Code Assessment

for

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Setup Environment

To create the development environment extract all the files in the zip to a folder, navigate a terminal into that folder and execute the following commands.

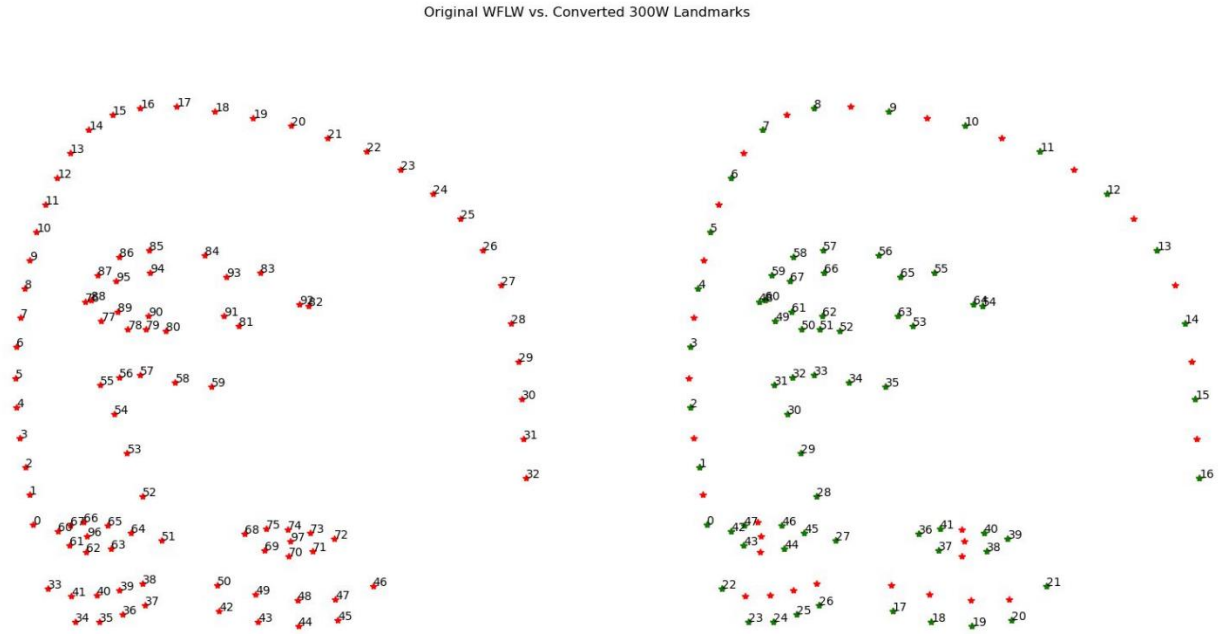
```
conda create -n rd python=3.12 --file requirements.txt
conda activate rd
```

Question 1

The file *300W_landmarks_test.csv* has been added to the dataset folder in zip. To regenerate it execute the following command.

```
python convert.py
```

To do the conversion the file *WFLW_landmarks_test.csv* is read into a pandas DataFrame and one row at a time the points are mapped to 300W style points. This is done by taking a subset of the WFLW points, interpolation was considered but the WFLW format actually filters quite nicely and the ground truth values are persisted. This can bee seen in the following diagram where the WFLW points are shown in red and the 300W points are shown in green. The red points on the right hand side are the ones that are filtered out.

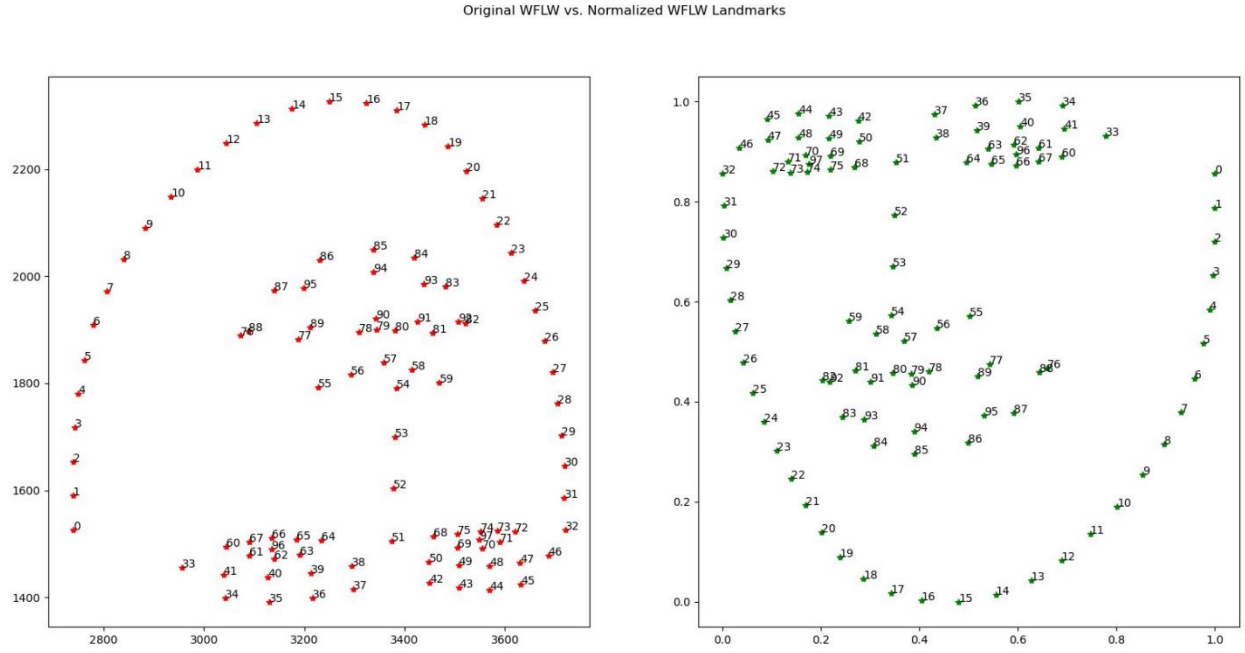


Question 2

The file *WFLW_normalized_landmarks_test.csv* has been added to the dataset folder in the zip. To regenerate it execute the following command.

```
python normalize.py
```

To do the normalization the file *WFLW_landmarks_test.csv* is read into a pandas DataFrame and one row at a time the x and y values are normalized to a range of 0 to 1. While this is being done some checks are performed to see if the image needs to be flipped across an axis or rotated 180^{o} to maintain consistent left and right hand sides as well as tops and bottoms. The flipping and normalization can be seen in the following image.



Visualization

The script *display.py* was created to explore the data and to verify the correctness of the transformations as well as provide the diagrams for this document. Additional files can be generated with *convert.py* and *normalize.py* then visualized with *display.py* with minor updates to each file. Use the following command to visualize the results.

```
python display.py
```

Useful Resources

For understanding the basics of how WFLW is mapped to 300W:

https://github.com/wywu/LAB/issues/17

For plotting glyphs with text:

https://stackoverflow.com/questions/42553919/matplotlib-scatter-plot-with-numpy-row-index-as-marker

For making plots pretty:

https://matplotlib.org/stable/gallery/subplots_axes_and_figures/subplots_demo.html

pandas examples:

https://www.digitalocean.com/community/tutorials/update-rows-and-columns-python-pandas