

Assignment #06

Hope to Skills

Free Artificial Intelligence Advance Course

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Submission:

- Make a Google Collab notebook to implement this assignment.
- In case you face difficulty in creating the Google Collab Notebook Follow these [Steps](#)
- Submit a **.ipynb** file detailing all the information. No other format will be accepted
- Submission file should be named as **Assignment_06_StudentName.ipynb**
- Deadline for this Assignment is **Saturday 15-06-2024**.
- Strictly follow the submission deadline.
- Make Submission in the **Assignment-06** Google Form and press the submit button.
- Click [here](#) to submit the Assignment

What you will learn

- How to create the google Collab NoteBook from Scratch.
- Using the basic built in functions and apply the following.

Solve the Following Task

Question 1: Explain the basic structure and working of a simple Artificial Neural Network (ANN).

In your explanation, include the following points: (Marks 20)

- The role of neurons and layers in an ANN.
- How information flows through the network.
- The significance of activation functions and provide examples of commonly used activation functions.
- The concept of weights and biases and their role in training an ANN.

Instructions: This is a theoretical question. No dataset is required.

Question 2: Build a FCNN to recognize handwritten digits. Use MNIST handwritten digit data set. Your network should have: (Marks 20)

- An input layer of size 784 (28x28 pixels)
- Two hidden layers with 128 neurons each and ReLU activation
- An output layer with 10 neurons (one for each digit) and softmax activation (Use accuracy as an error measure).

Instructions: Use mnist dataset from the keras

Question 3: Explain the importance of hyperparameter tuning in training an ANN. List at least three hyperparameters commonly tuned in ANN training and describe their impact on the model's performance. (Marks 20)

Instructions: This is a theoretical question. No dataset is required.

Question 4: Write a Python script to create and compare the performance of an ANN using different activation functions (ReLU, Sigmoid, and Tanh) for the hidden layers. Use a simple dataset (e.g., Iris dataset) to train and evaluate the models. Report the accuracy for each activation function. (Marks 20)

Question 5: Weather Prediction Using Fully Connected Neural Networks. (Marks 20)

- Write code to load historical weather data from a CSV file.
- Preprocess the data by handling missing values, converting categorical variables to numerical, and normalizing numerical features.
- Write code to create a neural network model using TensorFlow or Keras, with appropriate input, hidden, and output layers.
- Write code to train the neural network model using the training data, and include validation to monitor performance.
- Write code to evaluate the model on the test dataset and print the mean squared error.
- Experiment with different configurations of the model and hyperparameters to improve performance. Document the impact of changes.
- Write code to predict weather conditions using new or unseen data and interpret the results.

Instructions: You can get the dataset from [here](#)