TensorFlow Fundamentals

Assignment Questions

PW SKILLS

Objective: The objective of this assignment is to gain practical experience with fundamental operations in TensorFlow, including creating and manipulating matrices, performing arithmetic operations on tensors, and understanding the difference between TensorFlow constants and variables.

Part 1: Theoretical Questions

1. What are the different data structures used in Tensorflow?. Give some examples.
2. How does the TensorFlow constant differ from a TensorFlow variable? Explain with an example.
3. Describe the process of matrix addition, multiplication, and element-wise operations in TensorFlow.

Part 2: Practical Implementation

Task 1: Creating and Manipulating Matrices

1. Create a normal matrix A with dimensions 3x3, using TensorFlow's random_normal function. Display the values of matrix A.
2. Create a Gaussian matrix B with dimensions 4x4, using TensorFlow's truncated_normal function. Display the values of matrix B.
3. Create a matrix C with dimensions 2x2, where the values are drawn from a normal distribution with a mean of 3 and a standard deviation of 0.5, using TensorFlow's random.normal function. Display the values of matrix C.
4. Perform matrix addition between matrix A and matrix B, and store the result in matrix D.
5. Perform matrix multiplication between matrix C and matrix D, and store the result in matrix E.

Task 2: Performing Additional Matrix Operations

1. Create a matrix F with dimensions 3x3, initialized with random values using TensorFlow's random_uniform function.
2. Calculate the transpose of matrix F and store the result in matrix G.
3. Calculate the element-wise exponential of matrix F and store the result in matrix H.
4. Create a matrix I by concatenating matrix F and matrix G horizontally.
5. Create a matrix J by concatenating matrix F and matrix H vertically.

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_Matrix_Operations_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 implementation and evaluation of matrix operations: 15%**
4. **Proper code implementation and organization: 10%**
5. **Overall presentation and adherence to guidelines: 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.*