



University of the Philippines, Diliman
College of Engineering
Department of Computer Science

CS 180 Machine Problem 4-5
Face Recognition using ANN/SVM

Introduction

Facial recognition is one of many applications of machine learning. For this machine problem, you are to implement a facial recognition system using artificial neural networks and support vector machines.

Dataset

The dataset (<http://www.cl.cam.ac.uk/research/dtg/attarchive/facedatabase.html>) is composed of PGM files of 40 subjects. Use 60% of the images from each subject for training and the remaining for testing.

You may use the pixel intensities as features.

Analysis

1. Using a two-layer neural network with number of hidden nodes equal to half of the input nodes, how is the performance of your model on the training and test sets?
2. Vary the number of hidden nodes from half of the number of input nodes to equal to the number of input nodes. How is the performance of your model on the training and test sets? Plot this as a graph (Number of hidden nodes vs accuracy).
3. Using principal component analysis, transform the training data with respect to the 10 eigenvectors with the largest eigenvalues. Use this transformed data for ANN training. Performing the same transformation with the test data, how was the training time and model performance affected with this step?
4. Using the default parameters of SVM, how is the performance of your model on the training and test sets?
5. Using polynomial kernels with degrees 1-5, how is the performance of your model on the training and test sets? Plot this as a graph (Polynomial degree vs accuracy).
6. Using RBF as kernel for SVM, vary the value for gamma from 0.1 - 1 (0.1 increments). How is the performance of your model on the training and test sets? Plot this as a graph (Gamma vs accuracy).
7. Contrast your ANN model with your SVM model in terms of accuracy, ease of use, parameter tuning, and training time.

Deliverables

Submit the following via email to kedelaspensas@up.edu.ph with subject *CS180 MP4-5 <SECTION> <Surname>*:

- Source Code (Filename: *CS180MP4-5-<SECTION>_<Surname>.<ext>*)
- Analysis (Filename: *CS180MP4-5-<SECTION>_<Surname>.pdf*)

Deadline

The deadline of this machine problem is on 5PM 24 May 2018.

Notes

This machine problem can be solved using any programming language.

Code plagiarism will be dealt with an automatic grade of 5.0 and a case filed to the student disciplinary council.
Refrain from discussing solutions with your classmates and looking at available code online.