Homework 2

Sparse Autoencoder

Due: 11:59 pm, April 4, 2018

In this homework, you will practice to implement Sparse Autoencoder (SAE) and show how it can discover basic features in video/audio data. Details of SAE algorithm can be found in Lecture Note and attached pdf file given from Stanford Machine Learning course. You may code by yourself with either Matlab or Python for all homeworks.

Problem1. Complete source code: Main.m (15 points), Init_AE.m (10 points), Feedforward.m (15 points)

Problem2. Write a report to answer following questions.

1) With video data, please show the followings;
   A. Find the effects of different learning rates? (10 points)
   B. What is the benefits of feature normalization ? (10 points)
   C. Compare SAE learning of different sparsity coefficients: 0 (without sparsity), 1 and 10 (while fix learning rate 0.01, sparsity target 0.1) (10 points)
   D. Compare SAE learning of different sparsity target: 0.1 and 0.3 (while fix learning rate 0.01, sparsity coefficients 1) (10 points)
2) With audio data, repeat 1C and 1D. (20 points)

Tip1. You may use 'Visualization.m' to draw cost curve and learned features.

Tip2. Firstly, try to complete learning SAE without sparsity constraint. Starts from simple setting.

Notes

You need to Upload two files on KLMS.

Report: [hw2_yourID.pdf]

Source codes & Learning result [hw2_yourID.zip]

- Source codes: All the MATLAB source codes.
- Learning result: Result_YOURID_audio.mat , Result_YOURID_video.mat (Main.m will automatically make these files at the end of learning.)
- Your scores on Problem1 can be adjusted based on your report on Problem2.
- Submissions delayed within 24 hours will get -10 points penalty.
- If you have any questions, post them at Q&A board to share your problem with others.