

# Applied Machine Learning

## Outline

Salahadin Seid

School of Data Science  
Emerland University

August 8, 2024



ኤመራልድ ኢንተርናሽናል ኮሌጅ  
EMERALD INTERNATIONAL COLLEGE

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods
- 5 Method of Assessment
- 6 Reading Material

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods
- 5 Method of Assessment
- 6 Reading Material

# Intro

- Full Name: Salahadin Seid Musa
- Contact:  
salubinseid@gmail.com/salahadin.seid@kiot.edu.et
- Educational profile:
  - PhD candidate - Sandwich Program in Network and Mobile Internet (AAU and Italy)
  - MSc in Computer Science - Addis Ababa University
  - BSc in Computer Science - Jimma University
- Academic teaching experience: Jimma University (former) and Wollo University (Now)
- Research Experience: Internet of Things, Edge/Cloud Computing, Artificial Intelligent of Things, Machine Learning, TinyML

# About the Course

- The course teaches you a wide-ranging set of techniques of **supervised** and **unsupervised** ML approaches using Python.
- This course is also deep dive into details of the **DL architectures** with a focus on learning end- to-end models for tasks.

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods
- 5 Method of Assessment
- 6 Reading Material

# Course Objective and Outcomes

- At the end of the course, the students will be expected to:
  - Design and implement advanced ML algorithms for classification, regression, and clustering problems
  - Be able to evaluate and interpret the results of the algorithms.
  - Learn DL methods for working with image, text, and audio data which could have spatial and temporal behavior.
  - Apply such DL mechanisms to various learning problems. Know the open issues in DL, and have a grasp of the current research directions

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline**
- 4 Teaching and Learning Methods
- 5 Method of Assessment
- 6 Reading Material



# Outline

- Introduction to Inference and Learning
- Introduction to Classification and Regression
- Advanced Regression
- Bagging and Random Forest
- Boosting
- Clustering: Hierarchical Clustering, Density Based Clustering
- Principal Component Analysis (PCA)

## Outline ...

- Introduction to Artificial Neural Network (ANN)
- Convolutional Neural network (CNN) and its variants (LeNet, AlexNet, GoogLeNet, DenseNet, ResNet) and training strategies.
- Recurrent Neural network (RNN) and its variants (Vannila RNN, LSTM, GRU)
- Transfer Learning, Multi-task learning, Interpretability of DL Models
- Deep Boltzmann Machine, Deep Belief Network, Deep Autoencoder
- Time Series Analysis
- Reinforcement learning, Semi-supervised Learning and Un-Supervised Learning
- Deep Reinforcement Learning
- Generative Adversative Network

# Outline ...

- Model Interpretations
- Handling Multimodal and Imbalanced Datasets
- Bias in Artificial Intelligence
- Ensemble Methods
- Solving difficult tasks in NLP, Pattern Recognition, and Data Science
- Bleeding-Edge Architectures

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods**
- 5 Method of Assessment
- 6 Reading Material

# Teaching and Learning Methods

This course will be offered through

- Lectures and Presentations,
- Class discussions,
- Laboratory work, and Group project work

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods
- 5 Method of Assessment**
- 6 Reading Material

# Method of Assessment

The achievements of learners are assessed

- 10%: Article Review (Individual Work)
- 10%: Assignment (Individual Work)
- 30%: Project Work and Presentation (Group Work)
- 50%: Final Examination

- 1 Intro
- 2 Course Objective and Outcomes
- 3 Course outline
- 4 Teaching and Learning Methods
- 5 Method of Assessment
- 6 Reading Material**



- [1] A. Géron, “Hands-on machine learning with scikit-learn and tensorflow (concepts, tools, and techniques to build intelligent systems),” 2019.
- [2] . C. A. Goodfellow I., Bengio Y., “Deep learning. mit press. deep learning in neural networks: An overview, jürgen schmidhuber, neural networks;,” 2016.
- [3] A. J. S. Bernhard Schölkopf, “Learning with kernels: Support vector machines, regularization, optimization, and beyond (adaptive computation and machine learning,” 2001.