Spring 2022: CSEE5590/490 – Special Topics

Python and Deep Learning Module-2 - ICP-9

Lesson Overview:
In this lesson, we are going to discuss Neural Network, Backpropagation, Activation Function, Cost/Loss Functions, Gradient Descent (Optimization Algorithm) and Learning Rate.

Use Case Description:
Image Classification on the handwritten digits data set

Source Code:
Provided in your assignment folder and assignment repo.

In class programming: (use the MNIST dataset from the lecture slides)

1. We had used 2 hidden layers and *relu* activation:
    a. Change the number of hidden layers and the activation to tanh or elu and report if accuracy changes.
2. Using the history object in the source code, plot the loss and accuracy for both training data and validation data on the same graph.
3. Run the same code without scaling (normalizing) the images, how does the accuracy change or the model training (stable/unstable, ...)
4. Convert the sequential model to a functional API model. (Create don't change the previous model).
5. Plot one of the images in the test data, and then do inferencing to check what is the prediction of the model on that single image from the test data.

Bonus point (10%):

1. Change the loss method to (sparce categorical cross entropy).
    a. For this part you need to explain WHY you encountered an error and what you did to overcome this.
2. Use a method (from NumPy) to print the correct class from the model prediction.

** Follow the IPC rubric guidelines.

Submission Guidelines:

1. Once finished document your code and make sure all parts of the assignments are completed.
2. Push your code to your GitHub repo and update the ReadMe file, add your info, and partner info.
3. Submit the assignment on Canvas.
4. Present your work to TA during class time to prove the execution and complete submission.

After class submission:

1. Once finished document your code and make sure all parts of the assignments are completed.
2. Push your code to your GitHub repo and update the ReadMe file, add your info, and partner info.
3. Submit the assignment on Canvas before the deadline.
4. Record a short video (1~3) minute, proof of execution and complete assignment.

5. Add video link to ReadMe file.

Note: *Cheating, plagiarism, disruptive behavior, and other forms of unacceptable conduct are subject to strong sanctions in accordance with university policy. See detailed description of university policy at the following URL: https://catalog.umkc.edu/special-notices/academic-honesty/*