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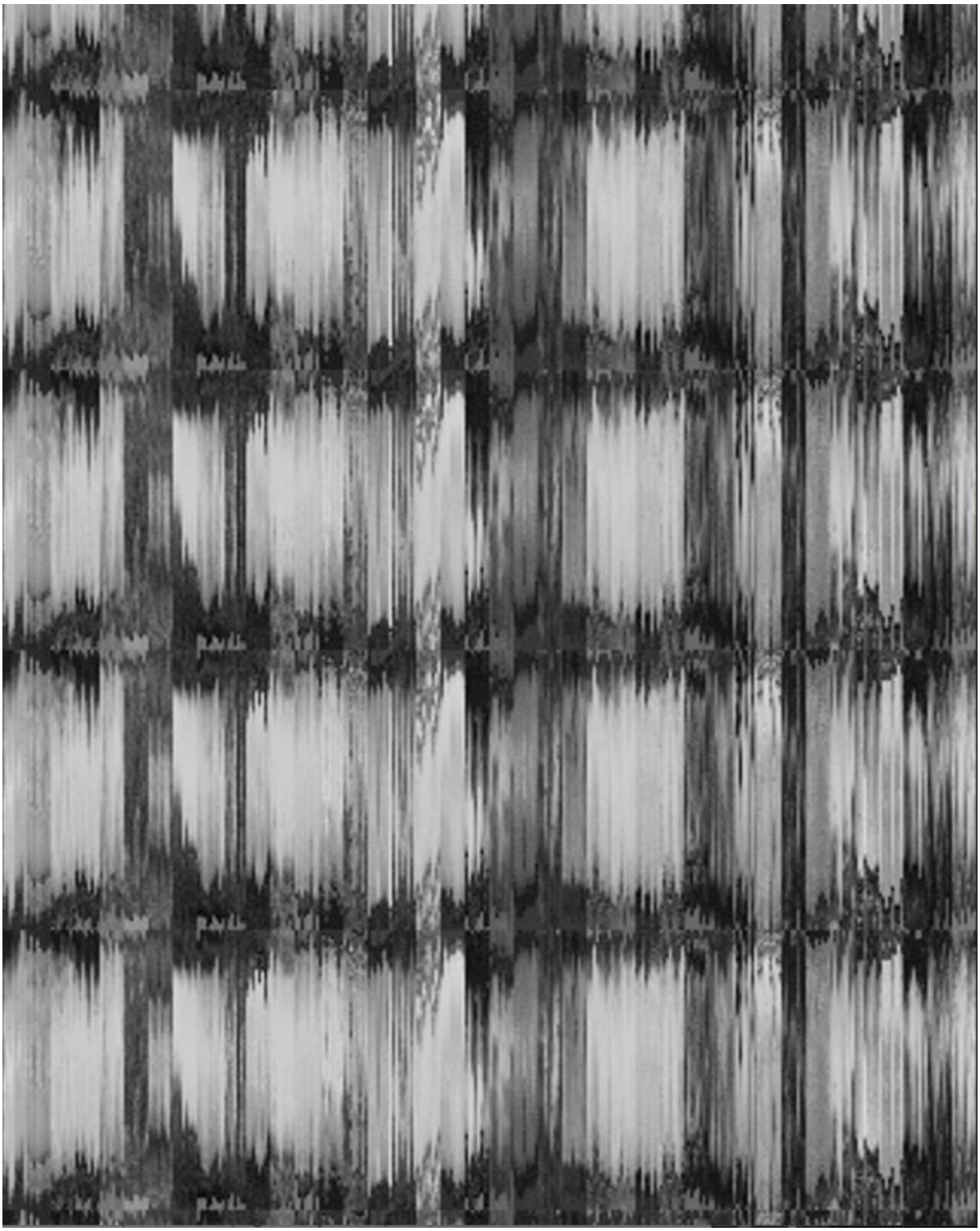
ECE 1395

