Artificial Intelligence and Machine Learning Developer

Contents

Course name: Artificial Intelligence and Machine Learning Developer

About the programme:

The programme aims to help students gain practical knowledge and accelerate entry into the roles of Artificial Intelligence/ Machine Learning Scientist, Computer Scientist AIML, Data Scientist, Machine Learning Engineer, Robotics Scientist, Business Intelligence Developer and AI Research Scientist. This project (internship)-based and multi-skill course will provide structured and unstructured data to solve critical business problems with machine learning and deep learning.

Programme outcomes:

- Python programming
- Statistical modelling
- Neural network architecture
- Applied mathematics and algorithms
- Signal processing techniques

Eligibility criteria:

- Graduates (preferably in Science, CS, IT and EC streams)

Duration of the programme:

Hours: 720 hours
Days: 178
Months: 5

Offline training centres:

NA

Course syllabus:

Module 1
Classical machine learning
Unit: Foundation for machine learning
- Develop programming solutions using Python
- Develop programming solutions using Scientific Python libraries
- Perform matrix operations on data, carry out Singular Value Decomposition and estimate matrix determinants

- Analyse random phenomena as random processes and design probabilistic models
- Model minimisation and maximisation problems using optimisation techniques
- Databases with Python Clients

Module 2

Classical machine learning
Unit: Machine learning techniques
- Understand machine learning concepts
- Design and develop regression models
- Apply classification techniques for real-world problems
- Develop non- parametric models to solve real-world problems
- Develop unsupervised learning models to decipher patterns within data
- Identify context specific performance metric to measure performance of models

Module 3

Deep Learning Techniques
Unit 1: Probabilistic and statistical methods for learning
- Build various Bayesian models and mixture models comprising both real and discrete valued data
- Use Bayesian inference algorithms to draw conclusions about posterior distribution of model parameters given the observed data

Unit 2: Deep Learning
- Apply important concepts such as cost functions and hypotheses to build deep learning models
- Fundamental neural network architecture
- Apply recursive chain rule based gradient descent learning for parameter optimisation
- Identify overfitting and underfitting scenarios in deep learning models and apply appropriate regularisation techniques to overcome them
- Solve visual processing problems using convolutional neural networks (CNN) and text/ temporal data processing problems using recurrent neural networks (RNN)
- Integrate several deep learning based optimisations which avoid vanishing/ exploding gradient issues in both CNN and RNN
- Proficient in various techniques used for generative models such as deep belief networks, autoencoders, and adversarial networks
- Reinforcement learning techniques such as policy gradients, deep Q-networks (DQN) and Markov Decision Process (MDP)
- Implement deep reinforcement learning techniques to build models for problems like balancing an object while moving, playing games, walking robots and self- driving cars
- Deep Generative Models (VAE, GAN, GPT models)
- Transformer-based architectures and LLMs (BERT, GPT, LLaMA , PaLM models)
- Zero-shot and few-shot learning
- Instructing LLMs (InstructGPT)
- Prompt Engineering

Unit 3
- AI/ML on cloud (Cloud Basics, Cloud AI and ML services on Azure, AWS and Google cloud)

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Unit 4
- Responsible AI, Bias & Fairness, Explainability, Privacy and Data Protection

Module 4
Project/ Internship
- Conceptualisation, design, development, and evaluation of an artificial intelligent model using classical or deep machine learning framework

Certification process:

Students have to appear for an online assessment on the successful completion of the course and project/ internship.

Certificate issued by

IIT Palakkad