CHRIST (Deemed to be University)
Department of Computer Science
Master of Artificial Intelligence and Machine Learning

Course: MAI371 – Deep Learning
Exercise No: LAB Exercise – 4
Date: 09 – 03 – 2024
Duration: 2 Hrs

Question (10 Marks)

1. You are tasked with developing a deep neural network (DNN) model to predict customer churn for a telecommunications company. The dataset provided contains various features such as customer demographics, usage patterns, and service subscription details. Your objective is to implement dropout, layer-wise dropout, and Monte Carlo dropout techniques in the DNN architecture to assess their impact on model performance and generalization.

Implementing Dropout:
- Begin by constructing a baseline DNN architecture without any dropout layers.
- Introduce dropout layers after each hidden layer with a dropout rate of 0.5.
- Train the model on the provided dataset and evaluate its performance on a separate validation set.

Implementing Layer-wise Dropout:
- Modify the DNN architecture to incorporate layer-wise dropout, where dropout is applied after each hidden layer with varying dropout rates (e.g., 0.2, 0.3, 0.4).
- Train the modified model and assess its performance using validation metrics.

Implementing Monte Carlo Dropout:
- Extend the DNN architecture to include Monte Carlo dropout, enabling dropout during both training and inference phases.
- Train the model using this architecture and evaluate its performance on the validation set.

Comparison and Visualization:
- Compare the performance metrics (e.g., accuracy, F1 score, ROC curve) of the three models (baseline, with dropout, with layer-wise dropout, with Monte Carlo dropout).
- Visualize the training and validation accuracy/loss curves for each model to observe their convergence and potential overfitting.

Evaluation Rubrics:

Dropout Regularization: 3 marks
Layer Wise Dropout Regularization: 3 marks

Monte Carlo Dropout:2 marks
Comparison:2 Marks

Total:10 Marks

General Instruction:

1. Ensure that your code includes relevant comments to enhance readability and understanding. Subsequently, upload your code to GitHub for version control and collaborative access.
2. Include descriptive comments within the code, explaining its functionality and logic.
3. In the Google Classroom submission, include the GitHub URL where your code is hosted.
4. Attach a PDF document named "your_register_number_exercise_No.pdf" to the submission.The PDF document should include screenshots of the code and the output screen.
5. Upload the answer document&GitHub URL in Google Classroom on or before the deadline mentioned.Evaluation will not be considered for late submission