websiteAnalysis

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1 PrettyWebsite - A python package for websites' aesthetic analysis

This notebook is an example of how to use PrettyWebsite for simple aesthetic analysis of a website. This tutorial have been tested using version 0.0.3 of the package.

In this notebook, the main features of the library are explained.

```
In [1]: import os
        import cv2
        import prettywebsite
        import matplotlib.pyplot as plt
        import pkg_resources

        print("PrettyWebsite:",prettywebsite.__version__)
```

```
PrettyWebsite: 0.0.3
```

First we import our three sample images. We load them as img1, img2 and img3. we need to convert loaded image data from BGR (default in CV2) to RGB.

```
In [2]: img1 = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/sample
        img1 = cv2.cvtColor(img1, cv2.COLOR_BGR2RGB)
        img2 = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/sample
        img2 = cv2.cvtColor(img2, cv2.COLOR_BGR2RGB)
        img3 = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/sample
        img3 = cv2.cvtColor(img3, cv2.COLOR_BGR2RGB)

        img1_b = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/samp
        img2_b = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/samp
        img3_b = cv2.imread(pkg_resources.resource_filename('prettywebsite','../share/data/samp
```

```
In [3]: plt.figure("Images",figsize=(12, 6), dpi=80)
        plt.subplot(1,3,1)
        plt.title("Sample 1")
        plt.imshow(img1)
        plt.xticks([],[])
        plt.yticks([],[])
```

```
plt.subplot(1,3,2)
plt.title("Sample 2")
plt.imshow(img2)
plt.xticks([],[])
plt.yticks([],[])
plt.subplot(1,3,3)
plt.title("Sample 3")
plt.imshow(img3)
plt.xticks([],[])
plt.yticks([],[])
```

```
Out[3]: ([], <a list of 0 Text yticklabel objects>)
```

1.1 Visual Complexity

Visual complexity can be estimated using file weight or using more advance methods, such as QuadTree Decomposition.

1.1.1 Weight

Weight can be calculated using "os.stat(pathToImg).st_size"

```
In [4]: VC_1_W =  os.stat(pkg_resources.resource_filename('prettywebsite','../share/data/sample
        VC_2_W =  os.stat(pkg_resources.resource_filename('prettywebsite','../share/data/sample
        VC_3_W =  os.stat(pkg_resources.resource_filename('prettywebsite','../share/data/sample
```

