Smart Mirror Project

Testing and evaluation

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# Unit Testing

For Unit testing I have used the Unit testing module in python. I have conducted 3 Unit tests:

* 1st Test executes the main function and compares it to the output to have the same values
* 2nd Test checks if the formula that checks for Standard Deviation difference matches and calculates correctly
* 3rd Test checks if the formula for the final output to be the calculated correctly

Source Code:

#Code by Reday Yahya

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#Facial Landmark detection using OpenCV, DLIB with added help of imageutilities by pyimageresearch

#Unittesting for FMP\_MagicMirror

#Needed for testing

import unittest

from combo import getFaceCord

#needed for getFaceCord

from imutils.face\_utils import FaceAligner

from imutils.face\_utils import rect\_to\_bb

from imutils import face\_utils

import numpy as np

import imutils

import dlib

import cv2

import statistics

#Testing Class

class TestgetFaceCord(unittest.TestCase):

#1st test tests the function to produces an output that maches the live execution

def test\_getFaceCord(self):

#executes requirements

shape = getFaceCord("Material/attr/TPNA8Z.jpg", "output\_results/output.txt" )

coordinates = np.loadtxt("output\_results/output.txt")

#Test 1 array of coordinates is equal to the output file

np.alltrue(shape == coordinates)

#2nd test focuses on testing the formula to determine STDEV counts

def test\_Z\_Formula(self):

#here were just going to see if the formula

Zmanual = (62 - 45.000) / 6.782

#Reason why I didn't take values directly from output is due

#to the fact we don't need to specifically need to test mulitples

#when we can simply test the result of an example and the formula

#Calculated the result value manually just to see if python calculates

#exactly like a normal calculator would operate

#result should state that the coordinate is 2.5 STDEVs above the average

self.assertAlmostEqual(Zmanual, 2.506635210852256)

#3rd test focuses on output result

def test\_FinalOutput(self):

anomalousPoints = 45

FINALVAL = 100 - (anomalousPoints \* 100 / 136)

#Calculated the result value manually just to see if python calculates

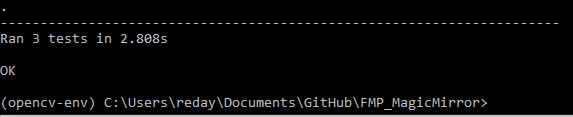
#exactly like a normal calculator would operate

#result should state a result that is 66,91% close

#with a anomalousPoint value of 45

self.assertAlmostEqual(FINALVAL,66.911764705882352941176470588235 )

Result:



All Tests have reported correctly and returned TRUE

# Evaluation

In this part of the document it will manually execute the system and compare different output results. The Evaluation is based on selfies friends and family have produced as well as images produced by the raspberry pi camera module via a live test of master.py.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Image | Facial Landmarks | Anomalous Points | Result (Similarity to model) | Evaluation |
| Chantal Steiner |  | 5 | 96.32352941176471 % | As her picture is part of the Statistical model (and since she is incredibly beautiful), she was expected to have a high similarity. With 96,32 % this is true |
| Selena Gomez |  | 8 | 94.11764705882354 % | Another user who has a different image in the statistical model. Expected her to have her result to be high % and with 94,12 % this is true. |
| Random Guy |  | 52 | 61.76470588235294 % | As he is man, age under 30 and since the statistical model is based on 100 attractive females under 30, it is expected for him to have a slight lower percentage. With 61,76% this proofed to be true. |
| Random Woman |  | 27 | 80.14705882352942 % | Here is an image of a random woman. Her age is unknown, however judging her facial landmarks she seems likely to be above 30 and she is not part of the statistical model. Her score should be high, however not high enough to be very close to 100%. As her result was 80,14% this seems a very accurate. |
| Mir Yahya |  | 82 | 39.70588235294117 % | My Dad is male, and he is old. As the statistical model is based on attractive females under 30, I believe his score to be very low. Note: His right eye as well as his lips are not matched by the iBug 300w model, however due to the face alignment, eyes and partial use of lips do not accurate Standard Deviations regardless. |
| Nooria Yahya |  | 61 | 61.029411764705884 % | My mother is female, and she is old. All parts of her face have been identified accurately. Her result should be expected to be low too, however it should be slightly higher than people in her age category, as the model is based of females and females are biologically alike. |