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Machine Learning CS 453X
Homework 2

Mean Square Error

Formula used:

$$f_{\mathrm{MSE}}(\mathbf{y}, \hat{\mathbf{y}}; \mathbf{w}) \quad = \quad \frac{1}{2n} \sum_{i=1}^{n} \left(g(\mathbf{x}^{(i)}; \mathbf{w}) - y^{(i)} \right)^2$$

Method 1:
Training MSE: 39.24296298929068
Testing MSE: 206.79647485406986

Method 2: (T = 5000 and learning_rate = 0.001)
Training MSE: 87.89921317334458
Testing MSE: 97.00998215844058

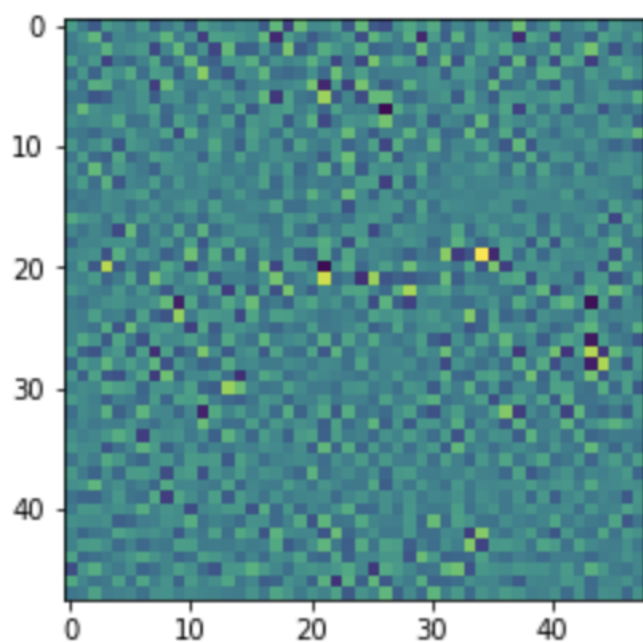Method 3: (T = 5000, learning_rate = 0.001, alpha = 0.1)
Training MSE: 88.05593100785939
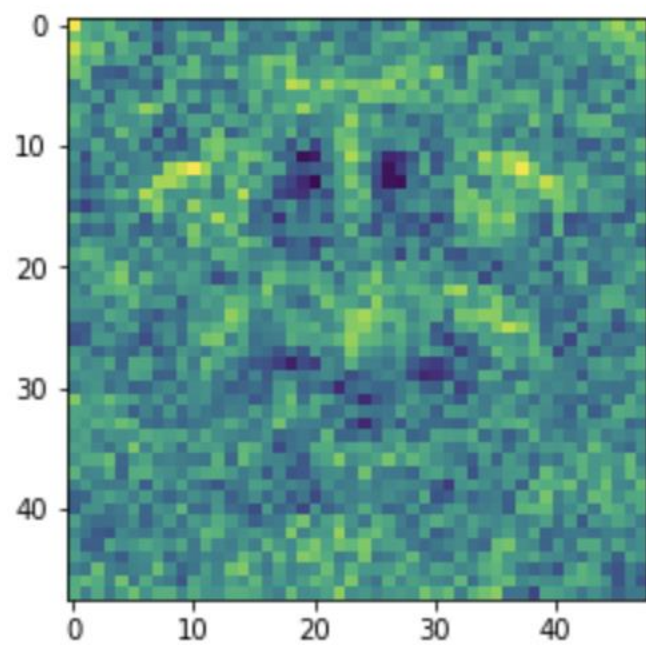Testing MSE: 96.73951901294978

Note: On method 2 and 3, when I set leaning_rate = 0.003, my gradient descent "overjumped" and the weights became infinity. Hence, I changed my weights to 0.001. I already asked the professor and he said the results are reasonable.
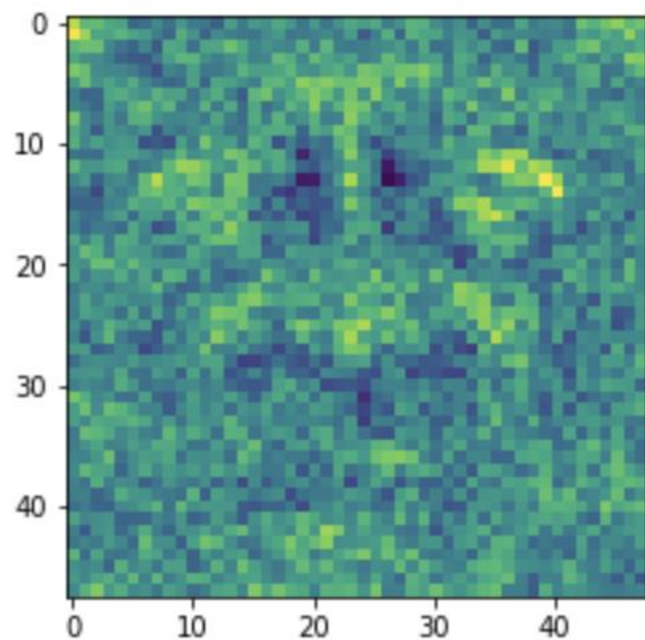
Visualizing Weights
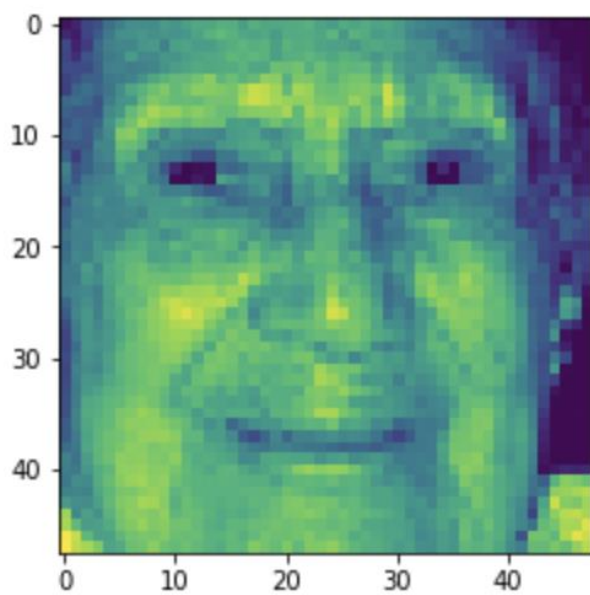
Method 1:

