Colour - Checker Detection Documentation

Release 0.1.2

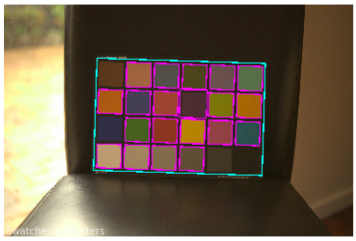
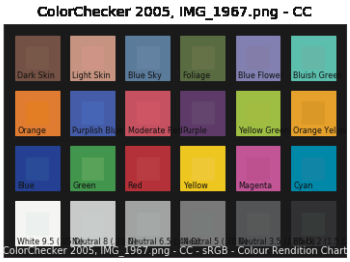
Colour Developers

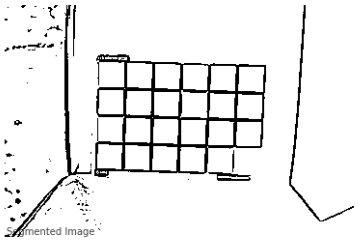
Nov 28, 2020

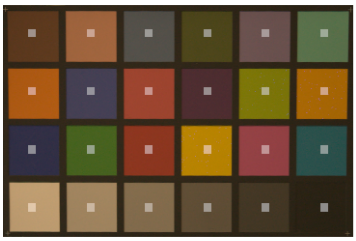
CONTENTS

A Python package implementing various colour checker detection algorithms and related utilities.

It is open source and freely available under the New BSD License terms.



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ONE

1.1 FEATURES

The following colour checker detection algorithms are implemented:

- Segmentation

CHAPTER

TWO

1.2 INSTALLATION

Because of their size, the resources dependencies needed to run the various examples and unit tests are not provided within the Pypi package. They are separately available as Git Submodules when cloning the repository.

2.1 1.2.1 Primary Dependencies

Colour - Checker Detection requires various dependencies in order to run:

- python>=3.5
- colour-science
- opencv-python>=4

2.2 1.2.2 Pypi

Once the dependencies are satisfied, **Colour - Checker Detection** can be installed from the Python Package Index by issuing this command in a shell:

```
pip install --user colour-checker-detection
```

The tests suite dependencies are installed as follows:

```
pip install --user 'colour-checker-detection[tests]'
```

The documentation building dependencies are installed as follows:

```
pip install --user 'colour-checker-detection[docs]'
```

The overall development dependencies are installed as follows:

```
pip install --user 'colour-checker-detection[development]'
```

CHAPTER

THREE

1.3 USAGE

3.1 1.3.1 API

The main reference for Colour - Checker Detection is the manual:

3.1.1 Colour - Checker Detection Manual

3.1.1.1 Reference

Colour - Checker Detection

Colour Checker Detection

- *Segmentation*

Segmentation

`colour_checker_detection`

`colour_checkers_coordinates_segmentation`(image)	Detects the colour checkers coordinates in given image $image$ using segmentation.
`extract_colour_checkers_segmentation`(image)	Extracts the colour checkers sub-images in given image using segmentation.
`detect_colour_checkers_segmentation`(image[, ...])	Detects the colour checkers swatches in given image using segmentation.

colour_checker_detection.colour_checkers_coordinates_segmentation

`colour_checker_detection.`**`colour_checkers_coordinates_segmentation`**(*image*, *additional_data=False*)

Detects the colour checkers coordinates in given image $image$ using segmentation.

This is the core detection definition. The process is a follows:

- Input image $image$ is converted to a grayscale image $image_g$.
- Image $image_g$ is denoised.
- Image $image_g$ is thresholded/segmented to image $image_s$.
- Image $image_s$ is eroded and dilated to cleanup remaining noise.

- Contours are detected on image $image_s$.
- Contours are filtered to only keep squares/swatches above and below defined surface area.
- Squares/swatches are clustered to isolate region-of-interest that are potentially colour checkers: Contours are scaled by a third so that colour checkers swatches are expected to be joined, creating a large rectangular cluster. Rectangles are fitted to the clusters.
- Clusters with an aspect ratio different to the expected one are rejected, a side-effect is that the complementary pane of the *X-Rite ColorChecker Passport* is omitted.
- Clusters with a number of swatches close to `SWATCHES` are kept.

Parameters

- **image** (`array_like`) – Image to detect the colour checkers in.
- **additional_data** (`bool, optional`) – Whether to output additional data.

Returns List of colour checkers coordinates or `ColourCheckersDetectionData` class instance with additional data.

Return type list or ColourCheckersDetectionData

Notes

- Multiple colour checkers can be detected if presented in `image`.

Examples

```
>>> import os
>>> from colour import read_image
>>> from colour_checker_detection import TESTS_RESOURCES_DIRECTORY
>>> path = os.path.join(TESTS_RESOURCES_DIRECTORY,
...                     'colour_checker_detection', 'detection',
...                     'IMG_1967.png')
>>> image = read_image(path)
>>> colour_checkers_coordinates_segmentation(image)
[array([[1065,  707],
       [ 369,  688],
       [ 382,  226],
       [1078,  246]]...)]
```

colour_checker_detection.extract_colour_checkers_segmentation

colour_checker_detection.**extract_colour_checkers_segmentation**(*image*)

Extracts the colour checkers sub-images in given image using segmentation.

Parameters **image** (`array_like`) – Image to extract the colours checkers sub-images from.

Returns List of colour checkers sub-images.

