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**HW 1**

We were supposed to identify which one among Binary tree and K-NN neighbors works faster and efficiently with mnist data.

After importing data from keras data base, which was divied into train and test data, we reshaped the 2D data into 1d using reshape function. Following the reshaping normalization of data was done and then we checked the size of both Train and Test data using shape function. The size of Training data was (60000, 784) and Test data (10000, 784).

20% of the Training data was used for validation and the original data separated for testing was entirely used to test the predictions of the model.

Binary Tree with min\_sample\_split = [2,3,5] gave accuracy scores around 87% (87.016667,87.775,86.891667). Comparatively the scores of KNN neighbors were higher around 97% for k values [1,5] to be exact (97.425,97.07500%).

Binary Tree ran faster compared to KNN neighbor algorithm. The KNN algorithm took around 20 mins whereas Binary Tree only took 5 per sample split.

We obtained the best results with KNeighbors Classifier (k=1) with accuracy score of 97.23 % on test data.