1.1.2 QuadTree Decomposition

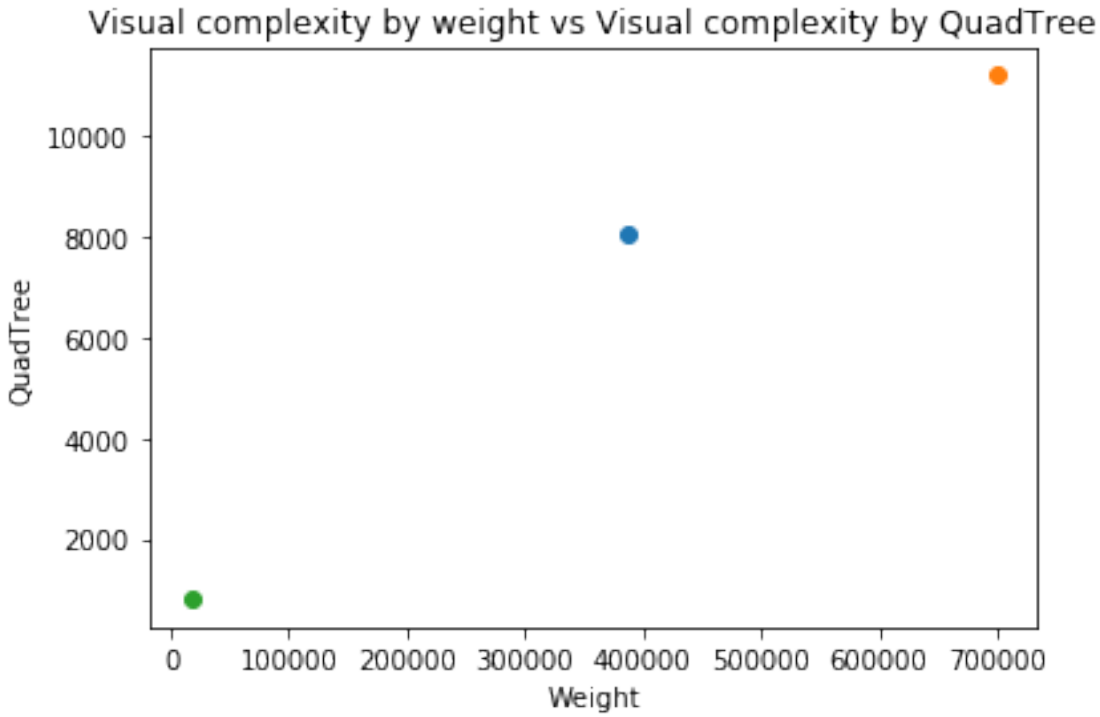
We need to use the binary images. VC is proportional to the number of rectangles obtained trhough QuadTree Decomposition

```
In [5]: VC_1_QT = len(prettywebsite.quadTreeDecomposition.quadTree(img1_b,minStd=5,minSize=10)
        VC_2_QT = len(prettywebsite.quadTreeDecomposition.quadTree(img2_b,minStd=5,minSize=10)
        VC_3_QT = len(prettywebsite.quadTreeDecomposition.quadTree(img3_b,minStd=5,minSize=10)
```

1.1.3 Weight vs QuadTree

We can visually inspect the relationship between weight and visual complexity by quadTree from our sample image

```
In [6]: plt.figure("W vs QT")
        plt.title("Visual complexity by weight vs Visual complexity by QuadTree")
        plt.xlabel("Weight")
        plt.ylabel("QuadTree")
        plt.scatter(VC_1_W, VC_1_QT)
        plt.scatter(VC_2_W, VC_2_QT)
        plt.scatter(VC_3_W, VC_3_QT)
        plt.show()
```



1.2 Symmetry

In PrettyWebsite a way to estimate a degree of freedom (range 0-100) using QuadTree Decomposition is present. We expect img3 to be the more symmetric, and img2 to be more slightly symmetric than img1.

```
In [7]: S_1 = prettywebsite.symmetry.getSymmetry(img1_b,5,20)
        S_2 = prettywebsite.symmetry.getSymmetry(img2_b,5,20)
        S_3 = prettywebsite.symmetry.getSymmetry(img3_b,5,20)
```

```
In [8]: plt.figure("Symmetry",figsize=(12, 3), dpi=80)
        plt.suptitle("Degree of Symmetry")
        plt.subplot(1,3,1)
        plt.title(S_1)
        plt.imshow(img1)
        plt.xticks([],[])
        plt.yticks([],[])
        plt.subplot(1,3,2)
        plt.title(S_2)
        plt.imshow(img2)
        plt.xticks([],[])
        plt.yticks([],[])
        plt.subplot(1,3,3)
        plt.title(S_3)
        plt.imshow(img3)
        plt.xticks([],[])
        plt.yticks([],[])
        plt.show()
```

1.3 Colorfulness

Colorfulness can be estimated by the Saturation (in the HRV color space) or from LinearRGB (in the RGB color Space).

