. Use `==` operator of `Color` instead.

green

(`numbers.Real`) Green, from 0.0 to 1.0.

green_int8

(`numbers.Integral`) Green as 8bit integer which is a common style. From 0 to 255.

New in version 0.3.0.

green_quantum

(`numbers.Integral`) Green. Scale depends on `QUANTUM_DEPTH`.

New in version 0.3.0.

normalized_string

(`basestring`) The normalized string representation of the color. The same color is always represented to the same string.

New in version 0.3.0.

red

(`numbers.Real`) Red, from 0.0 to 1.0.

red_int8

(`numbers.Integral`) Red as 8bit integer which is a common style. From 0 to 255.

New in version 0.3.0.

red_quantum

(`numbers.Integral`) Red. Scale depends on `QUANTUM_DEPTH`.

New in version 0.3.0.

string

(`basestring`) The string representation of the color.

`wand.color.scale_quantum_to_int8` (*quantum*)

Straightforward port of `ScaleQuantumToChar()` inline function.

Parameters **quantum** (`numbers.Integral`) – quantum value

Returns 8bit integer of the given quantum value

Return type `numbers.Integral`

New in version 0.3.0.

4.1.3 `wand.font` — Fonts

New in version 0.3.0.

Font is an object which takes the *path* of font file, *size*, *color*, and whether to use *antialiasing*. If you want to use font by its name rather than the file path, use *TTFQuery* package. The font path resolution by its name is a very complicated problem to achieve.

See also:

TTFQuery — Find and Extract Information from TTF Files TTFQuery builds on the *FontTools-TTX* package to allow the Python programmer to accomplish a number of tasks:

- query the system to find installed fonts
- retrieve metadata about any TTF font file
 - this includes the glyph outlines (shape) of individual code-points, which allows for rendering the glyphs in 3D (such as is done in OpenGLContext)
- lookup/find fonts by:
 - abstract family type
 - proper font name
- build simple metadata registries for run-time font matching

class `wand.font.Font`

Font struct which is a subtype of `tuple`.

Parameters

- **path** (`str`, `basestring`) – the path of the font file
- **size** (`numbers.Real`) – the size of typeface. 0 by default which means *autosized*
- **color** (`Color`) – the color of typeface. black by default
- **antialias** (`bool`) – whether to use antialiasing. True by default

Changed in version 0.3.9: The *size* parameter becomes optional. Its default value is 0, which means *autosized*.

antialias

(`bool`) Whether to apply antialiasing (True) or not (False).

color

(`wand.color.Color`) The font color.

path

(`basestring`) The path of font file.

size

(`numbers.Real`) The font size in pixels.

4.1.4 `wand.drawing` — Drawings

The module provides some vector drawing functions.

New in version 0.3.0.

`wand.drawing.CLIP_PATH_UNITS = ('undefined_path_units', 'user_space', 'user_space_on_use',`
(collections.Sequence) The list of clip path units

- 'undefined_path_units'
- 'user_space'
- 'user_space_on_use'
- 'object_bounding_box'

`wand.drawing.FILL_RULE_TYPES = ('undefined', 'evenodd', 'nonzero')`
(collections.Sequence) The list of fill-rule types.

- 'undefined'
- 'evenodd'
- 'nonzero'

`wand.drawing.FONT_METRICS_ATTRIBUTES = ('character_width', 'character_height', 'ascender',`
(collections.Sequence) The attribute names of font metrics.

`wand.drawing.GRAVITY_TYPES = ('forget', 'north_west', 'north', 'north_east', 'west', 'center')`
(collections.Sequence) The list of text gravity types.

- 'forget'
- 'north_west'
- 'north'
- 'north_east'
- 'west'
- 'center'
- 'east'
- 'south_west'
- 'south'
- 'south_east'
- 'static'

`wand.drawing.LINE_CAP_TYPES = ('undefined', 'butt', 'round', 'square')`
(collections.Sequence) The list of LineCap types

- 'undefined';
- 'butt'
- 'round'
- 'square'

`wand.drawing.LINE_JOIN_TYPES = ('undefined', 'miter', 'round', 'bevel')`
(collections.Sequence) The list of LineJoin types

- 'undefined'
- 'miter'
- 'round'
- 'bevel'

- 'undefined'

- ```
wand.drawing.STRETCH_TYPES = ('undefined', 'normal', 'ultra_condensed', 'extra_condensed',
 (collections.Sequence) The list of stretch types for fonts
```

- 'undefined';

- ```
wand.drawing.STYLE_TYPES = ('undefined', 'normal', 'italic', 'oblique', 'any')
```
- (collections.Sequence) The list of style types for fonts

- 'undefined;

- `wand.drawing.TEXT_ALIGN_TYPES = ('undefined', 'left', 'center', 'right')`
(collections.Sequence) The list of text align types

- 'undefined'

- ```
wand.drawing.TEXT_DECORATION_TYPES = ('undefined', 'no', 'underline', 'overline', 'line_th
```

- 'undefined'

-

- 'underline'
- 'overline'
- 'line\_through'

wand.drawing.TEXT\_DIRECTION\_TYPES = ('undefined', 'right\_to\_left', 'left\_to\_right')  
(collections.Sequence) The list of text direction types.

- 'undefined'
- 'right\_to\_left'
- 'left\_to\_right'

```
class wand.drawing.Drawing(drawing=None)
```

Drawing object. It maintains several vector drawing instructions and can get drawn into zero or more *Image* objects by calling it.

For example, the following code draws a diagonal line to the `image`:

```
with Drawing() as draw:
 draw.line((0, 0), image.size)
 draw(image)
```

**Parameters** **drawing** (*Drawing*) – an optional drawing object to clone. use *clone()* method rather than this parameter

New in version 0.3.0.

**affine** (*matrix*)

Adjusts the current affine transformation matrix with the specified affine transformation matrix. Note that the current affine transform is adjusted rather than replaced.

$$\begin{bmatrix} x' & y' & 1 \end{bmatrix} = \begin{bmatrix} x & y & 1 \end{bmatrix} * \begin{bmatrix} s_x & r_x & 0 \\ r_y & s_y & 0 \\ t_x & t_y & 1 \end{bmatrix}$$

**Parameters** `matrix` (`collections.Sequence`) – a list of `Real` to define affine matrix `[sx, rx, ry, sy, tx, ty]`

New in version 0.4.0.

**arc** (*start, end, degree*)

Draws a arc using the current *stroke\_color*, *stroke\_width*, and *fill\_color*.

## Parameters

- **start** (Sequence) – (Real, numbers.Real) pair which represents starting x and y of the arc
- **end** (Sequence) – (Real, numbers.Real) pair which represents ending x and y of the arc
- **degree** (Sequence) – (Real, numbers.Real) pair which represents starting degree, and ending degree

New in version 0.4.0.

**bezier** (*points=None*)

Draws a bezier curve through a set of points on the image, using the specified array of coordinates.

