Machine Learning Project Proposal

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1 Introduction to data

1.1 NORB dataset

This database is intended for experiments in 3D object recognition from shape. It contains images of 50 toys belonging to 5 generic categories: four-legged animals, human figures, airplanes, trucks, and cars. The objects were imaged by two cameras under 6 lighting conditions, 9 elevations (30 to 70 degrees every 5 degrees), and 18 azimuths (0 to 340 every 20 degrees).

Popular method done on this data set is deep belief networks (DBN). Vinod Nair and Geoffrey E. Hinton at University of Toronto have a paper (*3D Object Recognition with Deep Belief Nets*) on applying DBN on this data set.

1.2 MNIST dataset

The MNIST database of handwritten digits, available from this page, has a training set of 60,000 examples, and a test set of 10,000 examples. It is a subset of a larger set available from NIST. The digits have been size-normalized and centered in a fixed-size image.

Many methods including linear classifier, KNN, SVM, etc have been tested with this training set and test set. From the deep learning aspect, convolutional net is applied to this data set and gives a relatively satisfied result.

2 Project plan

Our plan for this project include:

- Read the deep learning review paper written by Yann Lecun, et. al.
- Learn 3 techniques: restricted boltzmann machine (RBM), deef belief networks and convolutional net.
- Try the codes written by others on the two data sets.
- Hopefully we can try the techniques we learned on new data set.
- Apply curriculum learning (optional).

3 Working mode

We created a repository on Github COMP790 and we will share our work there.