

CS 165B – Machine Learning, Summer 2020

Homework 2

Due Thursday, August 27, 2020 11:59pm

Write a Python3 program called `hw2.py` that creates a kernel perceptron classifier for the Iris data set. For this assignment, the objective is to separate Iris Setosa from the other species (Iris Versicolor and Iris Virginica).

1 Details

The program should be able to read in the contents of files, train perceptron using dot product, polynomial, and exponential kernel, and predict labels with trained kernel perceptron. We are assuming that the initial weight is all zeros.

You are provided a training data set and a testing data set for this assignment. They are for development only. You are also provided a skeleton code. Avoid changing the signature of these functions: `Perceptron.__init__()`, `.train()`, and `.test()` as they will be called to grade your code. `Perceptron.test()` should return a list of labels where 1 represents Iris Setosa and -1 represents other species.

The program must be able to run on CSIL and it must finish running within 1 minute. You are not allowed to use any third-party libraries or frameworks for this homework except those declared in the skeleton code.

2 Grading

The program will be compared to a standard implementation of kernel perceptron. Your classifier needs to perform at least as well as this baseline classifier in order to get full score. A different set of files will be used for grading. The code must work on CSIL or you will receive 0%.

Grade Breakdown:

- 30% for correct training procedures
- 20% for correct testing procedures
- 10% for implementing the dot product kernel correctly
- 10% for implementing the polynomial kernel correctly
- 10% for implementing the exponential kernel correctly
- 20% for performing at least as well as the baseline perceptron and finish running in 1 minute.

3 Submission

Submit your solution on CSIL using this command:

```
turnin hw2@changhai_wang hw2.py
```

You may submit multiple times before the deadline. Only the last one will be used.