At least four points should be given to complete a bezier path. The first & forth point being the start & end point, and the second & third point controlling the direction & curve.

Example bezier on image

```
with Drawing() as draw:
 points = [(40,10), # Start point
 (20,50), # First control
 (90,10), # Second control
 (70,40)] # End point
 draw.stroke_color = Color('#000')
 draw.fill_color = Color('#fff')
 draw.bezier(points)
 draw.draw(image)
```

**Parameters** `points` (`list`) – list of x,y tuples

New in version 0.4.0.

**border\_color**

(`Color`) the current border color. It also can be set. This attribute controls the behavior of `color()` during 'filltoborder' operation.

New in version 0.4.0.

**circle** (`origin`, `perimeter`)

Draws a circle from origin to perimeter

**Parameters**

- **origin** (`collections.Sequence`) – (`Real`, `numbers.Real`) pair which represents origin x and y of circle
- **perimeter** (`collections.Sequence`) – (`Real`, `numbers.Real`) pair which represents perimeter x and y of circle

New in version 0.4.0.

**clip\_path**

(`basestring`) The current clip path. It also can be set.

New in version 0.4.0.

**clip\_rule**

(`basestring`) The current clip rule. It also can be set. It's a string value from `FILL_RULE_TYPES` list.

New in version 0.4.0.

**clip\_units**

(`basestring`) The current clip units. It also can be set. It's a string value from `CLIP_PATH_UNITS` list.

New in version 0.4.0.

**clone()**

Copies a drawing object.

**Returns** a duplication

**Return type** `Drawing`

**color** (*x=None, y=None, paint\_method='undefined'*)

Draws a color on the image using current fill color, starting at specified position & method.

Available methods in `wand.drawing.PAINT_METHOD_TYPES`:

- 'undefined'
- 'point'
- 'replace'
- 'floodfill'
- 'filltoborder'
- 'reset'

New in version 0.4.0.

**comment** (*message=None*)

Adds a comment to the vector stream.

**Parameters** **message** (basestring) – the comment to set.

New in version 0.4.0.

**composite** (*operator, left, top, width, height, image*)

Composites an image onto the current image, using the specified composition operator, specified position, and at the specified size.

**Parameters**

- **operator** – the operator that affects how the composite is applied to the image. available values can be found in the `COMPOSITE_OPERATORS` list
- **type** – `COMPOSITE_OPERATORS`
- **left** (`numbers.Real`) – the column offset of the composited drawing source
- **top** (`numbers.Real`) – the row offset of the composited drawing source
- **width** (`numbers.Real`) – the total columns to include in the composited source
- **height** (`numbers.Real`) – the total rows to include in the composited source

New in version 0.4.0.

**draw** (*image*)

Renders the current drawing into the image. You can simply call `Drawing` instance rather than calling this method. That means the following code which calls `Drawing` object itself:

```
drawing(image)
```

is equivalent to the following code which calls `draw()` method:

```
drawing.draw(image)
```

**Parameters** **image** (`Image`) – the image to be drawn

**ellipse** (*origin, radius, rotation=(0, 360)*)

Draws a ellipse at `origin` with independent x & y radius. Ellipse can be partial by setting start & end rotation.

**Parameters**



- **origin** (`collections.Sequence`) – (`Real`, `numbers.Real`) pair which represents origin x and y of circle
- **radius** (`collections.Sequence`) – (`Real`, `numbers.Real`) pair which represents radius x and radius y of circle
- **rotation** (`collections.Sequence`) – (`Real`, `numbers.Real`) pair which represents start and end of ellipse. Default (0,360)

New in version 0.4.0.

#### **fill\_color**

(`Color`) The current color to fill. It also can be set.

#### **fill\_opacity**

(`Real`) The current fill opacity. It also can be set.

New in version 0.4.0.

#### **fill\_rule**

(`basestring`) The current fill rule. It can also be set. It's a string value from `FILL_RULE_TYPES` list.

New in version 0.4.0.

#### **font**

(`basestring`) The current font name. It also can be set.

#### **font\_family**

(`basestring`) The current font family. It also can be set.

New in version 0.4.0.

#### **font\_resolution**

(`Sequence`) The current font resolution. It also can be set.

New in version 0.4.0.

#### **font\_size**

(`numbers.Real`) The font size. It also can be set.

#### **font\_stretch**

(`basestring`) The current font stretch variation. It also can be set, but will only apply if the font-family or encoder supports the stretch type.

New in version 0.4.0.

#### **font\_style**

(`basestring`) The current font style. It also can be set, but will only apply if the font-family supports the style.

New in version 0.4.0.

#### **font\_weight**

(`Integral`) The current font weight. It also can be set.

New in version 0.4.0.

#### **get\_font\_metrics** (*image*, *text*, *multiline=False*)

Queries font metrics from the given `text`.

##### **Parameters**

- **image** (`Image`) – the image to be drawn
- **text** (`basestring`) – the text string for get font metrics.

- **multiline** (*boolean*) – text is multiline or not

**gravity**

(*basestring*) The text placement gravity used when annotating with text. It's a string from [GRAVITY\\_TYPES](#) list. It also can be set.

**line** (*start, end*)

Draws a line *start* to *end*.

**Parameters**

- **start** (*collections.Sequence*) – (*Integral*, *numbers.Integral*) pair which represents starting x and y of the line
- **end** (*collections.Sequence*) – (*Integral*, *numbers.Integral*) pair which represents ending x and y of the line

**matte** (*x=None, y=None, paint\_method='undefined'*)

Paints on the image's opacity channel in order to set effected pixels to transparent.

To influence the opacity of pixels. The available methods are:

- 'undefined'
- 'point'
- 'replace'
- 'floodfill'
- 'filltoborder'
- 'reset'

New in version 0.4.0.

**opacity**

(*Real*) returns the opacity used when drawing with the fill or stroke color or texture. Fully opaque is 1.0. This method only affects vector graphics, and is experimental. To set the opacity of a drawing, use [Drawing.fill\\_opacity](#) & [Drawing.stroke\\_opacity](#)

New in version 0.4.0.

**path\_close** ()

Adds a path element to the current path which closes the current subpath by drawing a straight line from the current point to the current subpath's most recent starting point.

New in version 0.4.0.

**path\_curve** (*to=None, controls=None, smooth=False, relative=False*)

Draws a cubic Bezier curve from the current point to given *to* (x,y) coordinate using *controls* points at the beginning and the end of the curve. If *smooth* is set to True, only one *controls* is expected and the previous control is used, else two pair of coordinates are expected to define the control points. The *to* coordinate then becomes the new current point.

**Parameters**

- **to** (*collections.Sequence*) – (*Real*, *numbers.Real*) pair which represents coordinates to draw to
- **controls** (*collections.Sequence*) – (*Real*, *numbers.Real*) coordinate to used to influence curve
- **smooth** (*bool*) – *bool* assume last defined control coordinate

- **relative** (*bool*) – treat given coordinates as relative to current point

New in version 0.4.0.