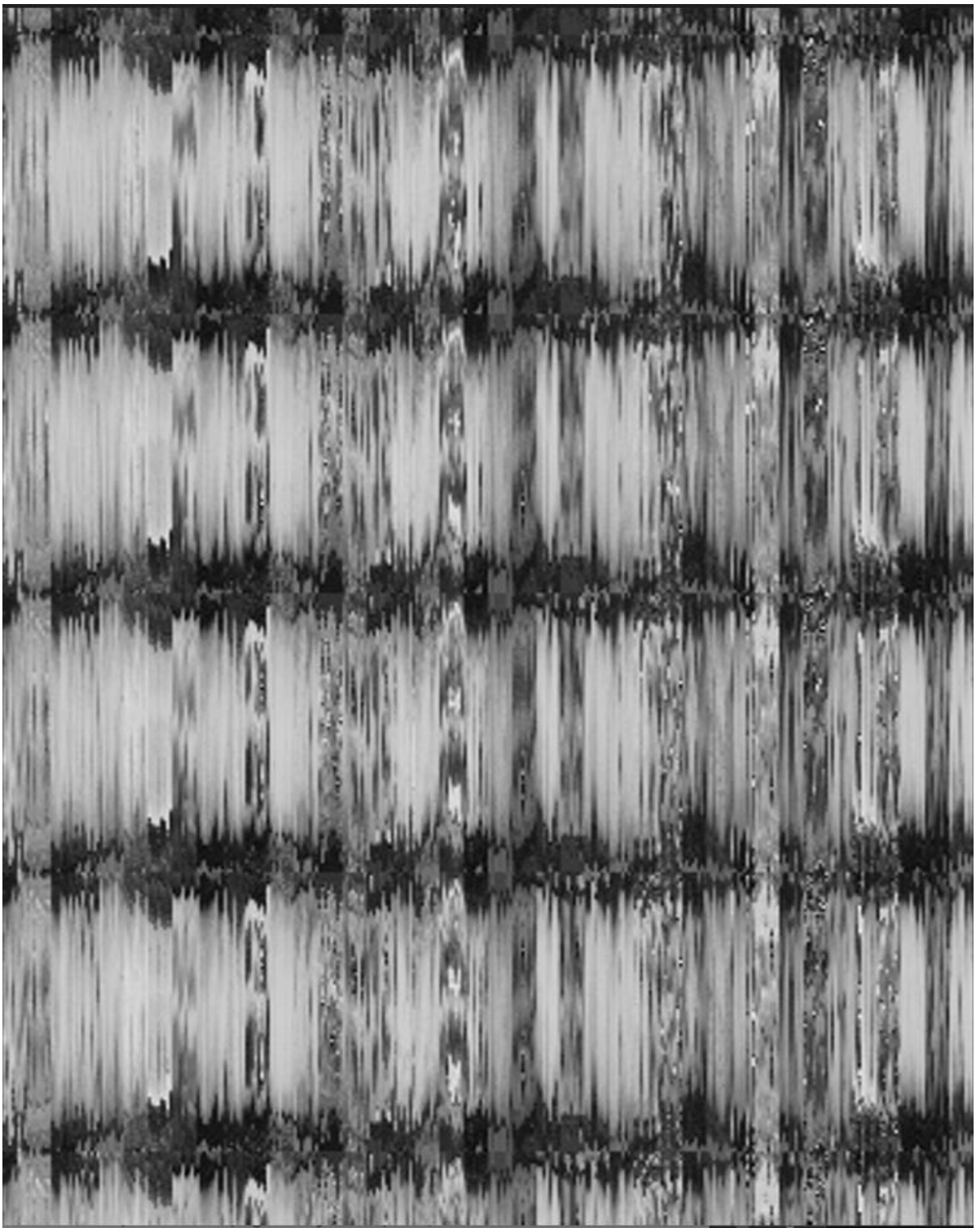
Pes71

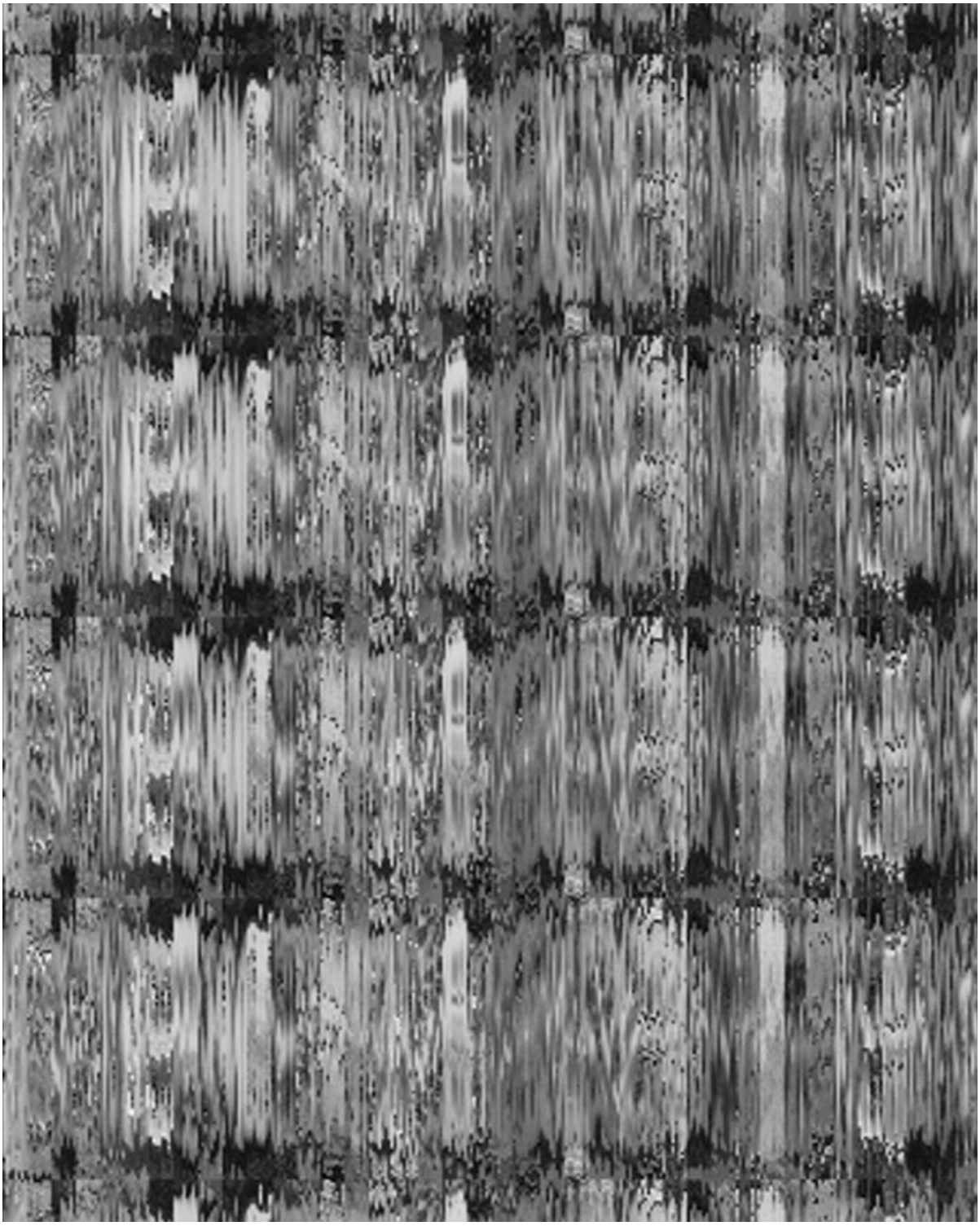
Hw. 5 Report

1b) The results of sigma were best when sigma was 0.05. When sigma was 0.05, I was able to get an accuracy of 78%. With all other values of sigma, the results were less than 50%.

2.1a)

