AI Applied Programming Assignment - 3

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Due date: June 18, 2024

1 Image Classification

1. Download the CIFAR-10 dataset from tensorflow.keras
2. Apply appropriate preprocessing steps prior to model training such as:
   - Train, validation, test split
   - Normalization
   - etc.
3. Build a Convolutional Neural Network model and train it using the train set from step 2
4. For each epoch, print the train and validation's loss and accuracy
5. Predict the test set using the model that you have built
6. Minimum test accuracy score of the model should be > 0.70

Note to the students. In order to efficiently train the classification model, the use of GPU provided by Google Colab may be necessary. If so, the details to how to use Colab's GPU are detailed here: `https://www.geeksforgeeks.org/how-to-use-gpu-in-google-colab/`. Starting the assignment at least one week before the due date is highly recommended as the Colab limits the GPU usage per day to 15 gigabytes. You are allowed to use **transfer learning** in this assignment but it is not necessary.

2 Autoencoder

1. Use the CIFAR-10 dataset from tensorflow.keras
2. Apply appropriate processing steps prior to model training:
   - Train, validation, test split
   - Normalization
   - etc.
3. Build an autoencoder model and train it using the train set from step 2
4. For each epoch, print the loss
5. Visualize the original images and the images outputted by the autoencoder using the first 10 images in the test set.

3 RNN

1. Download the Apple stock price dataset from `https://www.kaggle.com/datasets/soheiltehranipour/apple-stock-20132018/code`
    - Note: 'AAPL.xls' is the train set and 'AAPL - Jan2018.xls' is the test set
2. Apply appropriate preprocessing steps prior to model training
3. Build a Recursive Neural Network Model and train it using the train set
4. For each epoch, print the model loss
5. Predict the stock prices of the test set
6. Plot the predicted stock price values against the actual stock price values