ADTA 5550.401: Deep Learning with Big Data

Biniam Abebe

Midterm Assessment

PART I: AI Deep Learning (20 Points)

Question 1.1:

--) Provide an overview (at a **minimum** of **2 pages, including images**) of the history of artificial intelligence, including its sub-fields, machine learning and deep learning.

Question 1.2:

--) Provide an overview (at a **minimum** of **1.5 pages, including images**) of deep learning, including (but **not** limited to) the relationship between deep learning and machine learning, artificial intelligence.

Question 1.3:

--) Explain (at a **minimum** of **1.5 pages, including images**) why Deep Learning is very popular in recent years.

PART II: MLPs (Fully Connected Neural Networks) with Keras (50 Points)

Step 1 Result

**A diagram** of the neural network with all the layers, the neurons, and the feed-forwarding connections.

--) **Write a report** on these results:

* Present these results
* Compare these results: accuracy\_training versus accuracy\_evaluation.
* Using critical thinking to provide a **reasonable** explanation of the gap between them.

--) **Write another report** to **compare** the accuracy level from the evaluation process, i.e., accuracy\_evaluation, obtained in this project (MLP on **pima\_diabetes.csv**) with the accuracy level from the evaluation process of the project discussed in the lecture (MLP on **Iris.csv**)

* Present these results.
* Compare these results.
* Using critical thinking to provide a **reasonable** explanation of the gap between them.

PART III: Redesign the MLP (30 Points)

## TO-DO

To improve the performance of the MLP on the dataset pima\_diabetes.csv, it is assumed that the student plans to use the trial and error approach experimenting with a new design of the MLP. There are many ways to redesign a neural network.

--) First, based on the knowledge of the deep neural network MLP and using critical thinking, the student **redesigns** the MLP neural network, then **build, train,** and **evaluate** the redesigned MLP to find out if it produces a higher accuracy level.

--) Using MS PowerPoint or Draw Tool in MS Word to **draw the diagram** of the redesigned neural networks with all the layers, the neurons, and the feed-forwarding connections.

--) **Redo all the steps** of the project “**MLP on pima\_diabetes.csv**” in **another** Jupyter Notebook document.

## SUBMISSION REQUIREMENT #3

--) To discuss the new design of the MLP, add **one new** section into the MS DOCS document above: “**ADTA5550\_midterm.docx”**. The discussion should include:

* The **diagram** of the redesigned neural network
* Discussion in detail of **how** the MLP is re-designed
* Discussion in detail of **why** such a redesigned network can potentially produce improved performance, i.e., higher accuracy level.

--) **Run all the steps** of the project in the Jupyter Notebook document to get the results of each step.

--) Add **another** section to the MS DOCS document: “**ADTA5550\_midterm.docx**” to discuss the results obtained from the redesigned MLP, especially comparing them with those from PART II.

## IMPORTANT NOTES:

*--) With the assumption that the student uses the trial and error approach, it is* ***OK*** *if the results of training and evaluating the redesigned neural network do not show any significant improvement in the network performance.*