

# MTRE4300 Machine Learning for Robot Perception

## Project #2

**Due by 11:59 pm on 02/10/2021 (Wednesday)**

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:

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

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. It is a group project and each group submits one report only. Please assign one of your group members to upload your report and code, and write all members' names on the first page of the report.
4. Save your Matlab code as "surface\_fitting.m", and upload it to the D2L drop box as well.

### Grading Rubrics

10 points: The project report and Matlab code submitted correctly.

20 points: The code runs without any syntax errors.

10 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.

10 points: Describe how to prepare the training samples in the report.

20 points: The report format is good, and the report is very clear and well organized. No handwritings are included in the report.