Here are the command lines to run each file. If convergence is 1, it means it will stop until it converges, and the number of iterations in the command line will not matter.

Challenge0 is not linear separable.
python perceptron_starter.py --iterations 100 --train_file data/challenge0.dat --convergence 1

Challenge1 is linear separable.
python perceptron_starter.py --iterations 100 --train_file data/challenge1.dat --convergence 1

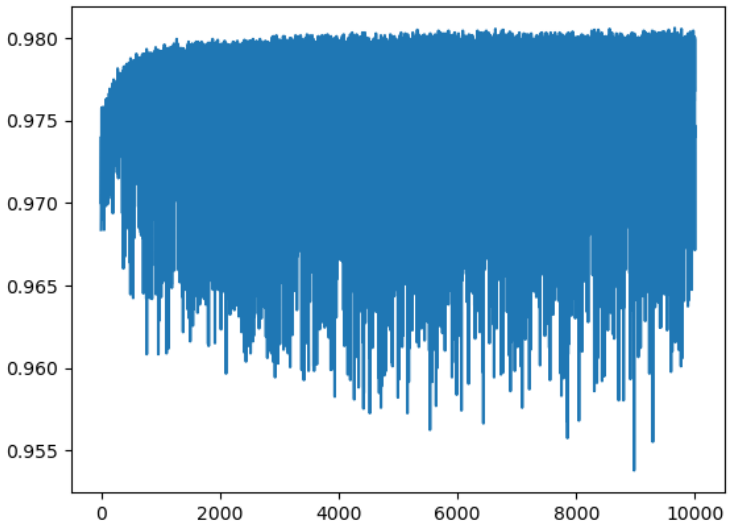
Challenge2 is not linear separable.
python perceptron_starter.py --iterations 100 --train_file data/challenge2.dat –convergence 1

Challenge3 is not linear separable.
python perceptron_starter.py --iterations 100 --train_file data/challenge3.dat --convergence 1

Challenge4 is linear separable.
python perceptron_starter.py --iterations 100 --train_file data/challenge4.dat --convergence 1

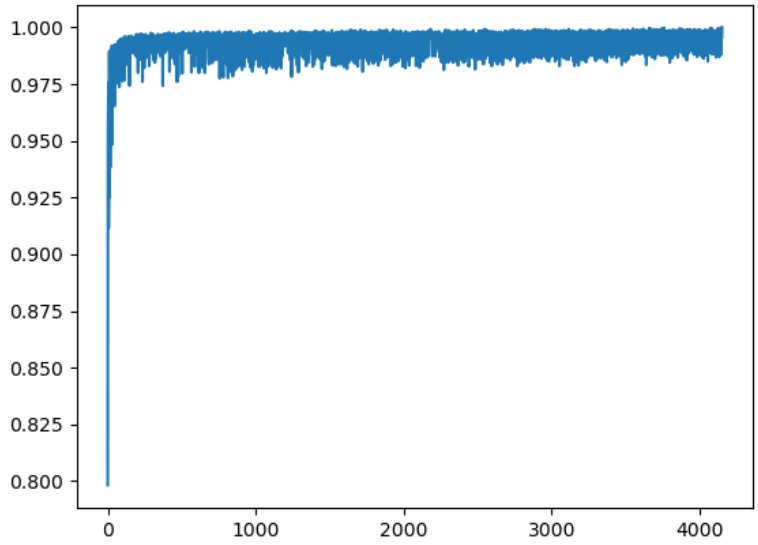
Here are the plots of each database:

Challenge0:



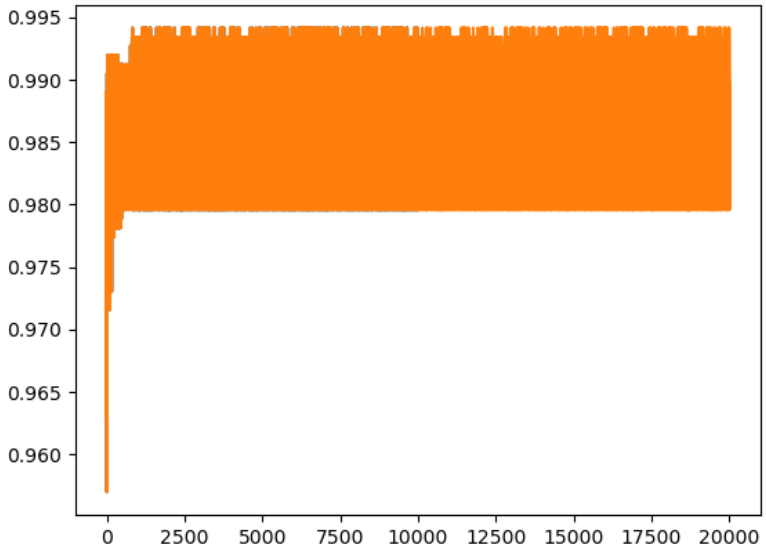
I set the maximum number of iterations for challenge0 to be 10000. The result weights have a maximum accuracy 0.981, and the final accuracy after about 10000 iterations is about 0.974. According to the plot, the accuracy did not get any closer to the 1.0, instead it is fluctuating up and down within the range 0.97 to 0.98.