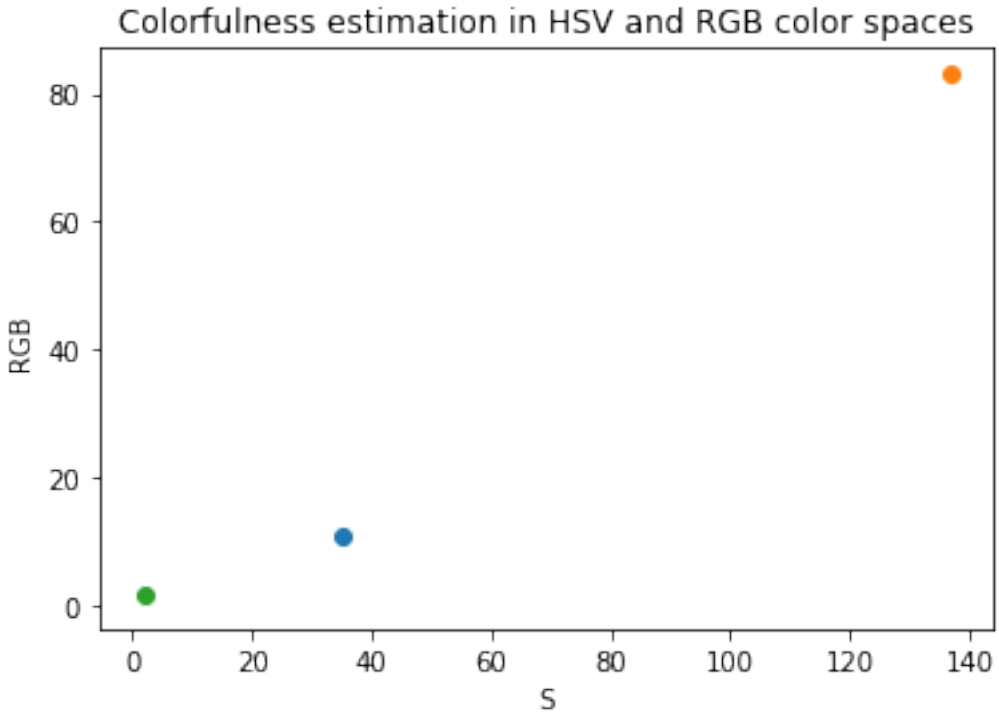
```
In [9]: C_1_S = prettywebsite.colorfulness.colorfulnessHSV(img1)
        C_2_S = prettywebsite.colorfulness.colorfulnessHSV(img2)
        C_3_S = prettywebsite.colorfulness.colorfulnessHSV(img3)
```

```
In [10]: C_1_RGB = prettywebsite.colorfulness.colorfulnessRGB(img1)
         C_2_RGB = prettywebsite.colorfulness.colorfulnessRGB(img2)
         C_3_RGB = prettywebsite.colorfulness.colorfulnessRGB(img3)
```

Again, we can check the correlation between the two methods

```
In [11]: plt.figure("S vs RGB")
         plt.title("Colorfulness estimation in HSV and RGB color spaces")
```

```
plt.xlabel("S")
plt.ylabel("RGB")
plt.scatter(C_1_S, C_1_RGB)
plt.scatter(C_2_S, C_2_RGB)
plt.scatter(C_3_S, C_3_RGB)
plt.show()
```



1.4 Brightness

Brightness can be estimated from two different formulas, explained by BT.709 and BT.601.

