CS 4342 Homework 2 Report

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MSE

Method one training MSE: **78.48592597858139**
Method one testing MSE: **413.59294963602144**
Method one sample weights:
[10.03075168 -3.55463343 -4.33319549 ... -4.53219613 5.26799667
37.61138638]

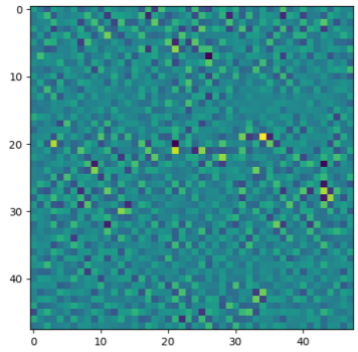
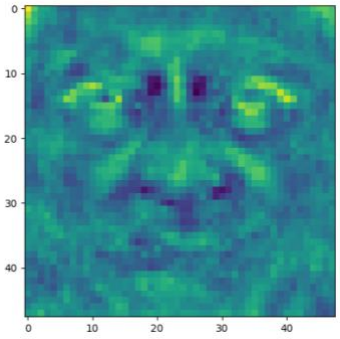
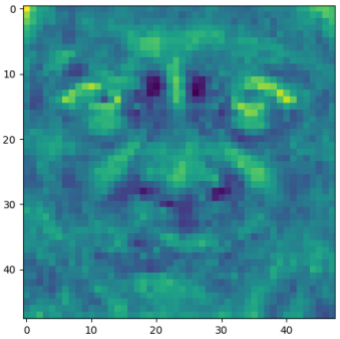
Method two training MSE: **167.11486247301045**
Method two testing MSE: **186.20656334170366**
Method two sample weights:
[1.48488846 1.11553174 0.89181752 ... -0.31099268 -0.36395243
14.39001606]

Method three training MSE: **167.20611466344457**
Method three testing MSE: **186.2128434301536**
Method three sample weights:
[1.49565144 1.08507432 0.88625888 ... -0.32582247 -0.34104578
14.42375258]

Regularized gradient descent RMSE: **13.65 years**

Visualized Weight Vectors

A visual representation of each method's weights are shown in the following table:

Method 1 Weighs	Method 2 Weights	Method 3 Weights
		

The weights from method one have no clear visual pattern. There are softer weights where the eyes and mouth are and spots of high and low activation around the chin, nose, dimples, and cheeks. One could argue that this could be useful for detecting wrinkles that older faces might present, but it is hard to tell if this is an actual intelligent pattern or if this is overfitting.

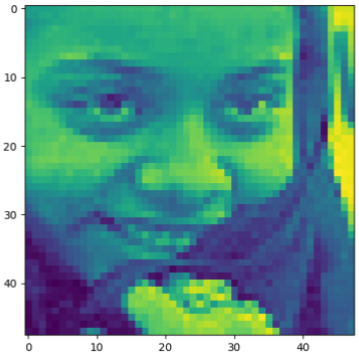
The weights from method two give a clear and interesting facial pattern. If this method had more iterations over which to train, it would likely look more similar to the first pattern.

The weights from method three likewise give a clear and interesting facial pattern. If this method had more iterations to train, it would likely remain at least somewhat face-like because the regularization prevents the weights from growing too big and overfitting to the data. These weights are almost identical to the weights from method two because there were not enough iterations for the regularization to play a large role in controlling the growth of the weights.

The Five Most Egregious Errors

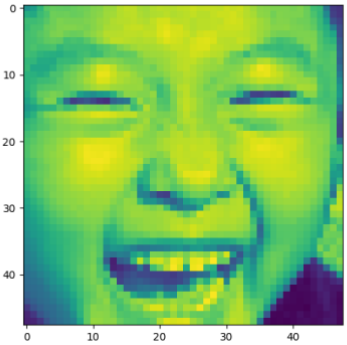
Number 1 Error

Photo number 884 was number 1 for worst error.
The actual age was 10.0 while the model guessed 59.803790701956814.



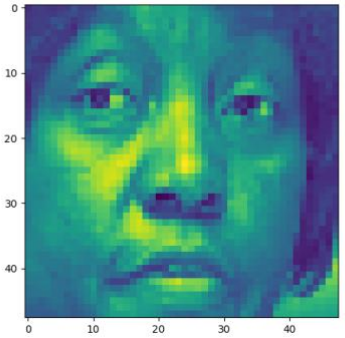
Number 2 Error

Photo number 1640 was number 2 for worst error.
The actual age was 4.0 while the model guessed 52.42483622734031.



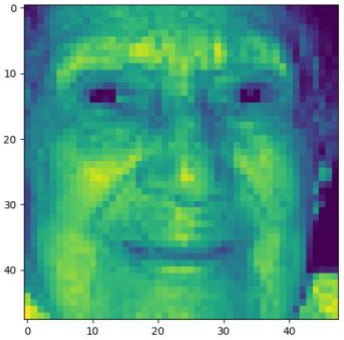
Number 3 Error

Photo number 830 was number 3 for worst error.
The actual age was 89.0 while the model guessed 41.39125953626056.



Number 4 Error

Photo number 581 was number 4 for worst error.
The actual age was 80.0 while the model guessed 33.229280680685065.



Number 5 Error

Photo number 939 was number 5 for worst error.
The actual age was 8.0 while the model guessed 53.46351318202749.