CSc 59929
Introduction to Machine Learning
Assignments for Week 4
Due September 25 by midnight

- Compete the programming exercise described on the following charts.

Programming Exercise

- Up to this point we've been looking at only two features at a time. We've done this largely so that we can visualize the decision boundary. With only two features, the decision boundary is a line in the plane defined by the two features.

- The models we've looked at so far (Perceptron, Adaline, and Logistic Regression (which we're just in the middle of exploring) are applicable to any number of features.

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Programming Exercise

- Note that, for the case with two features, the decision boundary that separates the two classes of samples is a line defined by the equation

$$w_0 + w_1 x_1 + w_2 x_2 = 0.$$

- In the case with m features, the decision boundary is a hyperplane defined by the equation

$$w_0 + w_1 x_1 + w_2 x_2 + \ldots + w_m x_m = 0.$$

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Programming Exercise

- Using the Iris dataset, pick two classes that are not linearly separable when you use only two features (e.g., Iris-setosa and Iris-versicolor when using petal length and sepal length).

- Train the Adaline learning model using the following
  - All six cases of using two features at a time.
  - All four cases of using three features at a time.
  - The one case of using all features at once.

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Programming Exercise

- Summarize your results (i.e, what's the best accuracy you can obtain for each of the 11 cases you considered) in a table.

- Discuss your findings. Does using more dimensions help when trying to classify the data in this dataset?

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