CS4287: Neural Computing

Assignment 1: MLP / CNN

Team-Based Project

Autumn Semester 2024 – 2025

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4th October 2024 (Week 4)- **Version 1.0**

1. Objectives

- Perform classification using a MuiltLayer Perceptron (MLP) OR one of the earlier Convolutional Neural Networks (CNNs) – AlexNet, Inception, VGGNet, and ResNet.
- Explore the impact of varying hyperparameter(s).

2. Submission

Submit a **Jupyter notebook** with the code where:

- The book is named CS4287-Prj1-ID1-ID2.ipynb
  - Where ID1 and ID2 are the student id numbers of the team members.
- The first line in the book is a comment with names and ID numbers of the team members
- The second line in the book should be a comment stating if the code executes to the end without an error.
- The third line in the book should be a comment with a link to the original source(s) where you opted to reuse existing implementation(s).
- **The code cell output actions must show the results of running a code cell.**
  - **I will assume that the code has a critical bug otherwise!**
- Every critical line of code MUST be commented by **YOU** to demonstrate a deep understanding of that code.

The Jupyter Notebook MUST contain short descriptions of the following in the order specified:

1. The Data Set (2 marks)
    a. Visualisation of some of the key attributes is necessary for a top grade. Should also consider modelling of correlation using heatmaps.
    b. Any pre-processing such as normalisation applied to the data.
2. The network structure and other hyperparameters (1 marks).
3. The Cost / Loss / Error / Objective function, and the optimiser (1 mark).
4. Cross Fold Validation (1 marks).
5. Results – accuracy and/or precision and/or recall: with plots included (2 mark).
6. Evaluation of the results (1 marks).
7. Impact of varying a hyperparameter(s) (2 marks).

Penalties:

- Code does not run to completion: {-1 … -5} penalty depending on severity
- Code contains bugs: {-1 …-5} penalty depending on severity.

3. Sample Data Repositories

Open Data Repositories

- UC Irvine Machine Learning Data Repository
- Kaggle datasets
- Amazon's AWS datasets

Metaportals that list open data repositories

- Data Portals
- Open Data Monitor
- Quandl

Other

- Wikipedia's listing of data repositories

3. Notes and Guidelines

- This assignment **constitutes 10%** of the total marks awarded for this module.
- You will work in a team of 2.
- **Submission deadline is 23:59: Sunday 20th October (start of Week 7).**
    - **One submission only to be uploaded per team.**
- NO SUBMISSIONS WILL BE ACCEPTED AFTER THIS DATE!
- Submission is via the Brightspace Assignment tool.
- You MAY be required to provide the lecturer with a walk through of your project submission during an interview in Teaching Week 8-10.
    - The project will be awarded an F grade if a walkthrough is not provided when requested to do so.
- Programming language is Python.
- A grading rubric will for this assignment is published separately.