Spring 2023

AIX20006 Assignment – Regression Modeling and Evaluation

Due date

Friday, May 12th, 2023.

Please note that no late submissions will be accepted.

Assignment description

The objective of this assignment is to exercise the implementation of the Multi-Layer Perceptron (MLP) with the Backpropagation algorithm for addressing a regression problem. This assignment also features an opportunity to learn how to evaluate a regression model in a more proper manner. The simulation code should be written in Python. The main deliverables for this assignment are 1) a report documenting your efforts on this assignment and 2) simulation codes you developed. All deliverables must be a joint effort, meaning that your team will need to distribute the different tasks amongst the members to share the workload fairly and effectively. However, please note that one student from your team should submit materials on behalf of the entire team.

Team

Students will work in a team of two or three students with the aim of developing teamwork skills while working with other students. The entire team will receive the same base grade; however, I will ask each of you to submit your own peer assessment in which you evaluate the contributions of your teammates; therefore, the grade may be changed as needed. This assessment aims to find ways to work well together and contribute equally to the overall product.

Data

You can access real-world operational datasets including the United States weather data (i.e., wind) through the LMS system.

- 20190120_Time_8_Altitude_22_Eastward_wind.csv

Problem statement

Suppose that you are asked to develop a regression model for analyzing the input-out mapping of the given dataset. Imagine that you are specifically required to use the MLP model to complete the regression task. Deliverables for this problem are as follows:

- Create an MLP-based regression model using the provided dataset and explain the regression model structure in detail. You may need to come up with by yourself how to divide the dataset.

- ✈ Evaluate the model performance using the given dataset. Specifically, you should provide the R-square value, the actual by predicted plot, the residual by predicted plot, and the model representation error value.
- ✈ Discuss with your teammates the results of the model evaluation.

Please note:

It is possible to solve this problem with various built-in libraries. Please feel free to use the libraries but cite them properly as needed.

Citation

Please ensure that all codes and materials originating from other sources including ChatGPT must be clearly documented.