Department of Computer Science and Engineering

Faculty of Engineering

University of North Texas

Assignment 4 CSCE5300 Spring 2024

Due on or before 17th April 2024.

Literature Review (15%)

* + Research and summarize recent advancements (within the last 3 years) in deep learning neural networks. Focus on notable architectures, training techniques, and applications. Provide critical analysis and identify key challenges or limitations.

Neural Network Implementation (40%)

* + Choose a deep learning framework (use Keras: you can even use PyTorch) and implement a neural network for an image classification problem.
  + Select an appropriate dataset for your application.
  + Design and build your neural network architecture. Experiment with different layers (e.g., convolutional, recurrent, dense) and activation functions.
  + Split your dataset into training, validation, and test sets.
  + Train your neural network using appropriate optimization techniques (e.g., stochastic gradient descent, Adam optimizer).

Performance Evaluation (25%)

* + Evaluate the performance of your neural network model using suitable metrics (e.g., accuracy, loss).
  + Discuss the impact of hyperparameters on model performance. Experiment with varying hyperparameters (e.g., learning rate, batch size) and analyze their effects on training dynamics and final performance.

Model Analysis and Interpretation (20%)

* + Analyze the trained model's performance through visualizations (e.g., confusion matrix, learning curves).
  + Interpret the model's predictions on sample data points. Identify strengths, weaknesses, and potential areas of improvement.
  + Reflect on the implications of your findings and propose future research directions.

Submission Guidelines:

* Prepare a detailed report (10-15 pages) summarizing your work. Include sections such as Introduction, Literature Review, Methodology, Experiment Setup, Results & Discussion, Conclusion, and References.
* Submit your source code (e.g., Jupyter Notebook, Python script) along with the report.