www.logicalimagination.com
800.657.1494

AI for Python

Course #: PY-560 **Duration:** 4 days

Prerequisites

Students should have solid experience in writing programs using Python.

Details

Artificial Intelligence (AI) is the creation and study of "intelligent agents" – software devices that perceive their environment and take actions that maximize their chance of successfully achieving their goals.

Python is a high-level, interpreted, highly extensible, object-oriented language that consistently ranks as one of the most popular programming languages for working with AI. With its comprehensive standard library and a large community of extensions, it can be used to create a diverse array of types of programs.

This course will assist students in learning about which algorithms should be used in a given context, as well as teaching them how to create AI building blocks using standard data mining techniques, using examples gathered from real-world applications.

Software Needed

Python 3 or higher and Anaconda.

Outline

- **Introduction**
  - What is Artificial Intelligence?
  - Applications of AI
  - Branches of AI
  - Building Agents
  - Development Environments
- **Classification and Regression**
  - Supervised vs. Unsupervised Learning
  - What is Classification?
  - Preprocessing and Encoding
  - Types of Classifiers
  - What is Regression?
  - Building Regressors
- **Predictive Analytics**
  - What is Ensemble Learning?
  - Using Decision Trees
  - Random Forests
  - Finding Optimal Training Parameters

- Computing Relative Feature Importance

- **Pattern Detection and Unsupervised Learning**
  - What is Unsupervised Learning?
  - Clustering Data With K-Means
  - Estimating Clusters With Mean Shift
  - Gaussian Mixture Models
  - Affinity Propagation Models

- **Recommender Systems**
  - Building Recommender Systems
  - Creating a Training Pipeline
  - Extracting Nearest Neighbors
  - Computing Similarity Scores
  - Collaborative Filtering

- **Logic Programming**
  - What is Logic Programming?
  - Solving Problems With Logic Programming
  - Matching Mathematical Expressions
  - Validating Primes

- **Heuristic Searches**
  - Heuristic Search Techniques
  - Constraint Satisfaction Problems
  - Local Search Techniques
  - Solving Problems With Constraints

- **Genetic Algorithms**
  - Evolutionary and Genetic Algorithms
  - Fundamental Concepts
  - Generating a Bit Pattern
  - Visualizing the Evolution
  - Solving the Symbol Regression Problem

- **Building Games**
  - Using Search Algorithms in Games
  - Combinatorial Search
  - Minimax Algorithm
  - Alpha-Beta Pruning
  - Negamax Algorithm
  - Building Game Bots

- **Natural Language Processing**
  - Tokenizing Text Data
  - Converting Words to Base Forms
  - Dividing Text Into Chunks
  - Extracting Word Frequencies
  - Topic Modeling Using Latent Dirichlet Allocation

- **Probabilistic Reasoning**
  - Understanding Sequential Data
  - Slicing Time-Series Data
  - Extracting Statistics from Time-Series Data
  - Generating Data Using Hidden Markov Models
  - Identifying Alphabet Sequences

- **Speech Recognizers**
  - Working With Speech Signals
  - Visualizing Audio Signals
  - Transforming Audio Signals to the Frequency Domain
  - Generating Audio Signals
  - Synthesizing Tones
  - Extracting Speech Features
  - Recognizing Spoken Words

- **Object Detection and Tracking**
  - Frame Differencing
  - Tracking Objects Using Colorspaces

- Tracking Objects Using Background Subtraction
- Optical Flow Based Tracking

- **Artificial Neural Networks**
  - Building a Perceptron Based Classifier
  - Single Layer Neural Networks
  - Multilayer Neural Networks
  - Vector Quantizers

- **Reinforcement Learning**
  - Understanding the Premise
  - Reinforcement Learning vs. Supervised Learning
  - Building Blocks of Reinforcement Learning
  - Creating an Environment
  - Building a Learning Agent

- **Deep Learning and Convolutional Neural Networks**
  - What are Convolutional Neural Networks?
  - Architecture
  - Types of Layers
  - Building a Perceptron Based Linear Regressor