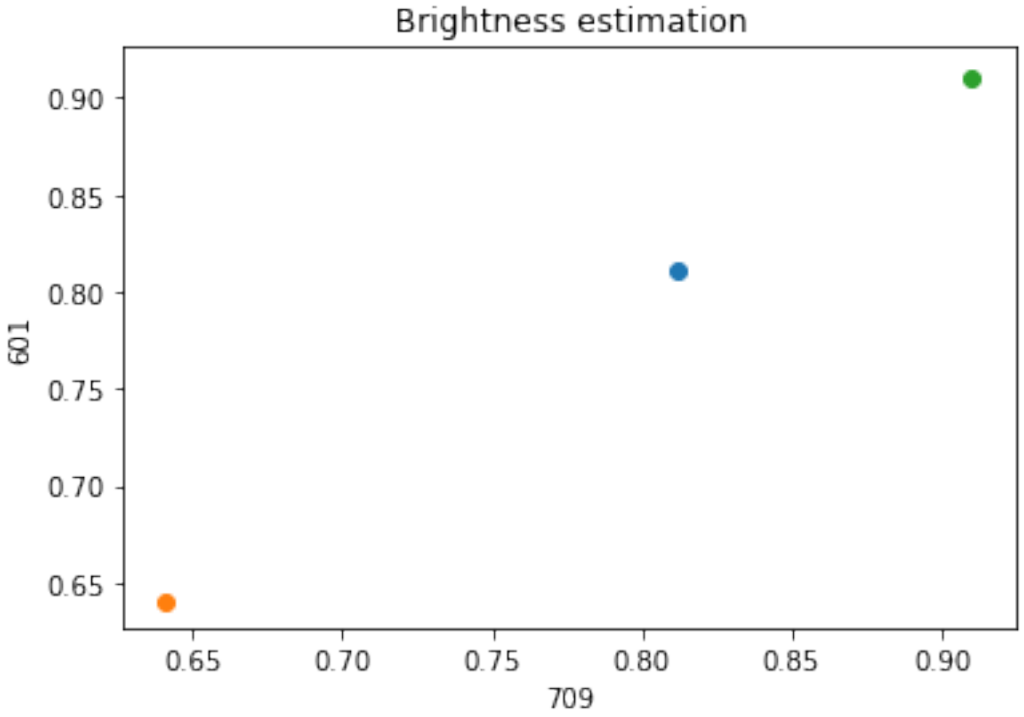
Please not that the procedure is quite slow. For faster results downsampling may be usefull.

```
In [12]: B_1_709 = prettywebsite.brightness.relativeLuminance_BT709(img1)
         B_2_709 = prettywebsite.brightness.relativeLuminance_BT709(img2)
         B_3_709 = prettywebsite.brightness.relativeLuminance_BT709(img3)

In [13]: B_1_601 = prettywebsite.brightness.relativeLuminance_BT709(img1)
         B_2_601 = prettywebsite.brightness.relativeLuminance_BT709(img2)
         B_3_601 = prettywebsite.brightness.relativeLuminance_BT709(img3)

In [14]: plt.figure("709 vs 601")
         plt.title("Brightness estimation")
         plt.xlabel("709")
         plt.ylabel("601")
```

```
plt.scatter(B_1_709, B_1_601)
plt.scatter(B_2_709, B_2_601)
plt.scatter(B_3_709, B_3_601)
plt.show()
```



1.5 Faces detection

Faces detection is possible thanks to OpenCV.

In our pages, we expect the function to find a single face only in img1

```
In [15]: print("In Img1 there is/are",len(prettywebsite.faceDetection.getFaces(img1)), "faces")
         print("In Img2 there is/are",len(prettywebsite.faceDetection.getFaces(img2)), "faces")
         print("In Img3 there is/are",len(prettywebsite.faceDetection.getFaces(img3)), "faces")
```

```
In Img1 there is/are 1 faces
In Img2 there is/are 0 faces
In Img3 there is/are 0 faces
```