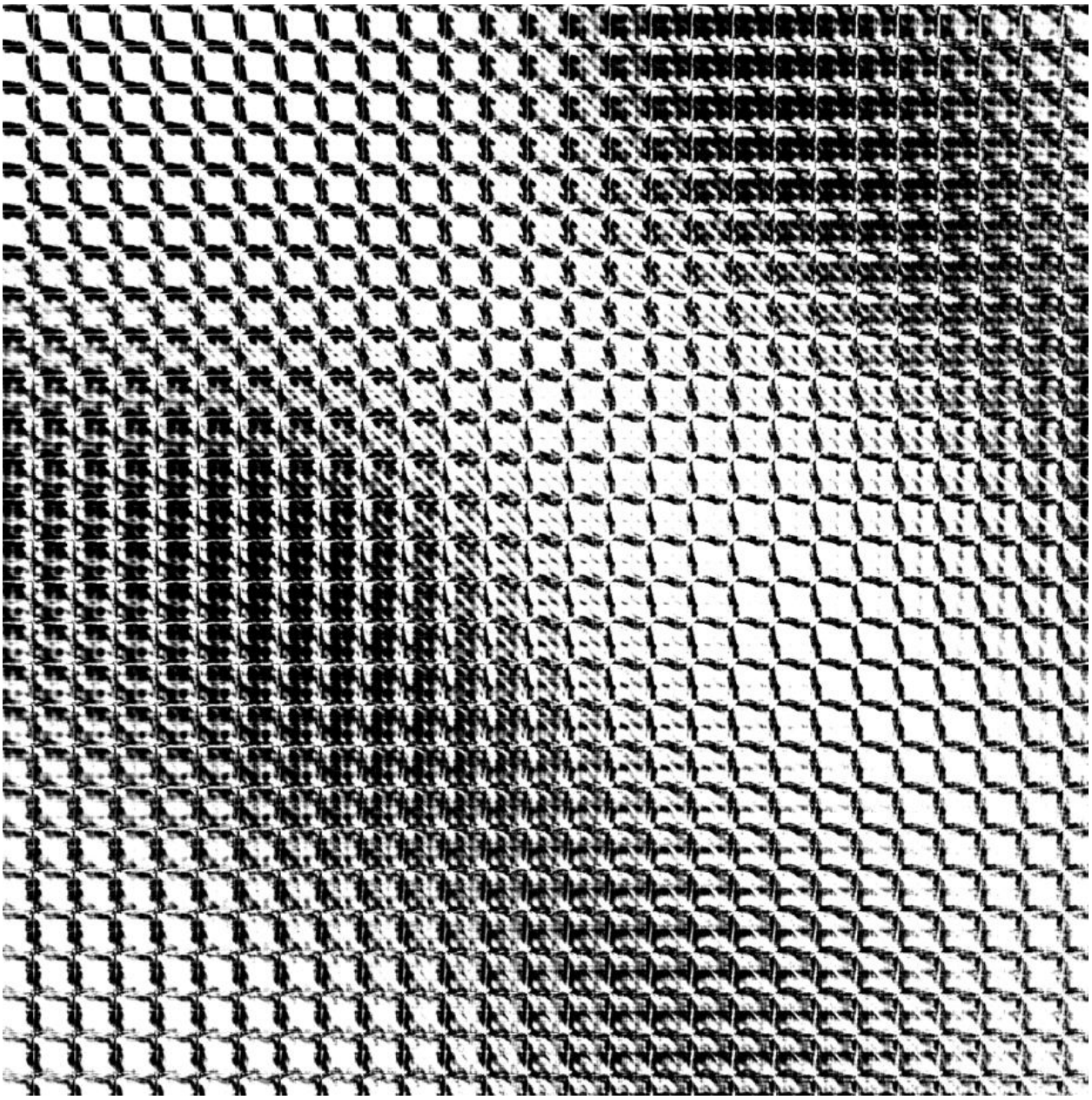


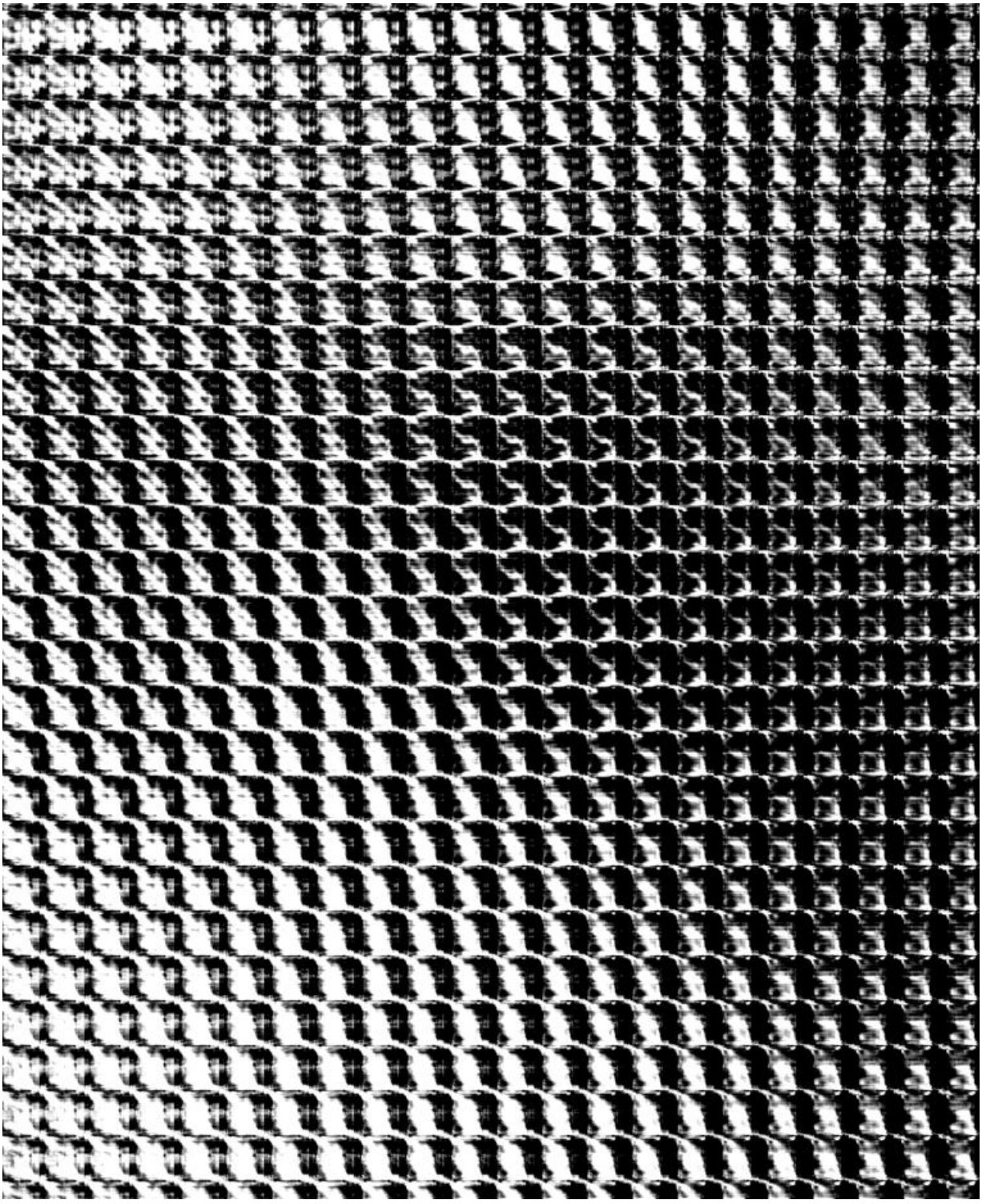


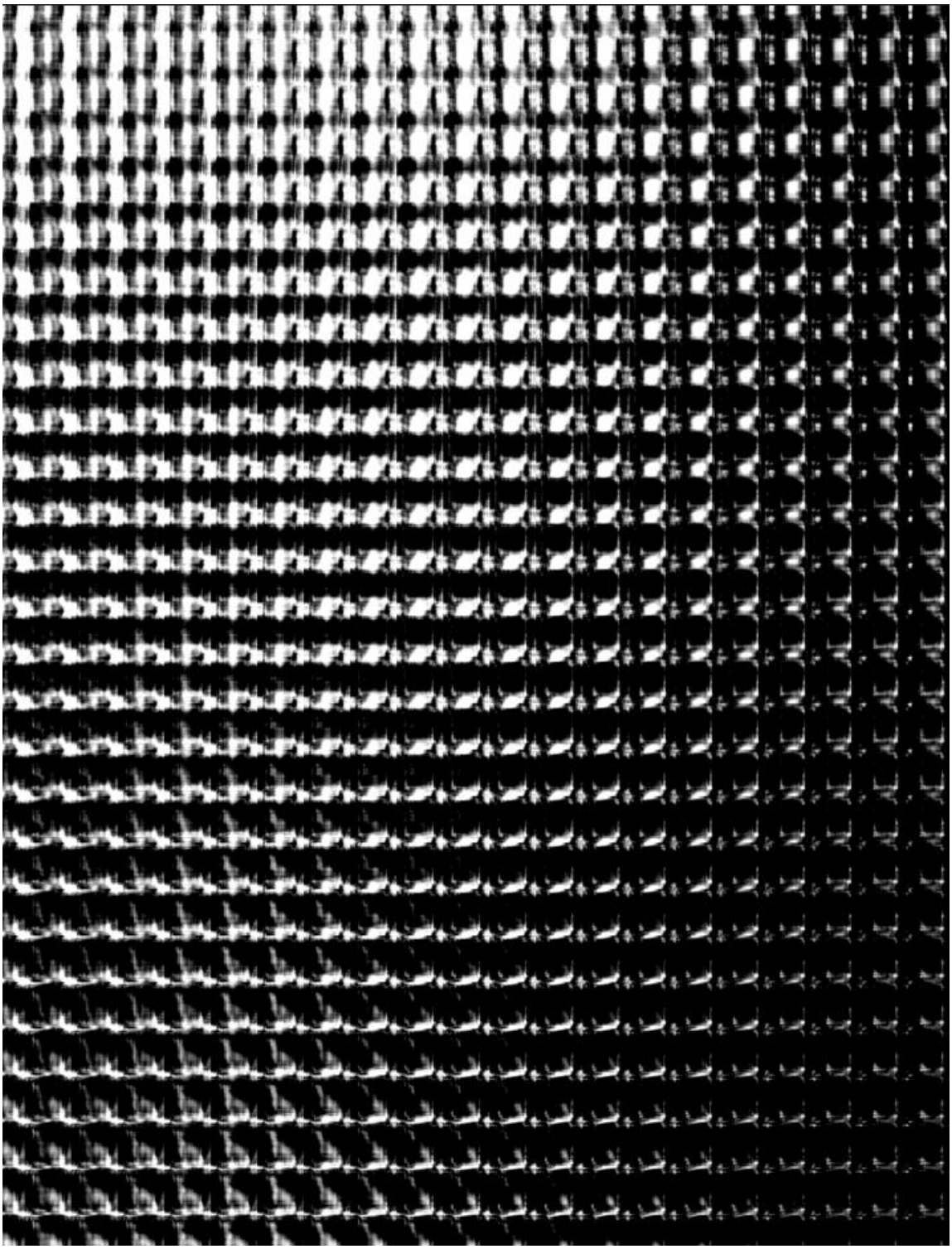


2.1b) The mean face that I got appears like a blurry version of a face. You can see some defining features of a face like a mouth, ears, eyes, etc., but it all looks very out of focus.

2.1c)







2.1d) The value of K = 164

2.1e) The dimensions of U are 10305 x 164. The eigenfaces that I got look like negatives of photos with different facial features highlighted.

2.2b) The dimensions of W_training is 320x164. The dimensions of W_testing is 80x164.

2.3a)

Value of K:	Accuracy %:
1	98.75%
3	95.00%
5	91.25%
7	82.50%
9	82.50%
11	78.75%

For my KNN classifier I got better values the less neighbors I used to find the classification.

2.3b)

Training time for each model (seconds)		
	One-vs-one	One-vs-all
Linear	0.01749945	0.01900959
