**Assignment 1 Report**

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Before attempting the assignment, I had no idea about the basics of machine learning algorithms and could only use libraries provided by scikit-learn, keras etc. But after solving this assignment I got the fundamentals down and was able to build basic algorithms from scratch using python.

From the first 6 questions about regression, I learnt the basic algorithm behind linear regression, least angle regression and ridge regression. Also was taught how to implement batch, mini batch and stochastic gradient descent and how they differ from each other in terms of results. Related to python I learnt about the various functions in numpy, mainly np.dot(), np.matmul() and the various normalization techniques which are made easier with the numpy library. I also learnt how to calculate cost functions of ML algorithms and what they signify in the main framework.

In each of the other questions, the unsupervised learning algorithms were explained and implemented from scratch. I learnt about the concept of clustering and plotting them using functions from the matlpotlib library. These questions will mainly be used in data analysis and segmentation to check for similarities in data points. K-Means clustering and Logistic regression was implemented from scratch which are classification algorithms. The rest of the problems (10-12) are related to hyperparameter tuning which is used to improve the performance of the algorithms implemented. Likelihood ratio test, maximum a posteriori and maximum likelihood all use k-fold cross validation to split the dataset into training and test data to improve training of the algorithm to get more accurate results.