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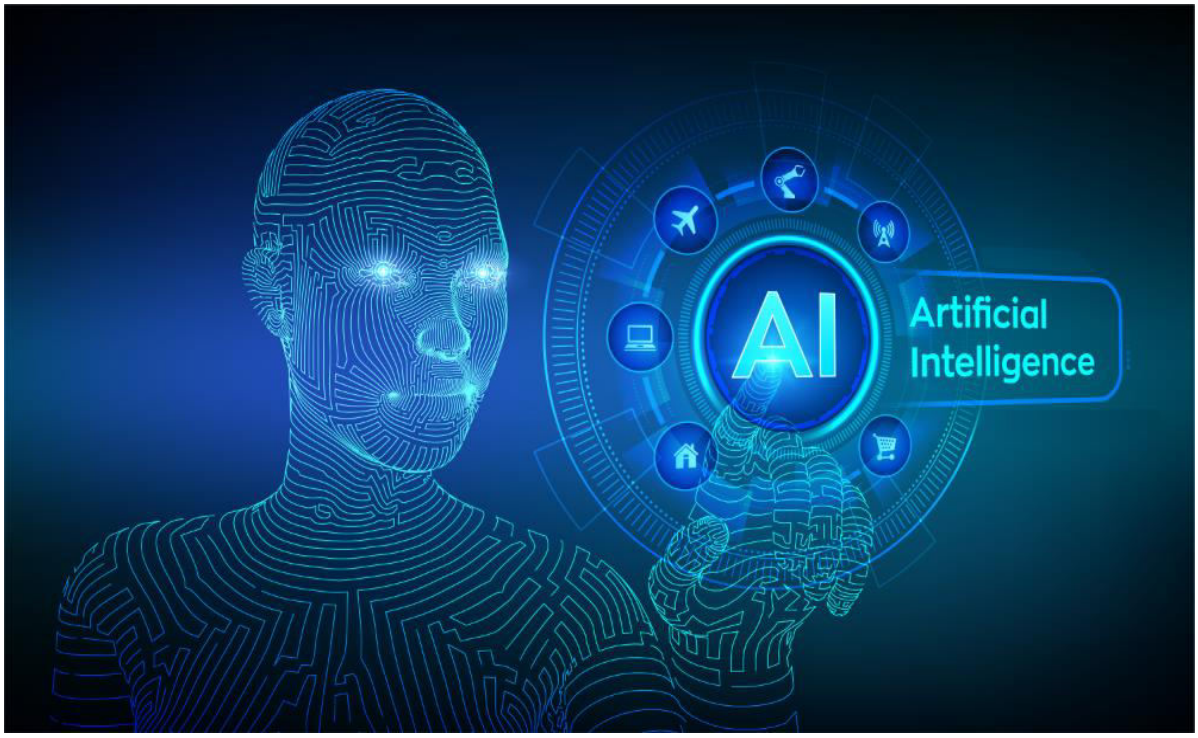

Artificial Intelligence Masters Program

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Artificial Intelligence Masters Program

Course Overview:

There is an increasing need for intelligent and accurate decision-making across industries. This has led to an exponential growth in the adoption of AI and ML technologies, and they are expected to remain relevant in years to come. The Masters Program in Machine Learning and AI has been designed specifically for professionals who want to become experts in Machine Learning & AI or who want to transform their careers altogether.

