Week 6: Lab Programs

Q1: Artificial Intelligence

Consider the given dataset "Ads_clicks" containing data about which add was clicked in each time step. Suppose an advertising company is running 10 different ads targeted towards a similar set of the population on a webpage. We have results for which ads were clicked by a user Each column index represents a different ad. We have a 1 if the ad was clicked by a user, and 0 if it was not.

A. Write down the MAB agent problem formulation in your own words.
B. Compute the total rewards after 2000-time steps using the ε-greedy action. a. for ε=0.01, ε= 0.3
C. Compute the total rewards after 1000-time steps using the Upper-Confidence-Bound action method for c= 1.5, 2
D. For all approaches, explain how the action value estimated compares to the optimal action.

Q2. Deep Learning:

To apply various data augmentation techniques to improve the generalization of a deep learning model trained on the Flower Photos dataset
https://storage.googleapis.com/download.tensorflow.org/example_images/flower_photos.tgz

- Load and preprocess the **Flower Photos dataset**. Resize images to **(224, 224)**, normalize pixel values, and split into training (80%) and validation (20%) sets.

- Apply **random flipping, rotation (max 20°), zoom (0.2), and brightness adjustment** to the training dataset using **Keras ImageDataGenerator or tf.keras layers**. Display sample augmented images.

- Use **Albumentations** library to apply **elastic transform, grid distortion, and CLAHE** to sample images. Visualize augmented outputs.

- Train a CNN model (e.g., MobileNetV2 or ResNet50) on:

a) **Unaugmented Dataset (Raw)**
b) **Augmented Dataset**

- Compare the validation accuracy and explain the effect of augmentation.