Machine Learning Sessional

Report for Assignment 3 on Artificial Neural Network

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1. Why may the validation help to determine appropriate number of nodes in the hidden layer?

In neural network, hidden layers are the layers between the input layer and the output layer. These layers, in conjunction, projects nonlinear behavior in a neural network. But, the optimum number of hidden layers are not constant for every problem and should be determined empirically. Because, if a problem has more or less than the optimum number of hidden layers, MLP will not converge within the regular time. So, to determine the number of hidden layers empirically, validation set is used. Validation set is a small set of input examples (not part of the training set) that is used to adjust the number of hidden layers. As it is not part of the actual training set, it mostly reflects the behavior of the neural network for new input data and thus by observing and changing the number of hidden layers, we can find the optimum number of hidden layers.

2. How have you ensured efficient implementation of backpropagation algorithm?

We coded in python and by using the "NumPy" library for all of our calculations we ensured the efficient implementation. We maintained 2 separate lists for the biases and weights of all layers. The output error was calculated using sigmoid function and numpys' pre-implemented methos. Then the error is propagated through all the layers. All the dot products were also done using numpys' array, which is the most efficient way we think.

3. Compare ANN with Decision tree.

Topic	**Artificial Neural Network**	**Decision Tree**
Use of Hidden Layers	Yes	No
Decision Boundary	Non Liner	Sum of Liner Boundaries
Complexity	O(number of nodes)	Tree grows exponentially with respect to number of features
Chances of Overfitting	Possible, but can be adjusted	Most likely
Use	Mostly for binary data	Mostly for multi category data
Understandability	Hard to understand	Easy to understand