imgviz Documentation

Release 1.3.0

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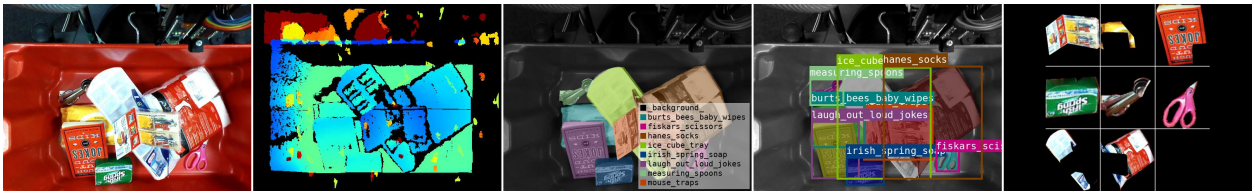
CONTENTS

Image Visualization Tools.



CHAPTER

ONE

INSTALLATION

```
pip install imgviz

# there are optional dependencies like skimage, below installs all.
pip install imgviz[all]
```

1.1 Getting Started


```
#!/usr/bin/env python
# flake8: noqa

import os.path as osp

import matplotlib.pyplot as plt

here = osp.dirname(osp.abspath(__file__))  # NOQA

# -----------------------------------------------------------------------------
# GETTING_STARTED {{
import imgviz


# sample data of rgb, depth, class label and instance masks
data = imgviz.data.arc2017()

rgb = data["rgb"]
gray = imgviz.rgb2gray(rgb)

# colorize depth image with JET colormap
depth = data["depth"]
depthviz = imgviz.depth2rgb(depth, min_value=0.3, max_value=1)
```

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```
# colorize label image
class_label = data["class_label"]
labelviz = imgviz.label2rgb(class_label, image=gray, label_names=data["class_names"],␣
↪font_size=20)

# instance bboxes
bboxes = data["bboxes"].astype(int)
labels = data["labels"]
masks = data["masks"] == 1
captions = [data["class_names"][l] for l in labels]
maskviz = imgviz.instances2rgb(gray, masks=masks, labels=labels, captions=captions)

# tile instance masks
insviz = [(rgb * m[:, :, None])[b[0] : b[2], b[1] : b[3]] for b, m in zip(bboxes, masks)]
insviz = imgviz.tile(imgs=insviz, border=(255, 255, 255))
insviz = imgviz.resize(insviz, height=rgb.shape[0])

# tile visualization
tiled = imgviz.tile(
    [rgb, depthviz, labelviz, maskviz, insviz],
    shape=(1, 5),
    border=(255, 255, 255),
    border_width=5,
)
# }} GETTING_STARTED
# -----------------------------------------------------------------------------

out_file = osp.join(here, ".readme/getting_started.jpg")
imgviz.io.imsave(out_file, tiled)

