

EE 543 PROJECT ASSIGNMENT

The related documents are:

- 1-EE 543 FALL 2018 PROJECT ASSIGNMENT (this one)
- 2-EE543 PROJECTS IMPORTANT DATES AND WHAT TO SUBMIT
- 3-EE543 PROJECT PROPOSAL FORM
- 4-EE543 PROJECT REPORT TEMPLATE

**Your project reports will be checked in TURNITIN.
Pligiarism is an ethical issue resulting in penalty.**

Projects can be done alone or as a group of up to 4 students.

WHAT TO DO

You are going to use machine learning methods listed below for pattern recognition.

In case single person choose two of these methods:

One of these methods should be **Deep Learning**. For visual datasets it is suggested to use CNN.

In case of group study choose one additional method for each additional student.

MACHINE LEARNING METHODS
Multilayer Perceptron (MLP)
Deep Learning: Convolutional Neural Networks (CNN)
Deep Learning: Stacked Auto Encoders
Deep Learning: Stacks of Restricted Boltzmann Machine (RBM) also called Deep RBM or Deep Belief Networks,
Support Vector Machine (SVM)
Some other methods you prefer (for example Viola Jones for face detection)

You can use libraries in MATLAB, python, C or C++ already available on internet for these methods. The main purpose of the project is to decide on structure of the networks and training them for a specific problem.

Deep Learning Net: <http://deeplearning.net>

There are plenty of resources, datasets, tutorials, explanation about codes, papers etc in this site.

For software some of the related sites are:

Keras: <https://keras.io>

Theano: <http://deeplearning.net/software/theano/>

Tensorflow: <https://www.tensorflow.org>

Cafe: <http://caffe.berkeleyvision.org>

Several others are available at: http://deeplearning.net/software_links/

Also at these sites you will find many tutorials, explanations, etc.

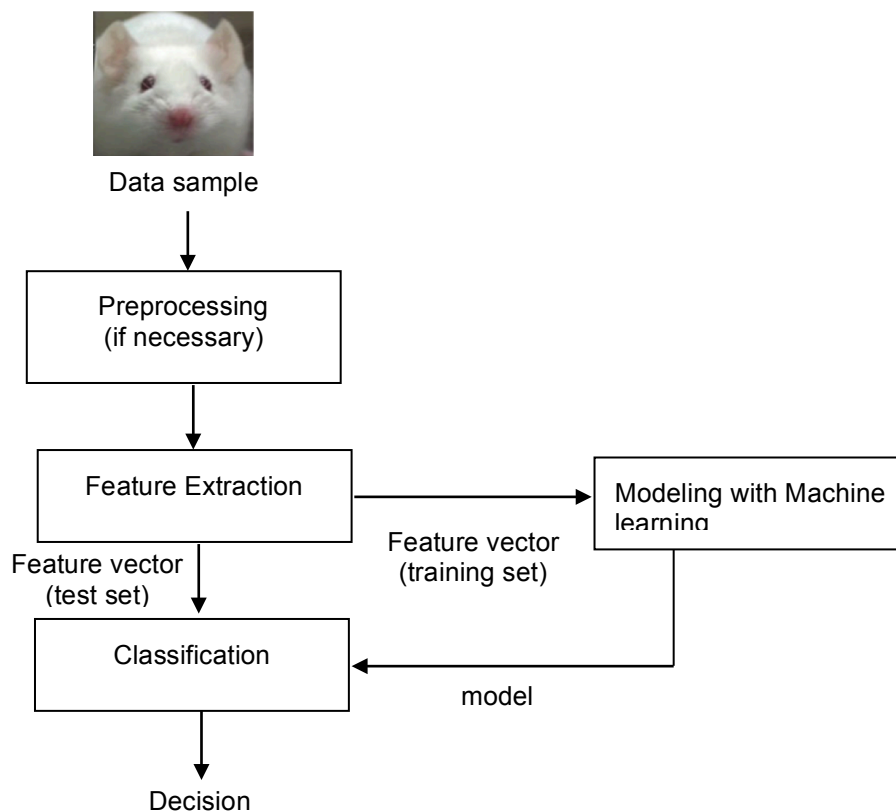
Choose a single problem category. Choose preferably, either face detection or face recognition, unless you intend to work on a special topic related to your thesis.