**path\_curve\_to\_quadratic\_bezier** (*to=None, control=None, smooth=False, relative=False*)

Draws a quadratic Bezier curve from the current point to given *to* coordinate. The control point is assumed to be the reflection of the control point on the previous command if *smooth* is True, else a pair of *control* coordinates must be given. Each coordinates can be relative, or absolute, to the current point by setting the *relative* flag. The *to* coordinate then becomes the new current point, and the *control* coordinate will be assumed when called again when *smooth* is set to true.

#### Parameters

- **to** (*collections.Sequence*) – (*Real, numbers.Real*) pair which represents coordinates to draw to
- **control** (*collections.Sequence*) – (*Real, numbers.Real*) coordinate to used to influence curve
- **smooth** (*bool*) – assume last defined control coordinate
- **relative** (*bool*) – treat given coordinates as relative to current point

New in version 0.4.0.

**path\_elliptic\_arc** (*to=None, radius=None, rotation=0.0, large\_arc=False, clockwise=False, relative=False*)

Draws an elliptical arc from the current point to given *to* coordinates. The *to* coordinates can be relative, or absolute, to the current point by setting the *relative* flag. The size and orientation of the ellipse are defined by two radii (*rx, ry*) in *radius* and an *rotation* parameters, which indicates how the ellipse as a whole is rotated relative to the current coordinate system. The center of the ellipse is calculated automatically to satisfy the constraints imposed by the other parameters. *large\_arc* and *clockwise* contribute to the automatic calculations and help determine how the arc is drawn. If *large\_arc* is True then draw the larger of the available arcs. If *clockwise* is true, then draw the arc matching a clock-wise rotation.

#### Parameters

- **to** (*collections.Sequence*) – (*Real, numbers.Real*) pair which represents coordinates to draw to
- **radius** (*collections.Sequence*) – (*Real, numbers.Real*) pair which represents the radii of the ellipse to draw
- **rotate** (*Real*) – degree to rotate ellipse on x-axis
- **large\_arc** (*bool*) – draw largest available arc
- **clockwise** (*bool*) – draw arc path clockwise from start to target
- **relative** (*bool*) – treat given coordinates as relative to current point

New in version 0.4.0.

**path\_finish** ()

Terminates the current path.

New in version 0.4.0.

**path\_horizontal\_line** (*x=None, relative=False*)

Draws a horizontal line path from the current point to the target point. Given *x* parameter can be relative, or absolute, to the current point by setting the *relative* flag. The target point then becomes the new current point.

#### Parameters

- **x** (*Real*) – *Real* x-axis point to draw to.
- **relative** (*bool*) – *bool* treat given point as relative to current point

New in version 0.4.0.

**path\_line** (*to=None, relative=False*)

Draws a line path from the current point to the given *to* coordinate. The *to* coordinates can be relative, or absolute, to the current point by setting the *relative* flag. The coordinate then becomes the new current point.

#### Parameters

- **to** (*collections.Sequence*) – (*Real, numbers.Real*) pair which represents coordinates to draw to.
- **relative** (*bool*) – *bool* treat given coordinates as relative to current point

New in version 0.4.0.

**path\_move** (*to=None, relative=False*)

Starts a new sub-path at the given coordinates. Given *to* parameter can be relative, or absolute, by setting the *relative* flag.

#### Parameters

- **to** (*collections.Sequence*) – (*Real, numbers.Real*) pair which represents coordinates to draw to.
- **relative** (*bool*) – *bool* treat given coordinates as relative to current point

New in version 0.4.0.

**path\_start** ()

Declares the start of a path drawing list which is terminated by a matching *path\_finish()* command. All other *path\_\** commands must be enclosed between a *path\_start()* and a *path\_finish()* command. This is because path drawing commands are subordinate commands and they do not function by themselves.

New in version 0.4.0.

**path\_vertical\_line** (*y=None, relative=False*)

Draws a vertical line path from the current point to the target point. Given *y* parameter can be relative, or absolute, to the current point by setting the *relative* flag. The target point then becomes the new current point.

#### Parameters

- **y** (*Real*) – *Real* y-axis point to draw to.
- **relative** (*bool*) – *bool* treat given point as relative to current point

New in version 0.4.0.

**point** (*x, y*)

Draws a point at given *x* and *y*

#### Parameters

- **x** (*Real*) – *Real* x of point
- **y** (*Real*) – *Real* y of point

New in version 0.4.0.

**polygon** (*points=None*)

Draws a polygon using the current `stoke_color`, *stroke\_width*, and *fill\_color*, using the specified array of coordinates.

Example polygon on image

```
with Drawing() as draw:
 points = [(40,10), (20,50), (90,10), (70,40)]
 draw.polygon(points)
 draw.draw(image)
```

**Parameters** `points` (*list*) – list of x,y tuples

New in version 0.4.0.

**polyline** (*points=None*)

Draws a polyline using the current `stoke_color`, *stroke\_width*, and *fill\_color*, using the specified array of coordinates.

Identical to *polygon*, but without closed stroke line.

**Parameters** `points` (*list*) – list of x,y tuples

New in version 0.4.0.

**pop** ()

Pop destroys the current drawing wand and returns to the previously pushed drawing wand. Multiple drawing wands may exist. It is an error to attempt to pop more drawing wands than have been pushed, and it is proper form to pop all drawing wands which have been pushed.

**Returns** success of pop operation

**Return type** *bool*

New in version 0.4.0.

**pop\_clip\_path** ()

Terminates a clip path definition.

New in version 0.4.0.

**pop\_defs** ()

Terminates a definition list.

New in version 0.4.0.

**pop\_pattern** ()

Terminates a pattern definition.

New in version 0.4.0.

**push** ()

Push clones the current drawing wand to create a new drawing wand. The original drawing wand(s) may be returned to by invoking *Drawing.pop*. The drawing wands are stored on a drawing wand stack. For every Pop there must have already been an equivalent Push.

**Returns** success of push operation

**Return type** *bool*

New in version 0.4.0.

**push\_clip\_path** (*clip\_mask\_id*)

Starts a clip path definition which is comprised of any number of drawing commands and terminated by a *Drawing.pop\_clip\_path* command.

**Parameters** *clip\_mask\_id* (basestring) – string identifier to associate with the clip path.

New in version 0.4.0.

**push\_defs** ()

Indicates that commands up to a terminating *Drawing.pop\_defs* command create named elements (e.g. clip-paths, textures, etc.) which may safely be processed earlier for the sake of efficiency.

New in version 0.4.0.

**push\_pattern** (*pattern\_id*, *left*, *top*, *width*, *height*)

Indicates that subsequent commands up to a *Drawing.pop\_pattern* command comprise the definition of a named pattern. The pattern space is assigned top left corner coordinates, a width and height, and becomes its own drawing space. Anything which can be drawn may be used in a pattern definition. Named patterns may be used as stroke or brush definitions.