img = imgviz.io.imread(out_file)
plt.imshow(img)
plt.axis("off")
plt.show()
```

1.2 API Reference

1.2.1 Functions

imgviz.asgray	Convert any array to gray image.
imgviz.gray2rgb	Covnert gray to rgb.
imgviz.rgb2gray	Covnert rgb to gray.
imgviz.rgb2rgba	Convert rgb to rgba.
imgviz.rgb2hsv	Convert rgb to hsv.
imgviz.rgba2rgb	Convert rgba to rgb.
imgviz.hsv2rgb	Convert hsv to rgb.
imgviz.depth2rgb	Convert depth to rgb.
imgviz.flow2rgb	Visualize optical flow.

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Table 1 – continued from previous page

imgviz.instances2rgb	Convert instances to rgb.
imgviz.label_colormap	Label colormap.
imgviz.label2rgb	Convert label to rgb.
imgviz.nchannel2rgb	Convert nchannel array to rgb by PCA.
imgviz.plot_trajectory	Plot the trajectory using transform matrices
imgviz.centerize	Centerize image for specified image size
imgviz.normalize	Normalize image.
imgviz.resize	Resize image.
imgviz.tile	Tile images.

imgviz.asgray

imgviz.**asgray**(*img*)
Convert any array to gray image.

Parameters **img** (*numpy.ndarray*) – Input image.

Returns **gray** – Output gray image.

Return type numpy.ndarray, (H, W), np.uint8

imgviz.gray2rgb

imgviz.**gray2rgb**(*gray*)
Covnert gray to rgb.

Parameters **gray** (*numpy.ndarray, (H, W), np.uint8*) – Input gray image.

Returns **rgb** – Output rgb image.

Return type numpy.ndarray, (H, W, 3), np.uint8

imgviz.rgb2gray

imgviz.**rgb2gray**(*rgb*)
Covnert rgb to gray.

Parameters **rgb** (*numpy.ndarray, (H, W, 3), np.uint8*) – Input rgb image.

Returns **gray** – Output gray image.

Return type numpy.ndarray, (H, W)

imgviz.rgb2rgba

imgviz.**rgb2rgba**(*rgb*)
Convert rgb to rgba.

Parameters **rgb** (*numpy.ndarray, (H, W, 3), np.uint8*) – Input rgb image.

Returns **rgba** – Output rgba image.

Return type numpy.ndarray, (H, W, 4), np.uint8

imgviz.rgb2hsv

imgviz.**rgb2hsv**(*rgb*)
Convert rgb to hsv.

Parameters **rgb** (*numpy.ndarray, (H, W, 3), np.uint8*) – Input rgb image.

Returns **hsv** – Output hsv image.

Return type numpy.ndarray, (H, W, 3), np.uint8

imgviz.rgba2rgb

imgviz.**rgba2rgb**(*rgba*)
Convert rgba to rgb.

Parameters **rgba** (*numpy.ndarray, (H, W, 4), np.uint8*) – Input rgba image.

Returns **rgb** – Output rgb image.

Return type numpy.ndarray, (H, W, 3), np.uint8

imgviz.hsv2rgb

imgviz.**hsv2rgb**(*hsv*)
Convert hsv to rgb.

Parameters **hsv** (*numpy.ndarray, (H, W, 3), np.uint8*) – Input hsv image.

Returns **rgb** – Output rgb image.

Return type numpy.ndarray, (H, W, 3), np.uint8

imgviz.depth2rgb

imgviz.**depth2rgb**(*depth*, *min_value=None*, *max_value=None*, *colormap='jet'*, *dtype=<class 'numpy.uint8'>*)
Convert depth to rgb.

Parameters

- **depth** (*numpy.ndarray, (H, W), float*) – Depth image.
- **dtype** (*numpy.dtype*) – Dtype of output image. default: np.uint8
- **min_value** (*float, optional*) – Minimum value for colorizing.
- **max_value** (*float, optional*) – Maximum value for colorizing.
- **colormap** (*str, optional*) – Colormap, default: 'jet'.

Returns **rgb** – Output colorized image.

Return type numpy.ndarray, (H, W, 3), np.uint8

imgviz.flow2rgb

imgviz.**flow2rgb**(*flow_uv*)
Visualize optical flow.

Parameters **flow_uv** (*numpy.ndarray, (H, W, 2), float*) – Optical flow.

Returns **dst** – RGB image.

Return type numpy.ndarray

imgviz.instances2rgb

imgviz.**instances2rgb**(*image*, *labels*, *bboxes=None*, *masks=None*, *captions=None*, *font_size=25*, *line_width=5*, *boundary_width=1*, *alpha=0.7*, *colormap=None*, *font_path=None*)
Convert instances to rgb.

Parameters

- **image** (*numpy.ndarray, (H, W, 3), numpy.uint8*) – RGB image.
- **labels** (*list of int, (N,)*) – Labels.
- **bboxes** (*list of numpy.ndarray, (N, 4), float*) – Bounding boxes.
