AI4D-Lab Tanzania - The University of Dodoma, CIVE

Artificial Intelligence Short Course

Machine Learning Outline

Zephania Reuben

June 24, 2022

Introduction

General Description

This course will provide understanding on different advantages of learning Machine Learning and it will be based on the real world applications, you will learn different Machine Learning algorithms and the Machine Learning road-map from data processing, model training, model fine turning, model selection to model deployment.

Python

Session Description

Python is regarded as being a great hobbyist programming language, it is recorded as the most growing and learned language for year 2021, yet it is also an extremely powerful language. In this session you will learn the basics to advanced.

Python

Session Objectives

1. To familiarize with the general understanding of programming.
2. To understand how to apply Python in solving different programmatic problems.
3. To understand Python in machine learning.

Data Science

Session Description

In this session you will be equipped with the knowledge on different data analysis and visualization tools, and how to understand data and extracting the useful information for Machine Learning algorithms, also hands on data wrangling by using project based approach which will provide relevant tasks for data manipulation.

Data Science

Session Objectives

1. To prepare, analyze, visualize and interpret data.
2. To understand data processing tools.
3. To apply the data processing tools.
4. To understand data categories and data manipulation.
5. To apply data wrangling techniques in handling text data.
6. To apply data wrangling techniques in handling image data.

Machine Learning

Session Description

This session will provide the foundation of Mathematics needed for machine learning in describing and inferencing Machine Learning algorithms, the session will also provide the knowledge of different Machine Learning algorithm, and when to use them, also you will learn the pros and cons of different Machine Learning algorithms.

Machine Learning

Session Objectives

1. To apply the principles of Algebra, Calculus,Probability, and Statistics in Machine Learning algorithms.
2. To make valuable of numerical optimization in optimizing Machine Learning solutions.
3. To understand Machine Learning modeling procedures.
4. To work with Machine Learning algorithms effectively.
5. To apply analysis of algorithm based problem context.

Outline I

1. Python Fundamentals
   - Basics of Python
     - Identifiers & Variables
     - Data Types
     - Operators
     - Decision Making
   - Collection Datatypes
     - List
     - Tuples
     - Dictionary and Sets
   - Functions
     - Defining functions
     - Calling functions
     - Function arguments
   - OOP in Python
     - Class and Objects
     - Inheritance
     - Polymorphism

Outline II

2 Data Science Fundamentals

- NumPy
  - Getting started with Numpy
  - Creating Numpy array
  - Computing mean,min,max on the ndarray
  - Reshaping and flattening multidimensional array
  - Creating sequences, repetitions, and random numbers
- Data Wrangling
  - Creating a series & dataframe
  - Selecting rows based on conditionals and replacing values
  - Handling missing value & dropping duplicate rows
  - Grouping, merging, & concatinating dataframes
- Data Visualization
  - Plots & multiline with Matplotlib
  - Grid, axes,titles, legend and labels
  - Saving plots to a file
  - Decorate graphs with plot styles and types
  - Plot types

Outline III

3 Machine Learning

- Fundamentals of Machine Learning
  - Introduction
  - Types of Machine Learning
  - Overview of Supervised Learning
  - Model Learning
  - Data Preparation
  - Regularization
  - Model Selection
  - Feature Selection
- ML Algorithms with Scikit-Learn
  - Regression and Classification Models
  - Logit Models
  - Tree Based and Ensamble Models
  - Algorithms Selection
  - Hyperparamenter turning
  - Model Evaluation
  - Model Deployment

Environment set-up

Anaconda: Install miniconda for python 3.9

1. Get it here.
2. Installation Procedures.

Environment set-up

Python libraries for Data Science and Machine Learning

- NumPy: conda install -c anaconda numpy
- SciPy: conda install -c anaconda scipy
- Pandas: conda install -c anaconda pandas
- Matplotlib: conda install -c conda-forge matplotlib
- Seaborn: conda install -c anaconda seaborn
- SciKit-Learn:conda install -c anaconda scikit-learn
- Jupyter Notebook: conda install -c anaconda jupyter
- Jupyter Lab: conda install -c conda-forge jupyterlab

THE UNIVERSITY OF DODOMA
UDOM
Embracing Knowledge

The Nelson Mandela
African Institution of Science and Technology
Arusha
Mt Kilimanjaro
2009
Academia for Society and Industry
NM
AIST