

## 1. Course Detail

### COURSE TITLE: DEEP LEARNING AND NEURAL NETWORKS

FACILITATOR(S):

NAMES: Mr. Richard Mkechera and Mr. Majid Nullo

Department: Computer Science Information Systems Engineering

College: St. Joseph College of Engineering and Technology

**Duration:** 5 Weeks

**Planned Start Date:** 1<sup>st</sup> August, 2022

**Venue:** Software Lab

## 2. Introduction *(Provide brief introduction to the short course)*

### About the Program

Deep learning and neural networks are very important components of data science which comprise predictive modeling and statistics, which accelerates the whole process of collecting, analyzing and interpreting large amounts of data. This course is extremely beneficial to data scientists, researchers and ICT professionals. This course provides a strong knowledge to deep learning and Neural networks, with focus on the process of developing models, model evaluation and interpretation. The course will conclude with a hands-on project in which you will have a chance to train and optimize a deep learning model on a simple real-world problem

## 3. Course Contents: The course shall include but not limited to: *(specify contents to be covered)*

3.1. Introduction to artificial neural networks

3.2. Introduction to deep learning- multi-level perceptron'

3.3. Improving Deep Neural Networks-Hyper parameter tuning, Regularization and Optimization

3.4. Convolution Neural networks

3.5. Sequence Models

3.6. Structuring Machine learning projects

## 4. Learning Outcomes: After completion of the short course, the participant should be able to: *(Specify the learning outcomes)*

- To understand the basic concepts behind, deep learning and neural networks and their biological inspirations
- To apply deep neural networks to problems such as image classification and object recognition
- To describe the challenges of modeling and strategies to overcome them
- To have acquired an understanding of pre-training of backpropagators, learning mechanism of Restricted Boltzman Machine, DBN, Convolutional Neural Networks
- Implement best practices in evaluating and interpreting DL models

## 5. Who Should Attend: This short course is suited to a wide range of professionals, including *(Specify the Professionals who should attend) for example*

- 5.1. Faculty Members
- 5.2. professional
- 5.3. Managers and Researchers
- 5.4. Analysts
- 5.5. Graduate Students

**6. Course Fees** (*Specify fees to be paid by participants*)

- I. Registration Fee: Tsh 20,000
- II. Course Fees: Tsh 180,000
- Total Fee Tsh 200,000

**7. Requirements** (*Specify the minimum number of attendees, equipment, space requirements, etc*)

Minimum Number of Attendees: 10

Equipment: Computer with **Nvidia GeForce RTX 2080 Ti** and internet, Projector, Mic, Speaker

Space Requirement: Lab with computer which has internet etc.

**COURSE TITLE: DEEP LEARNING AND NEURAL NETWORKS**

**Facilitator(s):** Mr. Richard Mkechera and Mr. Majid Nullo

| <b>Nº</b>         | <b>Date</b>   | <b>Total no of Hours</b> | <b>Topic</b>   |
|-------------------|---|--------------------------|--|
| <b>Unit – I:</b>  |   |                          |  |
| 1                 | Introduction to artificial neural networks  | 4                        | <ul style="list-style-type: none"> <li>• Build and train deep neural networks</li> <li>• Identify key architecture parameters</li> <li>• Implement vectorized neural networks and deep learning to applications</li> </ul> |
| <b>Unit – II:</b> |   |                          |  |
| 2                 | Improving Deep Neural Networks- Hyper parameter tuning, Regularization and Optimization | 4                        | <ul style="list-style-type: none"> <li>• Train test sets, analyze variance for DL applications</li> <li>• Use standard techniques and optimization algorithms</li> <li>• Build neural networks in TensorFlow</li> </ul>    |
| <b>Unit– III:</b> |   |                          |  |

|                           |                                       |        |  |
|---------------------------|---------------------------------------|--------|--|
| 3                         | Convolutional Neural networks         | 4      | <ul style="list-style-type: none"> <li>• Build a CNN and apply it to detection and recognition tasks</li> <li>• Use neural style transfer to generate art</li> <li>• Apply algorithms to image and video data</li> </ul> |
| <b>Unit- IV:</b>          |                                       |        |  |
| 4                         | Sequence Models                       | 4      | <ul style="list-style-type: none"> <li>• Build and train RNNs</li> <li>• Work with NLP and Word Embeddings</li> <li>• Use HuggingFace tokenizers and transformer models to perform NER and Question Answering</li> </ul> |
| <b>Unit- V:</b>           |                                       |        |  |
| 5                         | Structuring Machine learning projects | 4      | <ul style="list-style-type: none"> <li>• Developing any machine learning application that focuses on the above topics</li> </ul>   |
| Total no of contact hours |                                       | 20 hrs |  |