- **masks** (*numpy.ndarray, (N, H, W), bool*) – Masks.
- **captions** (*list of str*) – Captions.
- **font_size** (*int*) – Font size.
- **line_width** (*int*) – Line width.
- **alpha** (*float*) – Alpha of RGB.
- **colormap** (*numpy.ndarray, (M, 3), numpy.uint8*) – Label id to RGB color.

Returns **dst** – Visualized image.

Return type numpy.ndarray, (H, W, 3), numpy.uint8

imgviz.label_colormap

imgviz.**label_colormap**(*n_label=256*, *value=None*)
Label colormap.

Parameters

- **n_labels** (*int*) – Number of labels (default: 256).
- **value** (*float or int*) – Value scale or value of label color in HSV space.

Returns **cmap** – Label id to colormap.

Return type numpy.ndarray, (N, 3), numpy.uint8

imgviz.label2rgb

imgviz.**label2rgb**(*label*, *image=None*, *alpha=0.5*, *label_names=None*, *font_size=30*, *thresh_suppress=0*, *colormap=None*, *loc='rb'*, *font_path=None*)

Convert label to rgb.

Parameters

- **label** (*numpy.ndarray, (H, W), int*) – Label image.
- **image** (*numpy.ndarray, (H, W, 3), numpy.uint8*) – RGB image.
- **alpha** (*float*) – Alpha of RGB (default: 0.5).
- **label_names** (*list or dict of string*) – Label id to label name.
- **font_size** (*int*) – Font size (default: 30).
- **thresh_suppress** (*float*) – Threshold of label ratio in the label image.
- **colormap** (*numpy.ndarray, (M, 3), numpy.uint8*) – Label id to color. By default, *label_colormap()* is used.
- **loc** (*string*) – Location of legend (default: 'rb'). 'centroid', 'lt' and 'rb' are supported.
- **font_path** (*str*) – Font path.

Returns **res** – Visualized image.

Return type numpy.ndarray, (H, W, 3), numpy.uint8

imgviz.nchannel2rgb

imgviz.**nchannel2rgb**(*nchannel*, *dtype=<class 'numpy.uint8'>*, *pca=None*)

Convert nchannel array to rgb by PCA.

Parameters

- **nchannel** (*numpy.ndarray, (H, W, C), float*) – N channel image.
- **dtype** (*numpy.dtype*) – Dtype (default: numpy.uint8).
- **pca** (*sklearn.decomposition.PCA*) – PCA.

Returns **dst** – Visualized image.

Return type numpy.ndarray, (H, W, 3), numpy.uint8

imgviz.plot_trajectory

imgviz.**plot_trajectory**(*transforms*, *is_relative=False*, *mode='xz'*, *style='b.'*, *axis=True*)

Plot the trajectory using transform matrices

Parameters

- **transforms** (*numpy.ndarray*) – transform matrices with the shape of [N, 4, 4] where N is the # of poses.
- **is_relative** (*bool*) – True for relative poses. default: False.
- **mode** (*str*) – x and y axis of trajectory. default: 'xz' following kitti format.
- **style** (*str*) – style of ploting, default: 'b.'

- **axis** (*bool*) – False to disable axis.

Returns **dst** – trajectory

Return type numpy.ndarray

imgviz.centerize

imgviz.**centerize**(*src*, *shape*, *cval=None*, *return_mask=False*, *interpolation='linear'*, *loc='center'*)

Centerize image for specified image size

Parameters

- **src** (*numpy.ndarray*) – Image to centerize
- **shape** (*tuple of int*) – Image shape (height, width) or (height, width, channel)
- **cval** (*int or float or numpy.ndarray*) – Color to be filled in the blank.
- **return_mask** (*numpy.ndarray*) – Mask for centerized image.
- **interpolation** (*str*) – Interpolation method (default: 'linear').
- **loc** (*str*) – Location of image ('center', 'lt', 'rb'). (default: 'center')

Returns **dst** – Centerized image.

Return type numpy.ndarray

imgviz.normalize

imgviz.**normalize**(*src*, *min_value=None*, *max_value=None*, *return_minmax=False*)

Normalize image.

Parameters

- **src** (*numpy.ndarray, (H, W) or (H, W, C), float*) – Input image.
- **min_value** (*float*) – Minimum value.
- **max_value** (*float*) – Maximum value.
- **return_minmax** (*bool*) – Flag to return min_value and max_value.

Returns **dst** – Normalized image in [0, 1].