Find a related dataset from internet or use the one related to your thesis topic.

MNIST dataset for handwritten digit recognition is **NOT** suggested, since already there is a tutorial on MNIST at tensorflow. It is good only for getting used to deep learning.

PROBLEM CATEGORY
Natural Images
Artificial Datasets
Face Recognition/Detection
Text Recognition
Speech Recognition
Brain Signals
Biomedical Images
A problem in your THESIS TOPIC
SOME DATASETS
<p>You may use datasets available at</p> <p>http://deeplearning.net/datasets/</p> <p>https://www.bbc.de/activities#competition</p> <p>https://grand-challenge.org/All_Challenges</p> <p>https://www.kaggle.com/datasets</p> <p>Some face datasets</p> <p>LFW: http://vis-www.cs.umass.edu/lfw/</p> <p>IJB-A: https://www.nist.gov/programs-projects/face-challenges</p> <p>CASIA: http://www.cbsr.ia.ac.cn/english/CASIA-WebFace-Database.html</p> <p>KinFace: http://www.kinfacew.com/download.html</p> <p>or anywhere else</p>

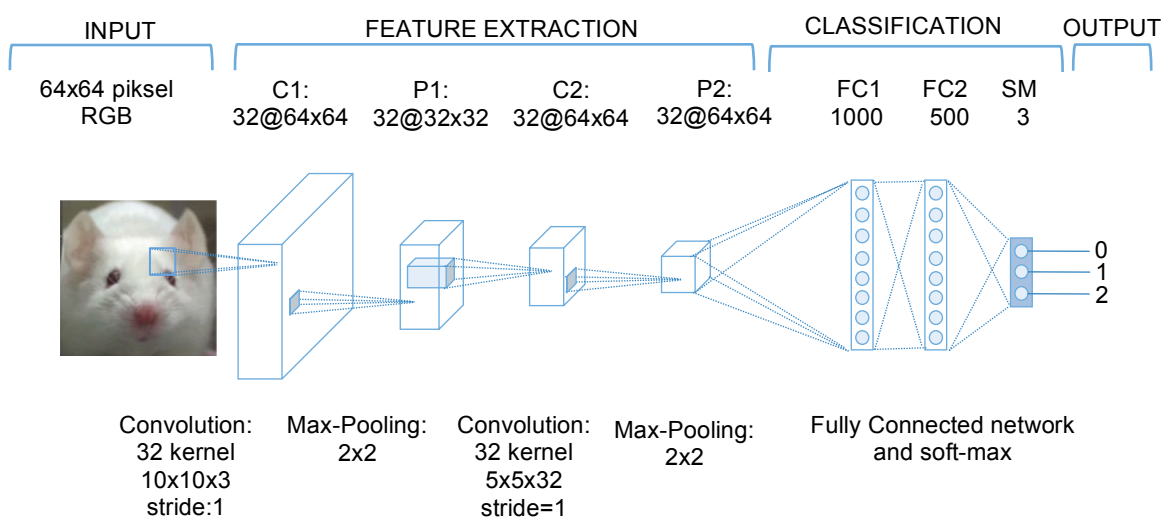
The steps necessary for pattern recognition are given below.



Feature extraction is a critical step for pattern recognition. For Deep Learning this is handled by the method itself. However for BP and SVM needs feature extraction for a successful performance, if you are going to use these methods in your project, survey carefully on what features can be used for your dataset before project proposal submission. Also depending on the dataset you have chosen, some preprocessing may be necessary (for example resizing samples, enhancing images etc).

Apply the chosen methods on the chosen data, compare performances of these methods.

An example network is given for CNN used for classification, here there are three classes.



You are allowed to use a pretrained network, say VGGnet trained on ImageNET and then adapt it to your problem say face recognition. Furthermore if you chose for example LFW dataset, not only the training set provided in LFW, you may use some additional faces in some other training set to improve performance, but apply first the protocol defined for LFW to see the effect of extending the training set.

GOOD LUCK!