Polynomial	0.01299572	0.01199961
RBF	0.01449943	0.0144999

Testing time for each model (seconds)		
	One-vs-one	One-vs-all
Linear	0.00198174	0.01108599
Polynomial	0.00200009	0.01000023
RBF	0.00350022	0.01099992

Accuracy (%)		
	One-vs-one	One-vs-all
Linear	98.75	98.75
Polynomial	91.25	91.25
RBF	100.00	100.00

All of the different types of SVM performed well. The polynomial consistently performed the worst for me ranging between the low 80s and 90s percentages. While the linear and RBF performed very well overall. Depending on the test they would vary as to which one worked best. I did not get any differences in my one-vs-one and one-vs-all results. I tried numerous configurations to ensure that they were set properly and continuously got the same results. The KNN performed relatively well with a Low value for K but I believe that using SVM would give me a more consistent result.

3) I would divide the states and highways into grids that would each contain N features. The features I would: number of gas stations per block, population density, average highway vehicular traffic per block, density of shopping services, current adoption rate of electric vehicles. I think using gas station density would be good to use because it would give you an idea of how often people need to refill. Population density would show non highway traffic that would need to be accounted for. Average highway vehicular traffic per block would be a good identifier of areas that may not be highly populated but have high

traffic flows. Density of shopping would also play into necessity of charging stations. I also though that current adoption rates would be useful because you would want to put more chargers where people are more likely to purchase an electric car than not.