

Course Name : ARTIFICIAL INTELLIGENCE PROGRAMMER
Duration : 4 Days
Skill Level : Beginner
Mode : Physical Classroom or Online Live Instructor

COURSE DESCRIPTION:

Learn the essential foundations of Artificial Intelligence Programming tools (Python, NumPy, PyTorch), the mathematics (calculus and linear algebra), and the key techniques of neural networks (gradient descent and backpropagation). Learning to program with Python, one of the most widely used languages in Artificial Intelligence, is the core of this track. We shall also focus on neural networks - AI's main building blocks. By learning foundational AI and math skills, the candidates lay the groundwork for advancing their career - whether they are just starting out, or readying for a full-time role in Machine Learning, Deep Learning, Artificial Intelligence domains.

WHAT WILL YOU LEARN?

- Python for AI Programming
- Numpy
- Pandas
- Matplotlib
- Linear Algebra Essentials
- Calculus Essentials
- Neural Networks
- Deep Learning with Pytorch
- Capstone Project: Create your own image classifier

PREREQUISITE:

Beginners. No programming knowledge is required.

METHODOLOGY:

This program will be conducted with interactive lectures, PowerPoint presentation, discussions, and practical exercise. This course can be conducted as instructor-led (ILT) or virtual instructor-led training (VILT).

JOB SCOPE:

After completing this course, the candidates can join for the following job roles,

- AI Engineer
- Machine Learning Developer
- Deep Learning Engineer
- Data Scientist
- AI Computer Vision Engineer
- DevOps Engineer
- AI Software Engineer

1: PYTHON FOR AI PROGRAMMING

MODULE 1: INTRO TO AI PROGRAMMING

- Welcome
- Introduction to AI Programming
- AI, Machine Learning & Deep Learning
- Programming in Python

MODULE 2: DATATYPES AND OPERATORS

- Introduction
- Arithmetic Operators
- Variables and Assignment Operators
- Integers and Floats
- Booleans, Comparison & Logical Operators
- Strings
- Type and Type Conversion
- String Methods
- Another String Method - Split
- "There's a Bug in my Code"

MODULE 3: DATA STRUCTURES

- Introduction
- Lists and Membership Operators
- Why Do We Need Lists?
- List Methods
- Tuples & Sets
- Dictionaries and Identity Operators
- When to Use Dictionaries?

MODULE 6: CONTROL FLOW

- Introduction
- Conditional Statements
- Boolean Expressions for Conditions
- For Loops
- Building Dictionaries
- Iterating Through Dictionaries with For Loops
- While Loops
- For Loops vs. While Loops
- Break, Continue
- Zip and Enumerate
- List Comprehensions

MODULE 6: FUNCTIONS

- Introduction
- Defining Functions
- Variable Scope
- Documentation
- Lambda Expressions
- Iterators and Generators
- Generator Expressions

MODULE 7: SCRIPTING

- Introduction
- Python Installation
- Install Python Using Anaconda
- Configuring Git Bash to Run Python
- Running a Python Script
- Programming Environment Setup
- Editing a Python Script
- Scripting with Raw Input
- Errors and Exceptions
- Handling Errors
- Accessing Error Messages
- Reading and Writing Files
- Importing Local Scripts
- The Standard Library
- Techniques for Importing Modules
- Third-Party Libraries
- Experimenting with an Interpreter

MODULE 8: DATATYPES AND OPERATORS

- Introduction
- Procedural vs. Object-Oriented Programming
- Class, Object, Method and Attribute
- OOP Syntax
- A Couple of Notes about OOP
- Commenting Object-Oriented Code
- A Gaussian Class
- How the Gaussian Class Works
- Magic Methods
- Inheritance
- Inheritance: Probability Distribution
- Demo: Inheritance Probability Distributions
- Advanced OOP Topics

MODULE 9: CONCLUSION

- QA
- Useful Resources
- Feedback

02: NUMPY, PANDAS, MATPLOTLIB

MODULE 1: ANACONDA

- Introduction
- What is Anaconda?
- Installing Anaconda
- Managing packages
- Managing environments
- More environment actions
- Best practices

