



Machine Learning Online | Assignment - III

Logistic Regression | Classification Problem

Consider the log-likelihood function for logistic regression:

$$L(\theta) = y(i) \log h_{\theta}(x(i)) + (1-y(i)) \log(1-h_{\theta}(x(i)))$$

1. The files “logisticX.csv” and “logisticY.csv” in the datasets folder contain the inputs ($x(i) \in \mathbb{R}^2$) and outputs ($y(i) \in \{0,1\}$) respectively for a binary classification problem, with one training example per row. Implement Mini-Batch Gradient Descent method for optimizing $L(\theta)$, and apply it to fit a logistic regression model to the data. Initialize params $\theta = \sim 0$ (the vector of all zeros). What are the coefficients θ resulting from your fit? (Remember to include the intercept term.)

2. Plot the training data (your axes should be x_1 and x_2 , corresponding to the two coordinates of the inputs, and you should use a different symbol for each point plotted to indicate whether that example had label 1 or 0). Also plot on the same figure the decision boundary fit by logistic regression. (i.e., this should be a straight line showing the boundary separating the region where $h(x) > 0.5$ from where $h(x) \leq 0.5$.)
3. **Bonus Problem** Read and Implement Newton's Method (given in Andrew NG CS229 Notes) for Part-A. Compare your results - Final Loss and Total Iterations taken before convergence.
4. Repeat Part-A and Part-B using Sci-kit Learn [Logistic Regression Class](#). Compute 5-fold Cross Validation Score on Training Set. There is no test set for the current problem.