**Parameters**

- **pattern\_id** (basestring) – a unique identifier for the pattern.
- **left** (*numbers.Real*) – x ordinate of top left corner.
- **top** (*numbers.Real*) – y ordinate of top left corner.
- **width** (*numbers.Real*) – width of pattern space.
- **height** (*numbers.Real*) – height of pattern space.

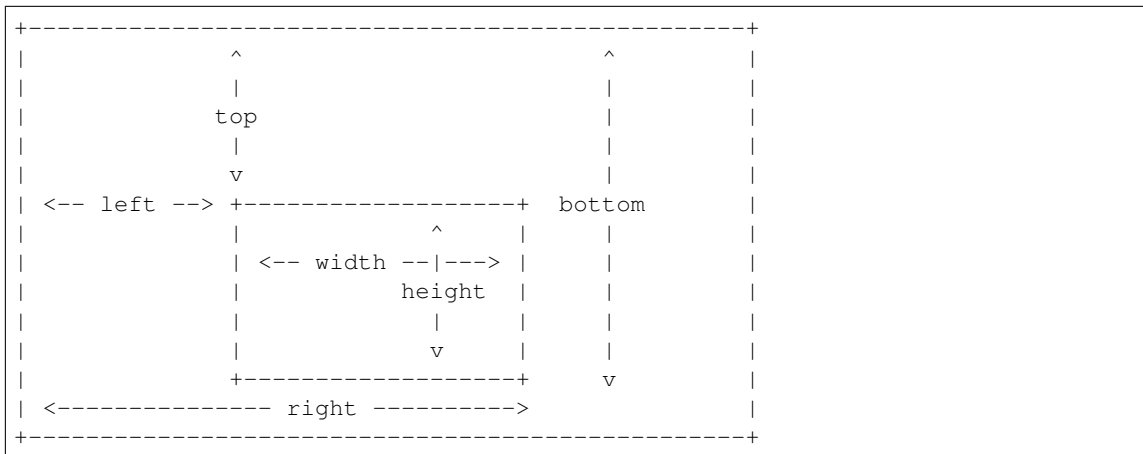
**Returns** success of push operation

**Return type** *bool*

New in version 0.4.0.

**rectangle** (*left=None*, *top=None*, *right=None*, *bottom=None*, *width=None*, *height=None*, *radius=None*, *xradius=None*, *yradius=None*)

Draws a rectangle using the current *stroke\_color*, *stroke\_width*, and *fill\_color*.

**Parameters**

- **left** (*numbers.Real*) – x-offset of the rectangle to draw
- **top** (*numbers.Real*) – y-offset of the rectangle to draw

- **right** (`numbers.Real`) – second x-offset of the rectangle to draw. this parameter and width parameter are exclusive each other
- **bottom** (`numbers.Real`) – second y-offset of the rectangle to draw. this parameter and height parameter are exclusive each other
- **width** (`numbers.Real`) – the width of the rectangle to draw. this parameter and right parameter are exclusive each other
- **height** (`numbers.Real`) – the height of the rectangle to draw. this parameter and bottom parameter are exclusive each other
- **radius** (`numbers.Real`) – the corner rounding. this is a short-cut for setting both `xradius`, and `yradius`
- **xradius** (`numbers.Real`) – the `xradius` corner in horizontal direction.
- **yradius** (`numbers.Real`) – the `yradius` corner in vertical direction.

New in version 0.3.6.

Changed in version 0.4.0: Radius keywords added to create rounded rectangle.

#### **rotate** (*degree*)

Applies the specified rotation to the current coordinate space.

**Parameters** **degree** (`Real`) – degree to rotate

New in version 0.4.0.

#### **scale** (*x=None, y=None*)

Adjusts the scaling factor to apply in the horizontal and vertical directions to the current coordinate space.

##### **Parameters**

- **x** (`Real`) – Horizontal scale factor
- **y** (`Real`) – Vertical scale factor

New in version 0.4.0.

#### **set\_fill\_pattern\_url** (*url*)

Sets the URL to use as a fill pattern for filling objects. Only local URLs (“#identifier”) are supported at this time. These local URLs are normally created by defining a named fill pattern with `Drawing.push_pattern` & `Drawing.pop_pattern`.

**Parameters** **url** (`basestring`) – URL to use to obtain fill pattern.

New in version 0.4.0.

#### **set\_stroke\_pattern\_url** (*url*)

Sets the pattern used for stroking object outlines. Only local URLs (“#identifier”) are supported at this time. These local URLs are normally created by defining a named stroke pattern with `Drawing.push_pattern` & `Drawing.pop_pattern`.

**Parameters** **url** (`basestring`) – URL to use to obtain stroke pattern.

New in version 0.4.0.

#### **skew** (*x=None, y=None*)

Skews the current coordinate system in the horizontal direction if `x` is given, and vertical direction if `y` is given.

##### **Parameters**

- **x** (`Real`) – Skew horizontal direction

- **y** (*Real*) – Skew vertical direction

New in version 0.4.0.

**stroke\_antialias**

(*bool*) Controls whether stroked outlines are antialiased. Stroked outlines are antialiased by default. When antialiasing is disabled stroked pixels are thresholded to determine if the stroke color or underlying canvas color should be used.

It also can be set.

New in version 0.4.0.

**stroke\_color**

(*Color*) The current color of stroke. It also can be set.

New in version 0.3.3.

**stroke\_dash\_array**

(Sequence) - (*numbers.Real*) An array representing the pattern of dashes & gaps used to stroke paths. It also can be set.

New in version 0.4.0.

**stroke\_dash\_offset**

(*numbers.Real*) The stroke dash offset. It also can be set.

New in version 0.4.0.

**stroke\_line\_cap**

(*basestring*) The stroke line cap. It also can be set.

New in version 0.4.0.

**stroke\_line\_join**

(*basestring*) The stroke line join. It also can be set.

New in version 0.4.0.

**stroke\_miter\_limit**

(*Integral*) The current miter limit. It also can be set.

New in version 0.4.0.

**stroke\_opacity**

(*Real*) The current stroke opacity. It also can be set.

New in version 0.4.0.

**stroke\_width**

(*numbers.Real*) The stroke width. It also can be set.

New in version 0.3.3.

**text** (*x*, *y*, *body*)

Writes a text *body* into (*x*, *y*).

**Parameters**

- **x** (*numbers.Integral*) – the left offset where to start writing a text
- **y** (*numbers.Integral*) – the baseline where to start writing text
- **body** (*basestring*) – the body string to write



**text\_alignment**

(*basestring*) The current text alignment setting. It's a string value from *TEXT\_ALIGN\_TYPES* list. It also can be set.

**text\_antialias**

(*bool*) The boolean value which represents whether antialiasing is used for text rendering. It also can be set to *True* or *False* to switch the setting.

**text\_decoration**

(*basestring*) The text decoration setting, a string from *TEXT\_DECORATION\_TYPES* list. It also can be set.

