

Project Updates: Image Classification with CIFAR-10 Dataset  
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Progress

Since the initial proposal, I have started the implementation of my code. First, I came up with a way to read in the data. I spent some time figuring out the formatting and organization of the data and determined how I would be able to utilize it. The data is already split into 5 training sets and 1 test set, but for cross validation, I will use all 6 sets as training and testing for different iterations. This will allow me to better compare all the different algorithms.

Then I began working on the Ridge Regression algorithm by creating a function to perform the calculations and analysis. I use 5 of the data sets as the training data, and then I split the one hold out set into two sets for the testing. The function first takes a set of lambdas (still need to figure out what set/ range to use) and finds the  $w$  for each. Then it chooses the lambda that gives the lowest error rate using the first test set. Then with the best lambda and corresponding  $w$ , the last test set is used to find the error rate and the squared error. While my method seems right, the code takes a long time to run, and so I will look into ways to speed it up.

In my project proposal, I proposed using K-means to classify the data. This was a mistake because K-means is used for unsupervised learning which is not what I want. I was thinking of a K-nearest Neighbors approach, but I'm not certain this will work. I will need look into the issue more and determine if it'll fit my needs. If not, I will need to choose another algorithm.

Action Items

- Figure out how to determine the set of lambdas used for Ridge Regression
- Look into approaches to help speed up the Ridge Regression calculations
- Check about using K-nearest neighbors—come up with an alternative algorithm
- Start implementing the second algorithm once finalized
- Work on Neural Networks aspect once we've covered it in class