Course Title: Introduction to Artificial Intelligence
Instructor: Muhammad Uzair Aslam
Contact Information: m.uzair@statdevs.com
Office Hours: 11 Am – 1 Pm (Saturday & Sunday)
Class Location: Upcode Labs (Onsite)
Class Time: Saturday & Sunday (1 – 3 Pm)

Course Description:

This six-month AI course is meticulously crafted to provide students with a strong grasp of Python programming fundamentals, focusing on their application in the realms of Artificial Intelligence (AI) and Data Science. Upon completion of this course, students will possess the expertise required to code in Python, develop functions, and be exceptionally prepared for advanced topics, including Regression Analysis, KNN Algorithm, Decision Trees, and Neural Networks, including Convolutional Neural Networks (CNN). Students will be equipped to work as entry level positions as Junior Data Analyst / Scientist, Junior AI/Machine Learning Engineer and other similar positions in the Industry.

Course Materials:

Reference Books:

1. Think Python, 2nd Edition (Allen B. Downey)
2. A Smarter Way to Learn Python (Mark Myers)
3. Python for Data Analysis 3rd Edition (Wes McKinney)
   Online Book Link https://wesmckinney.com/book/
4. Deep Learning with Python, 2nd Edition (Francois Chollet)
5. Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow (Aurélien Géron)

Lecture Slides will be uploaded on Google Drive.

Weekly Plan:

Week 1: AI and Data Science Introduction

- Introduction to AI (What is AI, overview of course)

Week 2: Python Revision

Class 3:
- Variables
- Loops
- If, else
- Logical Operators

Class 4:
- Lists - operations, methods, traversal, indexing, slicing

Week 3: Python Revision

Class 5:
- File I/O - reading, writing, paths,

- Dictionary – operations, traversal
- Numpy Array basics and manipulation
- Numpy use cases

Class 6:
- Loading Data with Pandas
- Data Cleaning and Analysis with Pandas
- Methods for working in Pandas

Week 4: Data Visualization and Class Project

Class 7:
- Data Visualization with Matplotlib
- Data Visualization with Seaborn

Class 8:
- Data Cleaning and Analysis in Class Project

Week 5: Data Pre processing

Class 9:
- Steps of Pre processing (Normalization, Duplicates Removal, One Hot Encoding)
- Splitting the data into Train/Validation/Test Sets

Class 10:
- Hands on Project for Data Pre processing

Week 6: Linear Regression

Class 11:
- Linear Regression Concepts and Assumptions
- Different Regression Models
- Interpretation of Coefficients

Class 12:
- Hands on Linear Regression in Class Project

Week 7: Evaluation of Regression Models and in Class Project

Class 13:
- Concept of MSE, RMSE, R^2 and adjusted R^2

Class 14:
- Carrying End to End Regression Analysis on Data Set

Week 8: Logistic Regression

Class 15:
- Logistics Regression Concepts
- Application of Logistic Regression

Class 16:
- Carrying Analysis using Logistic Regression on Data Set

Week 9: K Nearest Neighbour

Class 17:
- K Nearest Neighbour Concepts
- Application of KNN Algorithms

Class 18:
- Carrying Analysis using KNN Algorithm on a Data Set

Week 10: Decision Trees and Random Forest

Class 19:
- Concept of Node and Tree
- How are Decision Trees built
- Application of Decision Tree

Class 20:
- Random Forest Algorithm
- Hyper Parameter Tuning for Tree Algorithms
- In Class Project with Tree Algorithms on Data Set

Week 11: Naive Bayes Algorithm

Class 21:
- Concept of Naive Bayes Algorithm
- Applications of Naive Bayes Algorithm

Class 22:
- In Class Project with Naive Bayes Algorithm

Week 12: Text Classification with Naive Bayes

Class 23:
- String Manipulation in Python Revision
- Applying of Text Classification Project with Naive Bayes

Class 24:
- In Class Project of String Manipulation with Naive Bayes

Week 13: K-Means Clustering

Class 23:
- Concept of K-Means Algorithm
- Uses of K-Means in Customer Segmentation

Class 24:
- In Class Project of K Means Algorithm

Week 14: Introduction to Deep Learning

Week 15: Perceptrons

Week 16: Multilayer Perceptrons

Week 17: Project on Multilayer Perceptron

Week 18: Project on Multilayer Perceptrons for Image Recognition

Week 19: Convolutional Neural Networks

Week 20: More on Convolutional Neural Networks

Week 21: Object Identification Project

Week 22: Face Recognition with Convolutional Neural Networks

Week 23: Final Project Work

Week 24: Final Project Presentations

Attendance: 6 Absences are allowed in the full course.
Participation: Students are expected to raise questions, participate in class discussion and complete all Class Labs.

Instructions for Passing the Course:

A minimum 60% is required to pass this course.

Grading:

Assignments	Description	Weight age (%)
Class Participation	It includes attendance of classes and participate in class discussions.	10
Class Labs	All classes will have hands on Lab Exercises where students are expected to complete and submit the labs.	30
Home Assignments	Students are required to submit all four problem sets within the deadlines.	30
Final Project	A maximum of 2 students will form a group to create the Final Project. The project idea should be shared and finalized with the instructor by the end of Week 5.	30

Home Assessment Breakdown:

Home Assignments (30%):
Python Assignment 1: 7.5% (Due at end of Week 4)
Data Analysis Assignment 2: 7.5% (Due at end of Week 10)
Machine Learning Assignment 3: 7.5% (Due at end of Week 14)
Deep Learning Assignment 4: 7.5 % (Due at end of Week 20)

Contact Information:

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For personal contact, you can email the instructor at m.uzair@statdevs.com.