Course Outline:

Core Python

1. Getting Started

- History
- A Python Q&A Session
- How Python Runs Programs
- How You Run Programs

2. Introduction to Python:

- What is Python?
- Why Python?
- Python Applications in real life
- Brief history of Python
- Versions of Python
- Installing Python
- Using IDLE
- First Python Program
- Getting help from Python Docs

3. Types and Operations

- Introducing Python Object Types

- Numeric Types
- The Dynamic Typing Interlude
- Strings
- Lists and Dictionaries
- Tuples, Files and Everything Else

4. **Variables Data types**

- Intro to dynamic typing
- Variables in Python
- Naming conventions
- Basic Data types (representation of strings, integer, floats)

5. **Basic Syntax**

- Basic syntax
- Commenting
- Indentation
- Python keywords
- Strings
- String values
- String Operations
- String slicing
- Built in string methods
- Formatted printing
- Simple Input and Output handling

6. **Language Building blocks**

- Control statements, the if, elif, else
- True and False
- Arithmetic Operators
- Relational Operators
- Logical Operators

- Bitwise Operators
- While loop
- Usage of pass, break and continue
- For each loop

7. Collections

- Lists
- Tuples
- Sets
- Dictionaries
- Sorting collections
- Operations on collections
- Discussion on real life application of above collections

8. Functions

- Introduction to functions
- Built in functions
- User defined functions
- Function parameters
- Variable arguments ,args and kwargs
- Positional and named arguments
- Discussion scope of variables with respect to functions and namespace
- Passing function to another function

9. Project

10.File Handling

11. Modules

- Introduction to modules
- Introduction to standard modules
- OS module

- path module
- Sys module
- sub process module
- Argument parsing using argparse module
- .csv file parsing using csv module
- .jason file paring using Jason module
- Xml file parsing using xml module
- Introduction to logging module

12. Project 2: Building log parser and reporting the results

13. Object Oriented Programming

- Introduction to Classes and Objects
- Principles of OOP
- Instance methods
- Special methods
- Encapsulation
- Inheritance
- Polymorphism

14. Regular Expressions

- Introduction to regular exceptions
- Introduction to re module
- Simple character matches
- Match function
- Searching function
- Regular expression patterns
- Patterns in Regex
- Search And Replace

15. Optional I(for testers)

- Introduction to testing using Python
- Introduction to test automation
- Introduction to Selenium web deriver
- Web testing using selenium

16. Option II
(developers) Advance
topics:

- Generators
- Decorators
- Iterators and iterator protocol
- Debugging using PDB

17. Options III(Web programming)

- Introduction to web programming using Python
- Introduction to Django/Flask
- Introduction to Restful API's using Python

18. Option IV(Data science)

- Introduction to data science using python
- Introduction to pandas module
- Introduction to data visualization using matplotlib
- Introduction to numpy
- Introduction to scipy

Machine Learning

Setting up and installations

- Installing python

- Setting up Python environment for development
- Installation of Jupyter Notebook
- How to access our course material
- Write your first program in python

Python object and data structures operations

- Introduction to Python objects
- Number objects and operations
- Variable assignment and keywords
- String objects and operations
- Print formatting with strings

Python statements

- Introduction to Python statements
- If, else-if and else statements
- Comparison operators
- Chained comparison operators
- What are loops?
- For loops
- While loops

File and exception handling

- Process files using python
- Read/write and append file object
- File functions
- File pointer and operations
- Introduction to error handling
- Try, except and finally

Basic Statistics for Machine Learning

- Basic Statistics and Exploratory Analysis
- Descriptive summary statistics with Numpy
- Summarize continous and categorical data
- Outlier analysis

Introduction to Machine Learning

- Overview of Supervised and Unsupervised Machine Learning
- Linear Regression
- Clustering with K-means
- Naive Bayes Classification
- Introduction to Neural Networks

Data Processing for Machine Learning

- Advanced Data Mugging
- Outlier Analysis
- Treating for missing values
- Normalization vs Standardization of data

Machine Learning Algorithms

- Supervised Machine Learning algorithms
- K-Nearest Neighbors (KNN) concept and application
- Naive Bayes concept and application
- Logistic Regression concept and application
- Classification Trees concept and application
- Unsupervised Machine Learning algorithms
- Clustering with K-means concept and application
- Hierarchial Clustering concept and application

