

ECEN 689: Machine Learning: Fall 2020
Project 2: Decision trees, Boosting, SVM

Date Due: Thursday, Nov 19, 2020

This is the second of two projects in this course. Both carry equal weight.

A. Image Classification:

First, we will implement an image classifier using Convolutional Neural Networks. We will use the materials from Stanford University CS 231n Course ¹.

Link to the assignment page is [here](#). Details are given below.

Task 1

- You will implement a CNN to classify the CIFAR-10 Dataset.
- We will **only grade Q5** in [this page](#). But you are encouraged to try Q1-Q4 for a better understanding of CNNs.
- You can use either TensorFlow or PyTorch for Q5.
- You **should** solve part 5 of Q5 by implementing various techniques taught in class.

B. Titanic Dataset:

Next, we will implement a binary classifier using SVM, Decision trees and we will apply Boosting. Please use the notebook attached.²

Here is what you are expected to do.

Task 1

- You will implement a Decision tree classifier on the Dataset.
- We are going to the “scikit-learn” package for the entire notebook, so please make yourself comfortable with that. However, the homework is self contained and has everything you need to complete it.

Task 2

Now perform adaptive boosting for a decision tree classifier. Please play with the depth of the tree.

Task 3

Using the SVM classifier on the dataset, play with different kernels and present your observations.

Task 4 Apply Boosting to the SVM classifiers.

Task 5

Use your observations on the dataset, and using the above methods, try to improve the accuracy as much as you can. An ideal target is more than 85%

How to submit

1. Complete all the coding, create a text cell and explain your observations at the end or wherever you feel is appropriate.
2. Download the IPython Notebook as a HTML file for all questions.

¹Instructor gratefully acknowledges their permission to use these materials.

²We are just using the data which appears to be widely available in tensorflow and used in ML: https://www.tensorflow.org/tutorials/estimator/boosted_trees; please totally ignore its unfortunate morbid context.