**text\_direction**

(*basestring*) The text direction setting, a string from *TEXT\_DIRECTION\_TYPES* list. It also can be set.

**text\_encoding**

(*basestring*) The internally used text encoding setting. Although it also can be set, but it's not encouraged.

**text\_interline\_spacing**

(*numbers.Real*) The setting of the text line spacing. It also can be set.

**text\_interword\_spacing**

(*numbers.Real*) The setting of the word spacing. It also can be set.

**text\_kerning**

(*numbers.Real*) The setting of the text kerning. It also can be set.

**text\_under\_color**

(*Color*) The color of a background rectangle to place under text annotations. It also can be set.

**translate** (*x=None, y=None*)

Applies a translation to the current coordinate system which moves the coordinate system origin to the specified coordinate.

**Parameters**

- **x** (*Real*) – Skew horizontal direction
- **y** (*Real*) – Skew vertical direction

New in version 0.4.0.

**vector\_graphics**

(*basestring*) The XML text of the Vector Graphics. It also can be set. The drawing-wand XML is experimental, and subject to change.

Setting this property to *None* will reset all vector graphic properties to the default state.

New in version 0.4.0.

**viewbox** (*left, top, right, bottom*)

Viewbox sets the overall canvas size to be recorded with the drawing vector data. Usually this will be specified using the same size as the canvas image. When the vector data is saved to SVG or MVG formats, the viewbox is used to specify the size of the canvas image that a viewer will render the vector data on.

**Parameters**

- **left** (*Integral*) – the left most point of the viewbox.
- **top** (*Integral*) – the top most point of the viewbox.
- **right** (*Integral*) – the right most point of the viewbox.

- **bottom** (*Integral*) – the bottom most point of the viewbox.

New in version 0.4.0.

```
class wand.drawing.FontMetrics (character_width, character_height, ascender, descender,
 text_width, text_height, maximum_horizontal_advance, x1, y1,
 x2, y2, x, y)
```

The tuple subtype which consists of font metrics data.

**ascender**

Alias for field number 2

**character\_height**

Alias for field number 1

**character\_width**

Alias for field number 0

**descender**

Alias for field number 3

**maximum\_horizontal\_advance**

Alias for field number 6

**text\_height**

Alias for field number 5

**text\_width**

Alias for field number 4

**x**

Alias for field number 11

**x1**

Alias for field number 7

**x2**

Alias for field number 9

**y**

Alias for field number 12

**y1**

Alias for field number 8

**y2**

Alias for field number 10

## 4.1.5 wand.sequence — Sequences

New in version 0.3.0.

```
class wand.sequence.Sequence (image)
```

The list-like object that contains every *SingleImage* in the *Image* container. It implements `collections.Sequence` protocol.

New in version 0.3.0.

**append** (*image*)

S.append(object) – append object to the end of the sequence

**current\_index**

(`numbers.Integral`) The current index of its internal iterator.

---

**Note:** It's only for internal use.

---

**extend** (*images*, *offset=None*)

S.extend(iterable) – extend sequence by appending elements from the iterable

**index\_context** (\*\**kws*)

Scoped setter of `current_index`. Should be used for `with` statement e.g.:

```
with image.sequence.index_context(3):
 print(image.size)
```

---

**Note:** It's only for internal use.

---

**insert** (*index*, *image*)

S.insert(index, object) – insert object before index

**class** wand.sequence.**SingleImage** (*wand*, *container*, *c\_original\_resource*)

Each single image in `Image` container. For example, it can be a frame of GIF animation.

Note that all changes on single images are invisible to their containers until they are `close()`d (`destroy()`ed).

New in version 0.3.0.

**container = None**

(`wand.image.Image`) The container image.

**delay**

(`numbers.Integral`) The delay to pause before display the next image (in the `sequence` of its `container`). It's hundredths of a second.

**destroy** ()

Cleans up the resource explicitly. If you use the resource in `with` statement, it was called implicitly so have not to call it.

**index**

(`numbers.Integral`) The index of the single image in the `container` image.

## 4.1.6 wand.resource — Global resource management

There is the global resource to manage in MagickWand API. This module implements automatic global resource management through reference counting.

**wand.resource.genesis** ()

Instantiates the MagickWand API.

**Warning:** Don't call this function directly. Use `increment_refcount()` and `decrement_refcount()` functions instead.

**wand.resource.terminus** ()

Cleans up the MagickWand API.

**Warning:** Don't call this function directly. Use `increment_refcount()` and `decrement_refcount()` functions instead.

`wand.resource.increment_refcount()`

Increments the `reference_count` and instantiates the MagickWand API if it is the first use.

`wand.resource.decrement_refcount()`

Decrements the `reference_count` and cleans up the MagickWand API if it will be no more used.

**class** `wand.resource.Resource`

Abstract base class for MagickWand object that requires resource management. Its all subclasses manage the resource semiautomatically and support `with` statement as well:

```
with Resource() as resource:
 # use the resource...
pass
```

It doesn't implement constructor by itself, so subclasses should implement it. Every constructor should assign the pointer of its resource data into `resource` attribute inside of `with allocate()` context. For example:

```
class Pizza(Resource):
 '''My pizza yummy.'''

 def __init__(self):
 with self.allocate():
 self.resource = library.NewPizza()
```

New in version 0.1.2.

**allocate** (*\*\*kws*)

Allocates the memory for the resource explicitly. Its subclasses should assign the created resource into `resource` attribute inside of this context. For example:

```
with resource.allocate():
 resource.resource = library.NewResource()
```

**c\_clear\_exception** = `NotImplemented`

(`ctypes.CFUNCTYPE`) The `ctypes` function that clears an exception of the `resource`.

---

**Note:** It is an abstract attribute that has to be implemented in the subclass.

---

**c\_destroy\_resource** = `NotImplemented`

(`ctypes.CFUNCTYPE`) The `ctypes` function that destroys the `resource`.

---

**Note:** It is an abstract attribute that has to be implemented in the subclass.

---

**c\_get\_exception** = `NotImplemented`

(`ctypes.CFUNCTYPE`) The `ctypes` function that gets an exception from the `resource`.

---

**Note:** It is an abstract attribute that has to be implemented in the subclass.

---

**c\_is\_resource = NotImplemented**

(`ctypes.CFUNCTYPE`) The `ctypes` predicate function that returns whether the given pointer (that contains a resource data usually) is a valid resource.

---

**Note:** It is an abstract attribute that has to be implemented in the subclass.

---

**destroy()**

Cleans up the resource explicitly. If you use the resource in `with` statement, it was called implicitly so have not to call it.

**get\_exception()**

Gets a current exception instance.

**Returns** a current exception. it can be `None` as well if any errors aren't occurred

**Return type** `wand.exceptions.WandException`

**raise\_exception(stacklevel=1)**

Raises an exception or warning if it has occurred.

**resource**

Internal pointer to the resource instance. It may raise `DestroyedResourceError` when the resource has destroyed already.

