

Elijah Flinders  
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CSC 448 - Machine Learning  
Professor Christer Karlsson  
Program 1: Perceptron

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### **Program Description**

This program displays an entry level use of a starter perceptron class designed to operate on simple data sets. In this case the perceptron is showcased using the iris flower dataset. The perceptron will examine selected properties in the data, in the case of the iris flower data, it looks at sepal length and petal length. Over several learning iterations, it will try to decide whether a flower belongs in the versicolor group or the setosa group.

### **Uses of the Library**

You can use the library for binary classification on two different sets of data. In our case it was classifying the versicolor versus setosa group.

### **Libraries Used**

Numpy - Numerical Python library which allows for creation of multidimensional arrays the application of mathematical and logical operations on them. It was the main driver behind the hamming code generation in the program.

Pandas - A Data Analysis python library, which is used to import and manipulate the data given in the iris flower dataset.

Matplotlib - A general mathematical plotting library used to create, display, and alter information to be displayed on graphs. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits

### **Main Algorithm/How to Run**

Run: *python3 perceptronPractice.py*

This can be run in any cmd or bash terminal with access to the necessary libraries and python3.

The perceptron class is located in ML.py and the plotting script is found in a separate file perceptronPractice.py and is the entry to the program.

### **Testing and Verification, Expected Result**

Testing and verification of the perceptron's performance was done using the iris iris flower dataset over multiple iterations. Here is the link from where the data was pulled in a csv:

<https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data>

The program starts out by printing a graph which displays data for flowers and their features. Then it shows a graph which visualizes the iterations that the perceptron takes to minimize misclassifications. Finally, it shows a graph which generates a visual zoning function used to determine how it was decided whether a flower was placed in the versicolor group versus the setosa group.