Challenge1:



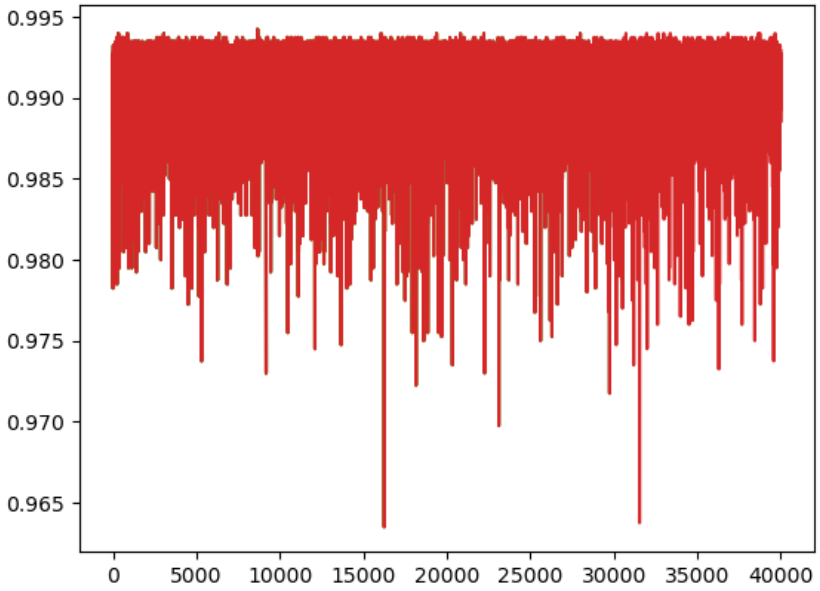
Challenge1 converged at iteration 4155. The maximum vector norm (R) is about 4.143. Therefore, the upper bound of delta is approximately 0.0124.

Challenge2:



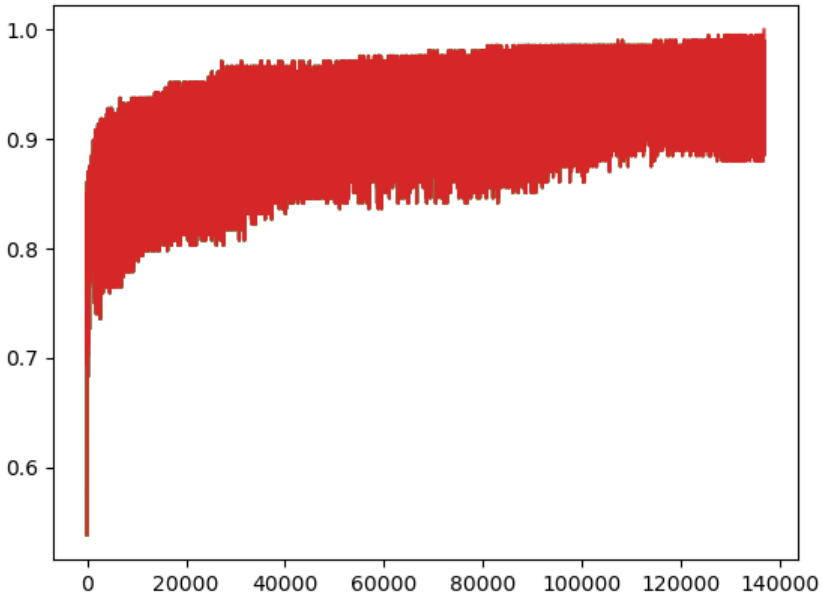
I also set the maximum number of iterations for challenge0 to be 20000. The result weights have a maximum accuracy 0.994, and the accuracy at about 20000th iteration is about 0.9876. According to the plot, the accuracy is bounded by 0.994 and 0.98 and didn't seem to achieve 1.0.

Challenge3:



Challenge3 is not linearly separable. I ran it 40000 times, and the maximum accuracy is 0.994, and the accuracy at the 40000th iteration is approximately 0.992. According to the plot, the accuracy bounced up and down in the range of approximately 0.975 to 0.994.

Challenge4:



Challenge4 converged at iteration 136694 with accuracy achieved 1.0. The maximum vector norm (R) is about 4.053. The upper bound of delta is approximately 0.00274.