MODULE 2: JUPYTOR NOTEBOOKS

- What are Jupyter notebooks?
- Installing Jupyter Notebook
- Launching the notebook server
- Notebook interface
- Code cells
- Markdown cells
- Keyboard shortcuts
- Magic keywords
- Converting notebooks
- Creating a slideshow
- Finishing up

MODULE 3: DATATYPES AND OPERATORS

- Introduction to NumPy
- Why Use NumPy?
- Creating and Saving NumPy ndarrays
- Using Built-in Functions to Create ndarrays
- Create an ndarray
- Accessing, Deleting, and Inserting Elements Into ndarrays
- Slicing ndarrays
- Boolean Indexing, Set Operations, and Sorting
- Manipulating ndarrays
- Arithmetic operations and Broadcasting
- Creating ndarrays with Broadcasting

MODULE 4: PANDAS

- Introduction to pandas
- Why Use pandas?
- Creating pandas Series
- Accessing and Deleting Elements in pandas Series
- Arithmetic Operations on pandas Series
- Manipulate a Series
- Creating pandas DataFrames
- Accessing Elements in pandas DataFrames
- Dealing with NaN
- Manipulate a DataFrame
- Loading Data into a pandas DataFrame

MODULE 4: MATPLOTLIB AND SEABORN

- Introduction
- Tidy Data
- Bar Charts
- Absolute vs. Relative Frequency
- Counting Missing Data
- Bar Chart Practice
- Pie Charts
- Histograms
- Figures, Axes, and Subplots
- Choosing a Plot for Discrete Data
- Descriptive Statistics, Outliers and Axis Limits
- Scales and Transformations

03. NEURAL NETWORKS & DEEP LEARNING WITH PYTORCH

MODULE 1: INTRO TO NEURAL NETWORKS

- Introduction
- Classification Problems
- Linear Boundaries
- Higher Dimensions
- Perceptrons
- Why "Neural Networks"?
- Perceptrons as Logical Operators
- Perceptron Trick
- Perceptron Algorithm
- Non-Linear Regions
- Error Functions
- Log-loss Error Function
- Discrete vs Continuous
- Softmax
- One-Hot Encoding
- Maximum Likelihood
- Maximizing Probabilities
- Cross-Entropy
- Multi-Class Cross Entropy
- Logistic Regression
- Gradient Descent
- Logistic Regression Algorithm
- Pre-Lab: Gradient Descent
- Perceptron vs Gradient Descent
- Continuous Perceptrons
- Non-linear Data & Models
- Neural Network Architecture
- Feedforward & Backpropagation

MODULE 2: GRADIENT DESCENT

- Mean Squared Error Function
- Gradient Descent
- Gradient Descent: The Math
- Gradient Descent: The Code
- Implementing Gradient Descent
- Multilayer Perceptrons
- Backpropagation
- Implementing Backpropagation

MODULE 3: TRAINING NEURAL NETWORKS

- Training Optimization
- Testing
- Overfitting and Underfitting
- Early Stopping
- Regularization
- Regularization 2
- Dropout
- Local Minima
- Random Restart
- Vanishing Gradient
- Other Activation Functions
- Batch vs Stochastic Gradient Descent
- Learning Rate Decay
- Momentum
- Error Functions Around the World

MODULE 4: DEEP LEARNING WITH PYTORCH

- Single layer neural networks
- Networks Using Matrix Multiplication
- Multilayer Networks Solution
- Neural Networks in PyTorch
- Neural Networks Solution
- Network Architectures in PyTorch
- Network Architectures Solution
- Training a Network Solution
- Classifying Fashion-MNIST
- Fashion-MNIST Solution
- Inference and Validation
- Validation Solution
- Dropout Solution
- Saving and Loading Models
- Loading Image Data
- Pre-Notebook with GPU
- Notebook Workspace w/ GPU
- Transfer Learning II

PROJECT: CREATE YOUR OWN IMAGE CLASSIFIER