Return type numpy.ndarray, float

imgviz.resize

imgviz.**resize**(*src*, *height=None*, *width=None*, *interpolation='linear'*, *backend='auto'*)

Resize image.

Parameters

- **src** (*numpy.ndarray, (H, W) or (H, W, C)*) – Input image.
- **height** (*int, optional*) – Height of image. If not given, the image is resized based on width keeping image ratio.
- **width** (*int, optional*) – Width of image. If not given, the image is resized based on height keeping image ratio.

- **interpolation** (*str*) – Resizing interpolation (default: 'linear').

  'linear': Linear interpolation.

  'nearest': Interpolate with the nearest value.

- **backend** (*str*) – Resizing backend (default: 'auto').

  'pillow': Pillow is used.

  'opencv': OpenCV is used.

Returns **dst** – Resized image.

Return type numpy.ndarray

imgviz.tile

imgviz.**tile**(*imgs*, *shape=None*, *cval=None*, *border=None*, *border_width=None*)

Tile images.

Parameters

- **imgs** (*numpy.ndarray*) – Image list which should be tiled.
- **shape** (*tuple of int*) – Tile shape.
- **cval** (*array-like, optional*) – Color to fill the background. Default is (0, 0, 0).
- **border** (*array-like, optional*) – Color for the border. If None, the border is not drawn.
- **border_width** (*int*) – Pixel size of the border.

Returns **dst** – Tiled image.

Return type numpy.ndarray

1.2.2 Classes

imgviz.Depth2RGB	Convert depth array to rgb.
imgviz.Nchannel2RGB	Convert nchannel array to rgb by PCA.

imgviz.Depth2RGB

class imgviz.**Depth2RGB**(*min_value=None*, *max_value=None*, *colormap='jet'*)

Convert depth array to rgb.

Parameters

- **min_value** (*float, optional*) – Minimum value for colorizing.
- **max_value** (*float, optional*) – Maximum value for colorizing.
- **colormap** (*str, optional*) – Colormap, default: 'jet'.

__init__(*min_value=None*, *max_value=None*, *colormap='jet'*)

Methods

__init__([min_value, max_value, colormap])	

Attributes

max_value	Maximum value of depth.
min_value	Minimum value of depth.

imgviz.Nchannel2RGB

class imgviz.**Nchannel2RGB**(*pca=None*)

Convert nchannel array to rgb by PCA.

Parameters **pca** (*sklearn.decomposition.PCA*) – PCA.

__init__(*pca=None*)

Methods

__init__([pca])	

Attributes

pca	PCA for N channel to 3.

1.2.3 Draw Module

imgviz.draw.circle	Draw circle on numpy array with Pillow.
imgviz.draw.rectangle	Draw rectangle on numpy array with Pillow.
imgviz.draw.star	Draw star on numpy array with Pillow.
imgviz.draw.text	Draw text on numpy array with Pillow.
imgviz.draw.text_in_rectangle	Draw text in a rectangle.
imgviz.draw.text_size	Get text size (height and width).
imgviz.draw.triangle	Draw triangle on numpy array with Pillow.

imgviz.draw.circle

imgviz.draw.**circle**(*src*, *center*, *diameter*, *fill=None*, *outline=None*, *width=0*)

Draw circle on numpy array with Pillow.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **center** (*(2,) array-like*) – center is (cy, cx).
- **diameter** (*float*) – Diameter of the circle.
- **fill** (*int or (3,) array-like, optional*) – RGB color to fill the mark. None for no fill. (default: None)
- **outline** (*int or (3,) array-like, optional*) – RGB color to draw the outline.
- **width** (*int, optional*) – Rectangle line width. (default: 0)

Returns **dst** – Output image.

Return type numpy.ndarray

imgviz.draw.rectangle

imgviz.draw.**rectangle**(*src*, *aabb1*, *aabb2*, *fill=None*, *outline=None*, *width=0*)

Draw rectangle on numpy array with Pillow.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **aabb1** (*array-like, (2,)*) – Minimum vertex (y_min, x_min) of the axis aligned bounding box (AABB).
- **aabb2** (*array-like, (2,)*) – Maximum vertex (y_max, x_max) of the AABB.
- **fill** (*int or array-like, (3,), optional*) – RGB color to fill the mark. None for no fill. (default: None)