**exception** `wand.resource.DestroyedResourceError`

An error that rises when some code tries access to an already destroyed resource.

Changed in version 0.3.0: It becomes a subtype of `wand.exceptions.WandException`.

## 4.1.7 wand.exceptions — Errors and warnings

This module maps MagickWand API's errors and warnings to Python's native exceptions and warnings. You can catch all MagickWand errors using Python's natural way to catch errors.

**See also:**

[ImageMagick Exceptions](#)

New in version 0.1.1.

**exception** `wand.exceptions.BaseError`

Bases: `wand.exceptions.WandException`

Base class for Wand-related errors.

New in version 0.4.4.

**exception** `wand.exceptions.BaseFatalError`

Bases: `wand.exceptions.WandException`

Base class for Wand-related fatal errors.

New in version 0.4.4.

**exception** `wand.exceptions.BaseWarning`

Bases: `wand.exceptions.WandException`, `exceptions.Warning`

Base class for Wand-related warnings.

New in version 0.4.4.

**exception** `wand.exceptions.BlobError`

Bases: `wand.exceptions.BaseError`, `exceptions.IOError`

A binary large object could not be allocated, read, or written.

**exception** `wand.exceptions.BlobFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.IOError`

A binary large object could not be allocated, read, or written.

**exception** `wand.exceptions.BlobWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.IOError`

A binary large object could not be allocated, read, or written.

`wand.exceptions.CODE_MAP = [(<class 'wand.exceptions.BaseWarning'>, 'Warning'), (<class 'wand.exceptions.BlobError'>, 'BlobError'), (<class 'wand.exceptions.BlobFatalError'>, 'BlobFatalError'), (<class 'wand.exceptions.BlobWarning'>, 'BlobWarning'), (<class 'wand.exceptions.CacheError'>, 'CacheError'), (<class 'wand.exceptions.CacheFatalError'>, 'CacheFatalError'), (<class 'wand.exceptions.CacheWarning'>, 'CacheWarning'), (<class 'wand.exceptions.CoderError'>, 'CoderError'), (<class 'wand.exceptions.CoderFatalError'>, 'CoderFatalError'), (<class 'wand.exceptions.CoderWarning'>, 'CoderWarning'), (<class 'wand.exceptions.ConfigureError'>, 'ConfigureError'), (<class 'wand.exceptions.ConfigureFatalError'>, 'ConfigureFatalError'), (<class 'wand.exceptions.ConfigureWarning'>, 'ConfigureWarning')]`  
(list) The list of (base\_class, suffix) pairs (for each code). It would be zipped with `DOMAIN_MAP` pairs' last element.

**exception** `wand.exceptions.CacheError`

Bases: `wand.exceptions.BaseError`

Pixels could not be read or written to the pixel cache.

**exception** `wand.exceptions.CacheFatalError`

Bases: `wand.exceptions.BaseFatalError`

Pixels could not be read or written to the pixel cache.

**exception** `wand.exceptions.CacheWarning`

Bases: `wand.exceptions.BaseWarning`

Pixels could not be read or written to the pixel cache.

**exception** `wand.exceptions.CoderError`

Bases: `wand.exceptions.BaseError`

There was a problem with an image coder.

**exception** `wand.exceptions.CoderFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem with an image coder.

**exception** `wand.exceptions.CoderWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem with an image coder.

**exception** `wand.exceptions.ConfigureError`

Bases: `wand.exceptions.BaseError`

There was a problem getting a configuration file.

**exception** `wand.exceptions.ConfigureFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem getting a configuration file.

**exception** `wand.exceptions.ConfigureWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem getting a configuration file.

**exception** `wand.exceptions.CorruptImageError`

Bases: `wand.exceptions.BaseError`, `exceptions.ValueError`

The image file may be corrupt.

**exception** `wand.exceptions.CorruptImageFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.ValueError`

The image file may be corrupt.

**exception** `wand.exceptions.CorruptImageWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.ValueError`

The image file may be corrupt.

`wand.exceptions.DOMAIN_MAP = [('ResourceLimit', 'A program resource is exhausted e.g. not enough memory')]`  
 (list) A list of error/warning domains, these descriptions and codes. The form of elements is like: (domain name, description, codes).

**exception** `wand.exceptions.DelegateError`

Bases: `wand.exceptions.BaseError`

An ImageMagick delegate failed to complete.

**exception** `wand.exceptions.DelegateFatalError`

Bases: `wand.exceptions.BaseFatalError`

An ImageMagick delegate failed to complete.

**exception** `wand.exceptions.DelegateWarning`

Bases: `wand.exceptions.BaseWarning`

An ImageMagick delegate failed to complete.

**exception** `wand.exceptions.DrawError`

Bases: `wand.exceptions.BaseError`

A drawing operation failed.

**exception** `wand.exceptions.DrawFatalError`

Bases: `wand.exceptions.BaseFatalError`

A drawing operation failed.

**exception** `wand.exceptions.DrawWarning`

Bases: `wand.exceptions.BaseWarning`

A drawing operation failed.

**exception** `wand.exceptions.FileOpenError`

Bases: `wand.exceptions.BaseError`, `exceptions.IOError`

The image file could not be opened for reading or writing.

**exception** `wand.exceptions.FileOpenFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.IOError`

The image file could not be opened for reading or writing.

**exception** `wand.exceptions.FileOpenWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.IOError`

The image file could not be opened for reading or writing.

**exception** `wand.exceptions.ImageError`

Bases: `wand.exceptions.BaseError`

The operation could not complete due to an incompatible image.

**exception** `wand.exceptions.ImageFatalError`

Bases: `wand.exceptions.BaseFatalError`

The operation could not complete due to an incompatible image.

**exception** `wand.exceptions.ImageWarning`

Bases: `wand.exceptions.BaseWarning`

The operation could not complete due to an incompatible image.

**exception** `wand.exceptions.MissingDelegateError`

Bases: `wand.exceptions.BaseError`, `exceptions.ImportError`

The image type can not be read or written because the appropriate; delegate is missing.

**exception** `wand.exceptions.MissingDelegateFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.ImportError`

The image type can not be read or written because the appropriate; delegate is missing.

**exception** `wand.exceptions.MissingDelegateWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.ImportError`

The image type can not be read or written because the appropriate; delegate is missing.

**exception** `wand.exceptions.ModuleError`

Bases: `wand.exceptions.BaseError`

There was a problem with an image module.

**exception** `wand.exceptions.ModuleFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem with an image module.

**exception** `wand.exceptions.ModuleWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem with an image module.

**exception** `wand.exceptions.MonitorError`

Bases: `wand.exceptions.BaseError`

There was a problem activating the progress monitor.

**exception** `wand.exceptions.MonitorFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem activating the progress monitor.

**exception** `wand.exceptions.MonitorWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem activating the progress monitor.

