MTRE4490 Machine Learning for Robot Perception

Project #3

Due by 11:59 pm on 02/17/2020 (Monday)

In this project, you are required to develop a Matlab program to implement a shallow neural network with the BP algorithm to learn a nonlinear function below:

$$z = \frac{\sin(\sqrt{x^2 + y^2})}{\sqrt{x^2 + y^2}} \quad , x \in (-8, 8),\ y \in (-8, 8)$$

The project requirements are shown as below

1. Each group submits an official technical report to summarize your project work. The report should include the following sections: Title page, Table of Contents, Task description, The network architecture, The training samples and the normalization operations, The training results (error and weight history), The test (prediction) results, The effects of the super-parameters, and Conclusions.
2. Submit the PDF version of your report to the D2L drop box.
3. Save your Matlab code as "surface_fitting.m", and upload it to the D2L drop box.

Grading Rubric

10 points: The project report and Matlab code submitted correctly.
20 points: Code runs without any syntax errors.
20 points: The surface function is predicted (maybe not correct).
10 points: The error history and weight history are presented in the report.
20 points: The network architecture is presented in the report correctly.
20 points: Describe how to prepare the training samples in the report.