

Module for Summer Internship Programme – 2024

on
Artificial Intelligence and Machine Learning Techniques

Objective:

This programme aims to provide a practical understanding of machine learning concepts and techniques, focusing on supervised learning, neural networks, natural language processing (NLP), and text classification. Participants will gain hands-on experience in building and evaluating machine learning models using Python and popular libraries.

Outcome:

Upon completion of the programme, participants will be able to:

- Understand machine learning fundamentals and their applications.
- Apply Python libraries for data manipulation, analysis, and modeling.
- Implement supervised learning algorithms and neural networks for classification tasks.
- Develop skills in natural language processing (NLP) and text classification.
- Visualize and interpret model results using appropriate techniques.
- Engage in hands-on projects to solve real-world machine learning problems effectively.

Duration: 1 month

Prerequisites:

- Basic knowledge of programming (preferably Python)
- Understanding of basic statistics concepts

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Week	Topic	
Week 1	Introduction to Machine Learning <ul style="list-style-type: none">● Introduction to machine learning and its applications● Overview of Python libraries for machine learning (NumPy, Pandas, Scikit-learn)● Exploratory Data Analysis (EDA) using Pandas and Matplotlib● Data preprocessing techniques (handling missing values, feature scaling, encoding categorical variables)	
Week 2	Supervised Learning Algorithms <ul style="list-style-type: none">● Introduction to supervised learning● Introduction to neural networks and feedforward networks● Decision trees and ensemble methods (Random Forest, Gradient Boosting)	

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	<ul style="list-style-type: none">● Support Vector Machines (SVM)● Model selection and hyperparameter tuning● Building a feedforward neural network from scratch● Model evaluation metrics (accuracy, precision, recall, F1-score)	
Week 3	<p>Neural Networks and Deep Learning</p> <ul style="list-style-type: none">● Building a simple neural network using TensorFlow/Keras● Convolutional Neural Networks (CNNs) for image classification● Visualizing classification results (confusion matrix, ROC curves, precision-recall curves)● Transfer learning and fine-tuning pre-trained models● Audio data processing with spectrogram analysis● Building an audio classification model using CNNs	
Week 4	<p>Natural Language Processing (NLP) and Text Classification</p> <ul style="list-style-type: none">● Overview of NLP and its applications● Introduction to NLTK library in Python● Tokenization, stemming, and lemmatization of text data● Introduction to text classification● Building a text classification pipeline with NLTK and Scikit-learn● Visualizing word frequency using bar charts and word clouds● Advanced NLP Techniques● Named Entity Recognition (NER) using NLTK● Sentiment analysis with NLTK	

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