**exception** `wand.exceptions.OptionError`

Bases: `wand.exceptions.BaseError`

A command-line option was malformed.



**exception** `wand.exceptions.OptionFatalError`

Bases: `wand.exceptions.BaseFatalError`

A command-line option was malformed.

**exception** `wand.exceptions.OptionWarning`

Bases: `wand.exceptions.BaseWarning`

A command-line option was malformed.

**exception** `wand.exceptions.PolicyError`

Bases: `wand.exceptions.BaseError`

A policy denies access to a delegate, coder, filter, path, or resource.

**exception** `wand.exceptions.PolicyFatalError`

Bases: `wand.exceptions.BaseFatalError`

A policy denies access to a delegate, coder, filter, path, or resource.

**exception** `wand.exceptions.PolicyWarning`

Bases: `wand.exceptions.BaseWarning`

A policy denies access to a delegate, coder, filter, path, or resource.

**exception** `wand.exceptions.RandomError`

Bases: `wand.exceptions.BaseError`

There is a problem generating a true or pseudo-random number.

**exception** `wand.exceptions.RandomFatalError`

Bases: `wand.exceptions.BaseFatalError`

There is a problem generating a true or pseudo-random number.

**exception** `wand.exceptions.RandomWarning`

Bases: `wand.exceptions.BaseWarning`

There is a problem generating a true or pseudo-random number.

**exception** `wand.exceptions.RegistryError`

Bases: `wand.exceptions.BaseError`

There was a problem getting or setting the registry.

**exception** `wand.exceptions.RegistryFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem getting or setting the registry.

**exception** `wand.exceptions.RegistryWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem getting or setting the registry.

**exception** `wand.exceptions.ResourceLimitError`

Bases: `wand.exceptions.BaseError`, `exceptions.MemoryError`

A program resource is exhausted e.g. not enough memory.

**exception** `wand.exceptions.ResourceLimitFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.MemoryError`

A program resource is exhausted e.g. not enough memory.

**exception** `wand.exceptions.ResourceLimitWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.MemoryError`

A program resource is exhausted e.g. not enough memory.

**exception** `wand.exceptions.StreamError`

Bases: `wand.exceptions.BaseError`, `exceptions.IOError`

There was a problem reading or writing from a stream.

**exception** `wand.exceptions.StreamFatalError`

Bases: `wand.exceptions.BaseFatalError`, `exceptions.IOError`

There was a problem reading or writing from a stream.

**exception** `wand.exceptions.StreamWarning`

Bases: `wand.exceptions.BaseWarning`, `exceptions.IOError`

There was a problem reading or writing from a stream.

`wand.exceptions.TYPE_MAP = {300: <class 'wand.exceptions.ResourceLimitWarning'>, 305: <c  
(dict) The dictionary of (code, exc_type).`

**exception** `wand.exceptions.TypeError`

Bases: `wand.exceptions.BaseError`

A font is unavailable; a substitution may have occurred.

**exception** `wand.exceptions.TypeFatalError`

Bases: `wand.exceptions.BaseFatalError`

A font is unavailable; a substitution may have occurred.

**exception** `wand.exceptions.TypeWarning`

Bases: `wand.exceptions.BaseWarning`

A font is unavailable; a substitution may have occurred.

**exception** `wand.exceptions.WandError`

Bases: `wand.exceptions.BaseError`

There was a problem specific to the MagickWand API.

**exception** `wand.exceptions.WandException`

Bases: `exceptions.Exception`

All Wand-related exceptions are derived from this class.

**exception** `wand.exceptions.WandFatalError`

Bases: `wand.exceptions.BaseFatalError`

There was a problem specific to the MagickWand API.

**exception** `wand.exceptions.WandLibraryVersionError`

Bases: `wand.exceptions.WandException`

Base class for Wand-related ImageMagick version errors.

New in version 0.3.2.

**exception** `wand.exceptions.WandWarning`

Bases: `wand.exceptions.BaseWarning`

There was a problem specific to the MagickWand API.

**exception** `wand.exceptions.XServerError`

Bases: `wand.exceptions.BaseError`

An X resource is unavailable.

**exception** `wand.exceptions.XServerFatalError`

Bases: `wand.exceptions.BaseFatalError`

An X resource is unavailable.

**exception** `wand.exceptions.XServerWarning`

Bases: `wand.exceptions.BaseWarning`

An X resource is unavailable.

### 4.1.8 `wand.api` — Low-level interfaces

Changed in version 0.1.10: Changed to throw `ImportError` instead of `AttributeError` when the shared library fails to load.

**class** `wand.api.MagickPixelPacket`

**class** `wand.api.PointInfo`

**class** `wand.api.AffineMatrix`

**class** `wand.api.c_magick_char_p`

This subclass prevents the automatic conversion behavior of `ctypes.c_char_p`, allowing memory to be properly freed in the destructor. It must only be used for non-const character pointers returned by ImageMagick functions.

`wand.api.library`

(`ctypes.CDLL`) The MagickWand library.

`wand.api.libc`

(`ctypes.CDLL`) The C standard library.

`wand.api.libmagick`

(`ctypes.CDLL`) The ImageMagick library. It is the same with `library` on platforms other than Windows.

New in version 0.1.10.

`wand.api.load_library()`

Loads the MagickWand library.

**Returns** the MagickWand library and the ImageMagick library

**Return type** `ctypes.CDLL`

### 4.1.9 `wand.compat` — Compatibility layer

This module provides several subtle things to support multiple Python versions (2.6, 2.7, 3.2–3.5) and VM implementations (CPython, PyPy).

`wand.compat.PY3 = False`

(`bool`) Whether it is Python 3.x or not.

`wand.compat.binary` (*string*, *var=None*)

Makes *string* to `str` in Python 2. Makes *string* to `bytes` in Python 3.

**Parameters**

- **string** (*bytes*, *str*, *unicode*) – a string to cast it to *binary\_type*
- **var** (*str*) – an optional variable name to be used for error message

wand.compat.**binary\_type**  
alias of `__builtin__.str`

wand.compat.**encode\_filename** (*filename*)  
If *filename* is a *text\_type*, encode it to *binary\_type* according to filesystem's default encoding.

wand.compat.**file\_types** = (<class 'io.RawIOBase'>, <type 'file'>)  
(*type*, *tuple*) Types for file objects that have `fileno()`.

wand.compat.**nested** (*\*args*, *\*\*kws*)  
Combine multiple context managers into a single nested context manager.

This function has been deprecated in favour of the multiple manager form of the `with` statement.

The one advantage of this function over the multiple manager form of the `with` statement is that argument unpacking allows it to be used with a variable number of context managers as follows:

**with nested(\*managers):** `do_something()`

wand.compat.**string\_type**  
alias of `__builtin__.basestring`

wand.compat.**text** (*string*)  
Makes *string* to *str* in Python 3. Does nothing in Python 2.