Return type list

Examples

```
>>> import os
>>> from colour import read_image
>>> from colour_checker_detection import TESTS_RESOURCES_DIRECTORY
>>> path = os.path.join(TESTS_RESOURCES_DIRECTORY,
...                     'colour_checker_detection', 'detection',
...                     'IMG_1967.png')
>>> image = read_image(path)
>>> extract_colour_checkers_segmentation(image)
...
[array([[[ 86, 104, 113],
         [ 89, 102, 118],
         [ 88, 101, 117],
         ...,
         [ 79, 101, 114],
         [ 76, 101, 114],
         [ 79,  98, 110]],

        [[ 84, 104, 112],
         [ 85, 102, 115],
         [ 84, 101, 115],
         ...,
         [ 80, 101, 110],
         [ 79, 101, 112],
         [ 78,  98, 112]],

        [[ 84, 102, 112],
         [ 82, 102, 112],
         [ 82, 101, 113],
         ...,
         [ 81, 100, 109],
         [ 80, 100, 110],
         [ 79, 100, 113]],

        ...,
        [[ 89, 105, 117],
         [ 90, 106, 120],
         [ 86, 106, 117],
         ...,
         [ 84, 100, 109],
         [ 83, 100, 111],
         [ 80, 100, 114]],

        [[ 89, 106, 116],
         [ 91, 107, 121],
         [ 89, 106, 119],
         ...,
         [ 81,  99, 113],
         [ 79, 100, 115],
         [ 75, 100, 114]],

        [[ 84, 108, 117],
         [ 89, 108, 117],
         [ 91, 107, 117],
         ...,
         [ 79,  98, 117],
         [ 77, 100, 117],
         [ 73, 101, 116]]], dtype=uint8)]
```

colour_checker_detection.detect_colour_checkers_segmentation

colour_checker_detection.**detect_colour_checkers_segmentation**(*image*, *samples=16*, *additional_data=False*)

Detects the colour checkers swatches in given image using segmentation.

Parameters

- **image** (array_like) – Image to detect the colour checkers swatches in.
- **samples** (int) – Samples count to use to compute the swatches colours. The effective samples count is $samples^2$.
- **additional_data** (bool, optional) – Whether to output additional data.

Returns List of colour checkers swatches or ColourCheckerSwatchesData class instances.

Return type list

Examples

```
>>> import os
>>> from colour import read_image
>>> from colour_checker_detection import TESTS_RESOURCES_DIRECTORY
>>> path = os.path.join(TESTS_RESOURCES_DIRECTORY,
...                     'colour_checker_detection', 'detection',
...                     'IMG_1967.png')
>>> image = read_image(path)
>>> detect_colour_checkers_segmentation(image)
[array([[ 0.3594894...,  0.2225419...,  0.1176996...],
       [ 0.6250058...,  0.3931947...,  0.2417636...],
       [ 0.3304194...,  0.3142103...,  0.2874383...],
       [ 0.3034269...,  0.2721812...,  0.1053537...],
       [ 0.4153488...,  0.3183605...,  0.3067842...],
       [ 0.3458465...,  0.4393400...,  0.2912665...],
       [ 0.6782215...,  0.3519573...,  0.0752686...],
       [ 0.2715231...,  0.2515535...,  0.3295411...],
       [ 0.6171124...,  0.2687208...,  0.1852935...],
       [ 0.3049796...,  0.1792275...,  0.1908085...],
       [ 0.4844366...,  0.4576518...,  0.0392559...],
       [ 0.6494152...,  0.3991223...,  0.0329260...],
       [ 0.1922949...,  0.1842026...,  0.2731065...],
       [ 0.2780555...,  0.3836590...,  0.1233134...],
       [ 0.5515815...,  0.2126631...,  0.1250530...],
       [ 0.7178619...,  0.5132913...,  0.0804213...],
       [ 0.5753956...,  0.2563947...,  0.2672106...],
       [ 0.1799058...,  0.3160584...,  0.2945296...],
       [ 0.7402078...,  0.6088296...,  0.4374975...],
       [ 0.6272391...,  0.5156084...,  0.3713541...],
       [ 0.5120363...,  0.4196305...,  0.2976295...],
       [ 0.3690167...,  0.3019190...,  0.2083050...],
       [ 0.2624792...,  0.2143349...,  0.1428991...],
       [ 0.1625438...,  0.1333312...,  0.0807412...]])]
```

Indices and tables

- genindex
- search

3.1.1.2 Bibliography

3.2 1.3.2 Examples

Various usage examples are available from the examples directory.

CHAPTER

FOUR

1.4 CONTRIBUTING

If you would like to contribute to Colour - Checker Detection, please refer to the following Contributing guide for Colour.

CHAPTER

FIVE

1.5 BIBLIOGRAPHY

The bibliography is available in the repository in BibTeX format.

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1.6 CODE OF CONDUCT

The *Code of Conduct*, adapted from the Contributor Covenant 1.4, is available on the Code of Conduct page.

CHAPTER

SEVEN

1.7 ABOUT

Colour - Checker Detection by Colour Developers
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https://opensource.org/licenses/BSD-3-Clause
https://github.com/colour-science/colour-checker-detection

BIBLIOGRAPHY

[Abe11] Felix Abecassis. Opencv - rotation (deskewing). 2011. URL: http://felix.abecassis.me/2011/10/opencv-rotation-deskewing/.

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