Building and Training Machine Learning models

- Setting up the project with ML workflow.
- Data Preprocessing and statistical exploration
- Building , Training and evaluation of Machine Learning Model

Artificial Intelligence

Linear Regression

- Introduction to Linear Regression
- Use cases of Linear Regression
- How to fit a Linear Regression model?
- Evaluating and interpreting results from Linear Regression models
- Predict Bike sharing demand

Logistic Regression

- Introduction to Logistic Regression
- Logistic Regression use cases
- Understand use of odds & Logic function to perform logistic regression
- Predicting credit card default cases

Decision Trees & Random Forest

- Introduction to Decision Trees & Random Forest
- Understanding criterion (Entropy & Information Gain) used in Decision Trees
- Using Ensemble methods in Decision Trees
- Applications of Random Forest

Model Evaluation Techniques

- Introduction to evaluation metrics and model selection in Machine Learning
- Importance of Confusion matrix for predictions
- Measures of model evaluation - Sensitivity, specificity, precision, recall & f-score
- Use AUC-ROC curve to decide best model

Dimensionality Reduction using PCA

- Introduction to Curse of Dimensionality
- What is dimensionality reduction?
- Technique used in PCA to reduce dimensions
- Applications of Principle component Analysis (PCA)
- Optimize model performance using PCA on SPECTF heart data

KNearestNeighbours

- Introduction to KNN
- Calculate neighbours using distance measures
- Find optimal value of K in KNN method
- Advantage & disadvantages of KNN

Naive Bayes Classifier

- Introduction to Naïve Bayes Classification
- Refresher on Probability theory
- Applications of Naive Bayes Algorithm in Machine Learning
- Classify spam emails based on probability

K-means Clustering

- Introduction to K-means clustering
- Decide clusters by adjusting centroids

- Understand applications of clustering in Machine Learning
- Segment hands in Poker data

Support Vector Machines

- Introduction to SVM
- Figure decision boundaries using support vectors
- Identify hyper plane in SVM
- Applications of SVM in Machine Learning

Time Series Forecasting

- Components of time series data
- Interpreting autocorrelation & partial autocorrelation functions
- Introduction to Time Series analysis
- Stationary vs non stationary data
- Stationary data and implement ARIMA model

Apriori Algorithm

- Applications of Apriori algorithm
- Understand Association rule
- Developing product recommendations using association rules
- Analyse online retail data using association rules

Recommendation Systems

- Introduction to Recommender systems
- Types of Recommender systems - collaborative, content based & Hybrid
- Types of similarity matrix (Cosine, Jaccard, Pearson correlation)
- Build Recommender systems on Movie data using KNN basics

Linear Discriminant Analysis

- Recap of dimensionality reduction concepts
- Types of dimensionality reduction
- Dimensionality reduction using LDA
- Apply LDA to determine Wine Quality

Anomaly Detection

- Introduction to Anomaly detection
- How Anomaly detection works?
- Types of Anomaly detection: Density based, Clustering etc. NET Based Commands
- Detect anomalies on electrocardiogram data

Ensemble Learning

- Introduction to Ensemble Learning
- What are Bagging and Boosting techniques?
- What is Bias variance trade off?
- Predict wage (annual income) classes from adult census data

Optimization

- Optimization techniques: Linear Programming using Excel solver
- Optimization in ML
- Neural networks
- Workflow of a Neural network & analogy with biological neurons

Prerequisites:

- Knowledge of basic mathematics is required
- Basic Programming knowledge
- Understanding the basics of statistics

Who Should attend:

- A potential candidate could be a graduate with degrees such as Bsc, BCA, MCA, B.E or B.Tech and must have studied PCM in 10+2

Number of Hours: 100hrs

Certification: None

Key Features:

- One to One Training
- Online Training
- Fastrack & Normal Track
- Resume Modification
- Mock Interviews
- Video Tutorials
- Materials
- Real Time Projects
- Virtual Live Experience
- Preparing for Certification