Regularization

Assignment Questions

PW SKILLS

Objective: Assess understanding of regularization techniques in deep learning. Evaluate application and comparison of different techniques. Enhance knowledge of regularization's role in improving model generalization.

Part 1: Understanding Regularization

1. What is regularization in the context of deep learning? Why is it important?
2. Explain the bias-variance tradeoff and how regularization helps in addressing this tradeoff.
3. Describe the concept of L1 and L2 regularization. How do they differ in terms of penalty calculation and their effects on the model?
4. Discuss the role of regularization in preventing overfitting and improving the generalization of deep learning models.

Part 2: Regularization Techniques

5. Explain Dropout regularization and how it works to reduce overfitting. Discuss the impact of Dropout on model training and inference.
6. Describe the concept of Early Stopping as a form of regularization. How does it help prevent overfitting during the training process?
7. Explain the concept of Batch Normalization and its role as a form of regularization. How does Batch Normalization help in preventing overfitting?

Part 3: Applying Regularization

8. Implement Dropout regularization in a deep learning model using a framework of your choice. Evaluate its impact on model performance and compare it with a model without Dropout.
9. Discuss the considerations and tradeoffs when choosing the appropriate regularization technique for a given deep learning task.

Submission Guidelines:

- **Answer all the questions in a single Jupyter Notebook file (.ipynb).**
- **Include necessary code, comments, and explanations to support your answers and implementation.**
- **Ensure the notebook runs without errors and is well-organized.**
- **Create a GitHub repository to host your assignment files.**
- **Rename the Jupyter Notebook file using the format "date_month_topic.ipynb" (e.g., "12_July_Regularization_Assignment.ipynb").**
- **Place the Jupyter Notebook file in the repository.**
- **Commit and push any additional files or resources required to run your code (if applicable) to the repository.**
- **Ensure the repository is publicly accessible.**
- **Submit the link to your GitHub repository as the assignment submission.**

Grading Criteria:

1. **Understanding and completeness of answers: 40%**
2. **Clarity and depth of explanations: 25%**
3. **Correct application of regularization concepts: 15%**
4. **Analysis and evaluation of regularization techniques: 10%**
5. **Proper code implementation and organization: 10%**

Note: *Create your assignment in Jupyter notebook and upload it to GitHub & share that uploaded assignment file link through your dashboard. Make sure the repository is public.*