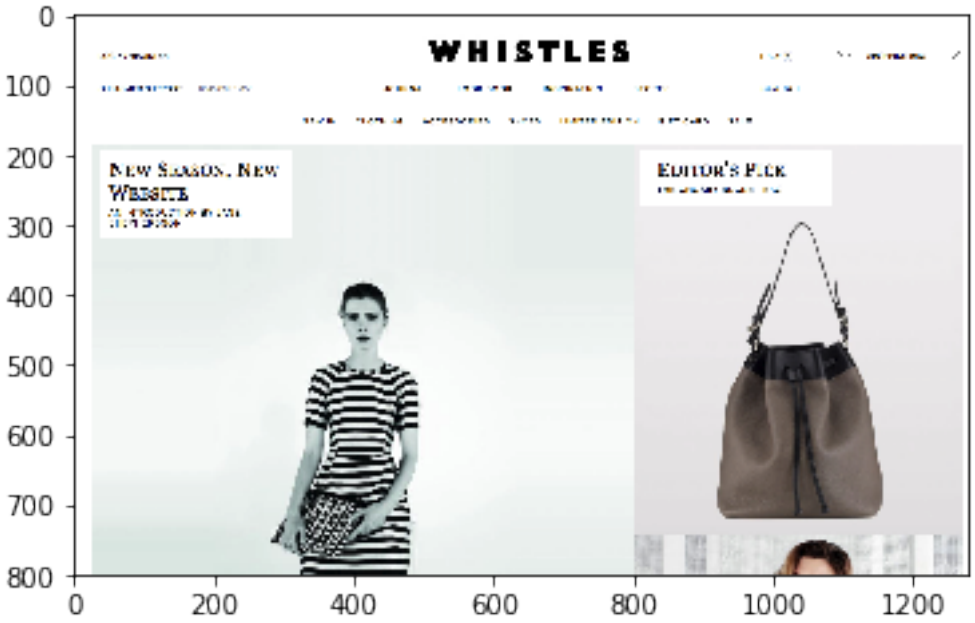
1.6 Colors estimation

With prettywebsite is possible to estimate the color distribution in an image, according to W3C sixteen basic colors.

This methods is unfortunately not the more suitable for recognition of colors in complex images such as modern websites, but can provide a general idea of the color pallette of a page.

```
In [17]: CS_1 = prettywebsite.colorDetection.getColorsW3C(img1,plot=True)
         for color in CS_1:
             print(color[0],"is used for the",round(color[1],1),"% of the image")
```

```
Aqua is used for the 0.0 % of the image
Black is used for the 4.3 % of the image
Blue is used for the 0.0 % of the image
Fuchsia is used for the 0.0 % of the image
Gray is used for the 4.4 % of the image
Green is used for the 0.0 % of the image
Lime is used for the 0.0 % of the image
Maroon is used for the 0.3 % of the image
Navy is used for the 0.1 % of the image
Olive is used for the 0.4 % of the image
Purple is used for the 0.0 % of the image
Red is used for the 0.0 % of the image
Silver is used for the 5.3 % of the image
Teal is used for the 0.1 % of the image
White is used for the 85.0 % of the image
Yellow is used for the 0.0 % of the image
```




```
In [18]: CS_2 = prettywebsite.colorDetection.getColorsW3C(img2,plot=True)
         for color in CS_2:
             print(color[0],"is used for the",round(color[1],1),"% of the image")
```

```
Aqua is used for the 0.0 % of the image
Black is used for the 6.9 % of the image
```

```
Blue is used for the 0.0 % of the image
Fuchsia is used for the 0.0 % of the image
Gray is used for the 2.8 % of the image
Green is used for the 0.5 % of the image
Lime is used for the 0.0 % of the image
Maroon is used for the 0.9 % of the image
Navy is used for the 0.1 % of the image
Olive is used for the 2.7 % of the image
Purple is used for the 1.9 % of the image
Red is used for the 7.2 % of the image
Silver is used for the 30.2 % of the image
Teal is used for the 0.8 % of the image
White is used for the 45.4 % of the image
Yellow is used for the 0.6 % of the image
```


```
In [19]: CS_3 = prettywebsite.colorDetection.getColorsW3C(img3,plot=True)
         for color in CS_3:
             print(color[0],"is used for the",round(color[1],1),"% of the image")
```

```
Aqua is used for the 0.0 % of the image
Black is used for the 0.1 % of the image
Blue is used for the 0.0 % of the image
Fuchsia is used for the 0.0 % of the image
Gray is used for the 0.2 % of the image
Green is used for the 0.0 % of the image
```

```
Lime is used for the 0.0 % of the image
Maroon is used for the 0.0 % of the image
Navy is used for the 0.0 % of the image
Olive is used for the 0.0 % of the image
Purple is used for the 0.0 % of the image
Red is used for the 0.0 % of the image
Silver is used for the 0.1 % of the image
Teal is used for the 0.0 % of the image
White is used for the 99.6 % of the image
Yellow is used for the 0.0 % of the image
```