Assessment Description

1 Introduction

Often the mathematical relationship between a system's input and output is unknown. For example, what is the equation that relates an Infra-red sensor's, e.g. a SHARP IR sensor, measured distance to its analogue voltage? It is, again, often, not intuitive as to what the function's form, or what its coefficients' values, should be.

Fortunately, machine learning is an approach that can be used to approximate an unknown function, which is the focus of this assessment.

2 Aim

The aims of this assessment are to:

- "Use a knowledge system development software".
- "Represent industrial knowledge and understand inference principles".
- "Develop a simple knowledge-based system".

3 Objective

The objectives of this assessment are to:

- Write a program in Python, using TensorFlow, which trains a neural network to approximate an unknown function, f; where,
$$y = f(x).$$
- Using the trained neural network, infer the network's output for a given vector.

4 Necessary Competencies

This assessment relies on the following competency:

- Be able to write, compile, and run a Python-based program.

5 Requirements

This assessment has the following requirements:

- The program is to be written in Python, using Python 3.5+ syntax.
- The program is to use TensorFlow, using TensorFlow 1.0+ syntax.

6 Resources

For this assessment, the following resources are available:

- A comma separated value file, which contains pairs of x and y values.
- A Python program, whose source code can be adapted to plot the given x and y values and the neural network's inferred output.

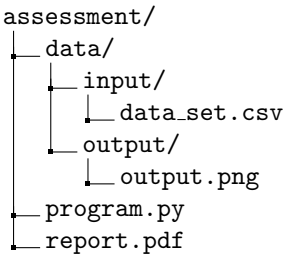

Figure 1: Recommended submission file structure.

7 Submission

Figure [1] illustrates the recommended file structure for this assessment.

It is expected that the submission includes:

- A two page description of the program.
- The program's source code.
- An image illustrating the original data set and the inferred output of your program.

Upload the submission as a single .zip file.

8 Grading

This assessment corresponds to "Project" and accounts for 40% of the course's final grade.

The following rubric will be used to mark this assessment:

Table 1: Marking Rubric.

E Range (0-39.99)	**D Range (40-49.99)**	**C Range (50-64.99)**	**B Range (65-79.99)**	**A Range (80-100)**
Inadequate	*Poor*	*Adequate*	*Good*	*Excellent*
The description describes what was done. No program submitted.	The description describes what was done; presents inaccurate results. The program does not address the assessment's requirements.	The description describes what was done; presents inaccurate results and discusses them; is appropriately written and typeset. The program addresses the assessment's requirements; generates inaccurate results.	The description is appropriately structured; describes what was done, how; presents results and discusses them; is appropriately written and typeset. The program is appropriately structured; commented; addresses the assessment's requirements; generates acceptable results.	The description is appropriately structured; clearly describes what was done, how, and why; presents accurate results and discusses them in detail; is written and typeset to a high standard. The program is appropriately structured; clearly commented; addresses the assessment's requirements effectively; generates accurate results.