**Parameters** **string** (*bytes*, *str*, *unicode*) – a string to cast it to *text\_type*

wand.compat.**text\_type**  
alias of `__builtin__.unicode`

**class** wand.compat.**xrange** (*stop*) → xrange object  
`xrange(start, stop[, step])` -> xrange object

Like `range()`, but instead of returning a list, returns an object that generates the numbers in the range on demand. For looping, this is slightly faster than `range()` and more memory efficient.

### 4.1.10 wand.display — Displaying images

The `display()` functions shows you the image. It is useful for debugging.

If you are in Mac, the image will be opened by your default image application (**Preview.app** usually).

If you are in Windows, the image will be opened by **imshow.exe**, or your default image application (**Windows Photo Viewer** usually) if **imshow.exe** is unavailable.

You can use it from CLI also. Execute `wand.display` module through `python -m` option:

```
$ python -m wand.display wandtests/assets/mona-lisa.jpg
```

New in version 0.1.9.

wand.display.**display** (*image*, *server\_name*=':0')  
Displays the passed image.

#### Parameters

- **image** (*Image*) – an image to display
- **server\_name** (*str*) – X11 server name to use. it is ignored and not used for Mac. default is `':0'`

### 4.1.11 wand.version — Version data

You can find the current version in the command line interface:

```
$ python -m wand.version
0.4.5
$ python -m wand.version --verbose
Wand 0.4.5
ImageMagick 6.7.7-6 2012-06-03 Q16 http://www.imagemagick.org
$ python -m wand.version --config | grep CC | cut -d : -f 2
gcc -std=gnu99 -std=gnu99
$ python -m wand.version --fonts | grep Helvetica
Helvetica
Helvetica-Bold
Helvetica-Light
Helvetica-Narrow
Helvetica-Oblique
$ python -m wand.version --formats | grep CMYK
CMYK
CMYKA
```

New in version 0.2.0: The command line interface.

New in version 0.2.2: The `--verbose/-v` option which also prints ImageMagick library version for CLI.

New in version 0.4.1: The `--fonts`, `--formats`, & `--config` option allows printing additional information about ImageMagick library.

`wand.version.VERSION = '0.4.5'`  
(basestring) The version string e.g. '0.1.2'.

Changed in version 0.1.9: Becomes string. (It was `tuple` before.)

`wand.version.VERSION_INFO = (0, 4, 5)`  
(`tuple`) The version tuple e.g. (0, 1, 2).

Changed in version 0.1.9: Becomes `tuple`. (It was string before.)

`wand.version.MAGICK_VERSION = None`  
(basestring) The version string of the linked ImageMagick library. The exactly same string to the result of `GetMagickVersion()` function.

Example:

```
'ImageMagick 6.7.7-6 2012-06-03 Q16 http://www.imagemagick.org'
```

New in version 0.2.1.

`wand.version.MAGICK_VERSION_INFO = None`  
(`tuple`) The version tuple e.g. (6, 7, 7, 6) of `MAGICK_VERSION`.

New in version 0.2.1.

`wand.version.MAGICK_VERSION_NUMBER = None`  
(`numbers.Integral`) The version number of the linked ImageMagick library.

New in version 0.2.1.

`wand.version.MAGICK_RELEASE_DATE = None`  
(`datetime.date`) The release date of the linked ImageMagick library. Equivalent to the result of `GetMagickReleaseDate()` function.

New in version 0.2.1.

wand.version.**MAGICK\_RELEASE\_DATE\_STRING** = None

(basestring) The date string e.g. '2012-06-03' of *MAGICK\_RELEASE\_DATE\_STRING*. This value is the exactly same string to the result of `GetMagickReleaseDate()` function.

New in version 0.2.1.

wand.version.**QUANTUM\_DEPTH** = None

(*numbers.Integral*) The quantum depth configuration of the linked ImageMagick library. One of 8, 16, 32, or 64.

New in version 0.3.0.

wand.version.**configure\_options** (pattern='\*')

Queries ImageMagick library for configurations options given at compile-time.

Example: Find where the ImageMagick documents are installed:

```
>>> from wand.version import configure_options
>>> configure_options('DOC*')
{'DOCUMENTATION_PATH': '/usr/local/share/doc/ImageMagick-6'}
```

**Parameters** *pattern* (basestring) – A term to filter queries against. Supports wildcard '\*' characters. Default patterns '\*' for all options.

**Returns** Directory of configuration options matching given pattern

**Return type** *collections.defaultdict*

wand.version.**fonts** (pattern='\*')

Queries ImageMagick library for available fonts.

Available fonts can be configured by defining *types.xml*, *type-ghostscript.xml*, or *type-windows.xml*. Use *wand.version.configure\_options()* to locate system search path, and *resources* article for defining xml file.

Example: List all bold Helvetica fonts:

```
>>> from wand.version import fonts
>>> fonts('*Helvetica*Bold*')
['Helvetica-Bold', 'Helvetica-Bold-Oblique', 'Helvetica-BoldOblique',
 'Helvetica-Narrow-Bold', 'Helvetica-Narrow-BoldOblique']
```

**Parameters** *pattern* (basestring) – A term to filter queries against. Supports wildcard '\*' characters. Default patterns '\*' for all options.

**Returns** Sequence of matching fonts

**Return type** *collections.Sequence*

wand.version.**formats** (pattern='\*')

Queries ImageMagick library for supported formats.

Example: List supported PNG formats:

```
>>> from wand.version import formats
>>> formats('PNG*')
['PNG', 'PNG00', 'PNG8', 'PNG24', 'PNG32', 'PNG48', 'PNG64']
```

**Parameters** *pattern* (basestring) – A term to filter formats against. Supports wildcards '\*' characters. Default pattern '\*' for all formats.

**Returns** Sequence of matching formats

**Return type** `collections.Sequence`





#### 5.1 Mailing list

Wand has the list for users. If you want to subscribe the list, just send a mail to:

[wand@librelist.com](mailto:wand@librelist.com)

The [list archive](#) provided by [Librelist](#) is synchronized every hour.

#### 5.2 Stack Overflow

There's a Stack Overflow tag for Wand:

<http://stackoverflow.com/questions/tagged/wand>

Freely ask questions about Wand including troubleshooting. Thanks for [sindikar](#)'s contribution.

#### 5.3 Quora

There's a Quora topic for Wand: [Wand \(ImageMagick binding\)](#). Be free to add questions to the topic, though it's suitable for higher-level questions rather than troubleshooting.



## CHAPTER 6

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### Open source

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Wand is an open source software written by [Hong Minhee](#) (initially written for [StyleShare](#)). See also the complete list of [contributors](#) as well. The source code is distributed under [MIT license](#) and you can find it at [GitHub repository](#). Check out now:

```
$ git clone git://github.com/emcconville/wand.git
```

If you find a bug, please notify to [our issue tracker](#). Pull requests are always welcome!

We discuss about Wand's development on IRC. Come [#wand](#) channel on freenode network.

Check out [Wand Changelog](#) also.



## CHAPTER 7

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