- **outline** (*int or array-like, (3,), optional*) – RGB color to draw the outline.
- **width** (*int, optional*) – Rectangle line width. (default: 0)

Returns **dst** – Output image.

Return type numpy.ndarray

imgviz.draw.star

imgviz.draw.**star**(*src*, *center*, *size*, *fill=None*, *outline=None*)

Draw star on numpy array with Pillow.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **center** (*(2,) array-like*) – center is (cy, cx).
- **size** (*float*) – Diameter to create the star.
- **fill** (*int or (3,) array-like, optional*) – RGB color to fill the mark. None for no fill. (default: None)

- **outline** (*int or (3,) array-like, optional*) – RGB color to draw the outline.

Returns **dst** – Output image.

Return type numpy.ndarray

imgviz.draw.text

imgviz.draw.**text**(*src*, *yx*, *text*, *size*, *color=(0, 0, 0)*, *font_path=None*)

Draw text on numpy array with Pillow.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **yx** (*(2,) array-like*) – Left top point of the text.
- **text** (*str*) – Text to draw.
- **size** (*int*) – Text size in pixel.
- **color** (*(3,) array-like*) – Text RGB color in uint8. Default is (0, 0, 0), which is black.
- **font_path** (*str*) – Default font is DejaVuSansMono in matplotlib.

Returns **dst** – Output image.

Return type numpy.ndarray

imgviz.draw.text_in_rectangle

imgviz.draw.**text_in_rectangle**(*src*, *loc*, *text*, *size*, *background*, *color=None*, *aabb1=None*, *aabb2=None*, *font_path=None*)

Draw text in a rectangle.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **loc** (*str*) – Location of text. It must be one of following: lt, rt, lb, or rb.
- **text** (*str*) – Text to draw.
- **size** (*int*) – Text size in pixel.
- **background** (*(3,) array-like*) – Background color in uint8.
- **color** (*(3,) array-like*) – Text RGB color in uint8. If None, the color is determined by background color. (default: None)
- **aabb1** (*(2,) array-like*) – Coordinate of the rectangle (y_min, x_min), (y_max, x_max). Default is (0, 0), (height, width).
- **aabb2** (*(2,) array-like*) – Coordinate of the rectangle (y_min, x_min), (y_max, x_max). Default is (0, 0), (height, width).

Returns **dst** – Output image.

Return type numpy.ndarray

imgviz.draw.text_size

imgviz.draw.**text_size**(*text*, *size*, *font_path=None*)
Get text size (height and width).

Parameters

- **text** (*str*) – Text.
- **size** (*int*) – Pixel font size.

Returns

- **height** (*int*) – Text height.
- **width** (*int*) – Text width.

imgviz.draw.triangle

imgviz.draw.**triangle**(*src*, *center*, *size*, *fill=None*, *outline=None*)
Draw triangle on numpy array with Pillow.

Parameters

- **src** (*numpy.ndarray*) – Input image.
- **center** (*(2,) array-like*) – center is (cy, cx).
- **size** (*float*) – Diameter to create the star.
- **fill** (*int or (3,) array-like, optional*) – RGB color to fill the mark. None for no fill. (default: None)
- **outline** (*int or (3,) array-like, optional*) – RGB color to draw the outline.

Returns **dst** – Output image.

Return type numpy.ndarray

1.2.4 IO Module

imgviz.io.imread	Read image from file.
imgviz.io.imsave	Save image to file.
imgviz.io.cv_imshow	Show image with OpenCV.
imgviz.io.cv_waitkey	Wait key for the OpenCV window.
imgviz.io.pyplot_to_numpy	Convert pyplot state to numpy array.
imgviz.io.pyglet_imshow	Show image with pyglet.
imgviz.io.pyglet_run	Start pyglet mainloop.
imgviz.io.PygletThreadedImageViewer	

imgviz.io.imread

imgviz.io.imsave

imgviz.io.cv_imshow

imgviz.io.cv_waitkey

imgviz.io.pyplot_to_numpy

imgviz.io.pyglet_imshow

imgviz.io.pyglet_run

imgviz.io.PygletThreadedImageViewer

CHAPTER

TWO

INDICES AND TABLES

- genindex
- search

INDEX