Method 2:

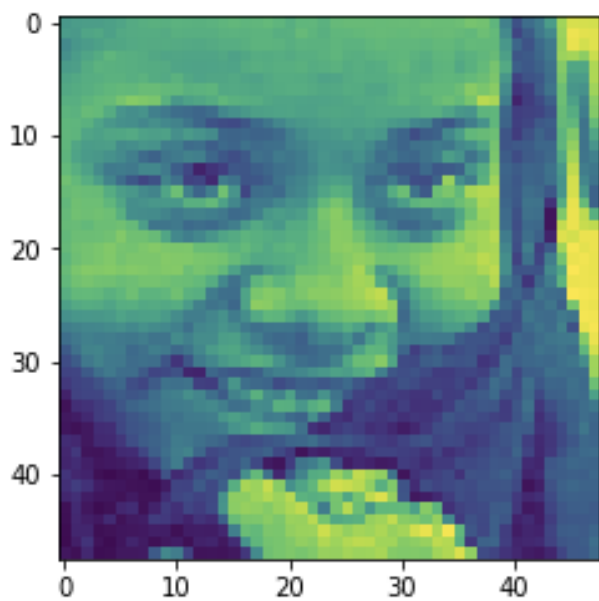

Method 3:

Top 5 Egregious Error

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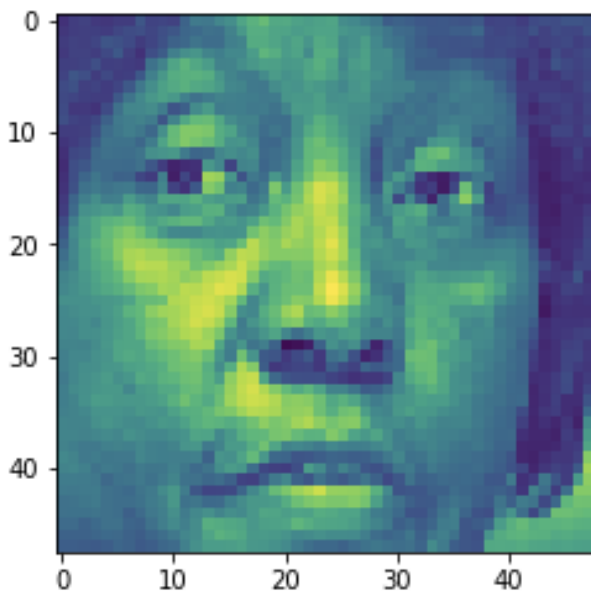Predicted: 32.07881314858461
Actual: 80.0

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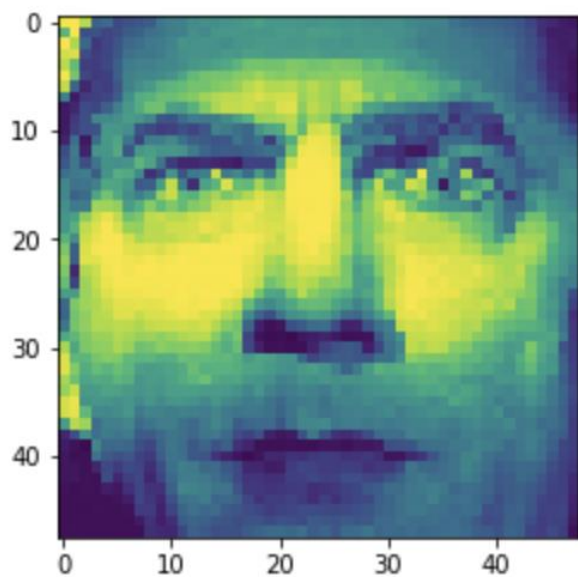

Predicted: 59.85149905268884
Actual: 10.0

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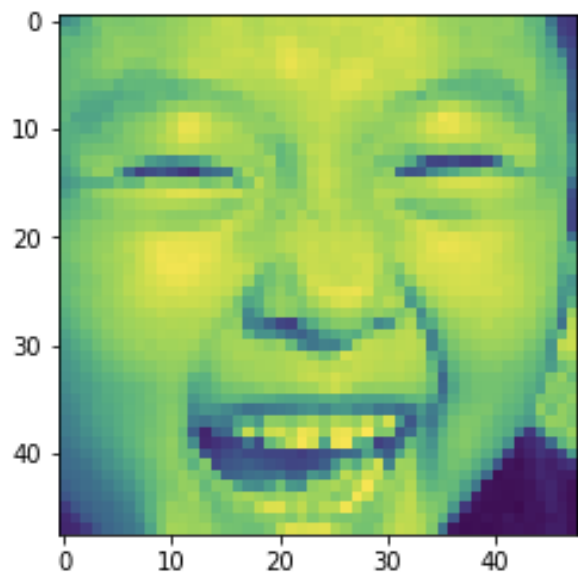

Predicted: 40.16579593130702
Actual: 89.0

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Predicted: 52.9035657047763

Actual: 99

Image at index: 1640

Predicted: 52.73122484883238

Actual: 4.0