Artificial Intelligence Training Track
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Pre-requisites
- Fundamentals of any programming language
- Familiarity with basic Algebra, Statistic, Probability and Calculus
(Recommended)
Track numbers
- Track 1, 2 and 3
Learning Outcome
Level 1
Pre-requisites
Must have completed L1 or its equivalent
Track numbers
- Track 4 and 5
Learning Outcome
Level 2
Pre-requisites
Must have completed L2 or its equivalent
Track numbers
- Track 6, 7 and 8
Learning Outcome

Level 3

After going through these tracks, learners will:
- have built a solid foundation for any ML/AI development. - be familiar with most of the prominent libraries and
frameworks for ML implementations.
Capstone Project
1) Binary Search - Create an application that will try to guess
a number a user chooses between from a predefined set.
2) Image Resizer - build an application that can resize an image file by
changing its dimensions to the target parameters
After going through these tracks, learners will:
- gain an in-depth understanding of most of learning models
and their use cases; hyperparameter tuning and ensemble
techniques to optimized the learning models or algorithms. - be able to use the prominent third-party ML services
provided by various cloud vendors and implement real (industry) use cases.
Capstone Project
1) Predict Housing Price - Predict the selling price of a new home in a given region
2) Chatbots - Create a chatbot for customer service.
After going through these tracks, learners will:

- learn specialized AI techniques and applications. - be able to understand and contribute to the R&D
of the specified fields.

Capstone Project

1) Facial Emotion Recognition and Detection - Use Deep Learning to identify and interpret human facial expressions.

2) Stock Price Predictor - This project seeks to utilize
Deep Learning models, Long-Short Term Memory (LSTM) Neural Network algorithm, to predict stock prices.

ML/AI Learning Path Track 1: Math for AI/ML

Statistics
- Types of Data
- Levels of Measurement - Categorical Variables - Numerical Variables
- Histogram
- Cross Tables and
Scatter Plots
- Mean, Median, Mode - Skewness
- Variance
- Standard Deviation - Covariance
- Correlation

Linear Algebra
- What is a Matrix?
- Scalars and Vectors
- Linear Algebra and Geometry
- What is a Tensor?
- Addition and Subtraction of Matrices - Transpose of a Matrix
- Dot Product of Matrices
- Matrix Norms
- Special Matrices and Vectors
Eigenvalues and Eigenvectors - Principle component analysis - Singular value decomposition

Calculus
- Derivatives (Scalar Derivative-Chain rule), Partial and Directional Derivative.
- Integrals
- Gradients
- Differential Operators
- Convex Optimization
- Gradient algorithms- local/global maxima
and minima, SGD, NAG, MAG, Adams

Probability
- Elements of Probability
- Random Variables
- Distributions (binomial, Bernoulli, Poisson, Exponential, Gaussian)
- Variance and Expectation - Bayes' Theorem, MAP, MLE - Special Random Variables - Markov Chain
- Information Theory

ML/AI Learning Path Track: 2 Fundamentals of Machine learning

Working with Data
- Exploring your data
- Cleaning and Munging
- Manipulating Data
- Rescaling
- Dimensionality Reduction

Machine Learning concepts
- What is Machine Learning? - Modelling
- Overfitting and Underfitting - The Bias-Variance tradeoff - Data Cleaning
- Data Preprocessing

Supervised Learning
- Simple Linear Regression - Multiple Regression
- Logistic Regression
- Logistic Regression
- Decision Tree

Unsupervised Learning
- Clustering
- K-means clustering
- KNN (k-nearest neighbors)

ML/AI Learning Path Track 3: Python for Implementing AI/ML

Python Basics
- Variables and Data Types – Basic python Syntax
- Operators
- Conditional Statements
- Functions – Sequence – Iterations – OOP
- Managing Data using python – Modules and Methods
- Essential Libraries
- Testing Python Code
- Debugging Python Applications

Databases concepts for implementing Machine Learning
Python Frameworks and libraries for ML
- Getting Started with Anaconda
- Installing and understanding the Jupyter's Interface – Prerequisites for Coding in the Jupyter Notebooks
- Numpy
- Scipy
- Scikit-learn
- Theano
- TensorFlow
- Keras
- PyTorch
- Pandas
- Matplotlib

ML/AI Learning Path Track 4: Advance Machine Learning

Advance Supervised Learning
- Simple Linear Regression – Multiple Regression
- Logistic Regression
- Logistic Regression
- Decision Tree
- Random Forest
- Naive Bayes
- Neural Networks – NLP
- Network Analysis

Unsupervised Learning

- Clustering
- K-means clustering
- KNN (k-nearest neighbors)
- Hierarchal clustering
- Anomaly detection
- Neural Networks
- Principle Component Analysis
- Independent Component Analysis - Apriori algorithm

Semi-supervised learning

Ensemble methods
- Bagging - Stacking - Boosting

Reinforcement Learning
- State-action-reward-state-action (SARSA) - Q-learning
- Deep Q-Networks

Deep Learning

Computational Learning Theory
Genetics Algorithm
The End-to-End Machine Learning Process (Putting it all together)
- Collection of Data
- Data Wrangling
- Model Selection
- Model Evaluation
- Model Deployment

ML/AI Learning Path Track 5: Machine Learning in the Cloud

Cloud Fundamentals

ML using Azure
- Automating Machine Learning with Azure services
- Creating a Regression Model with Azure ML Designer - Creating a Classification Model with Azure AI
- Creating a Clustering Model with Azure AI

ML using GCP
- Introduction to the Google Cloud Big Data
- Cloud SQL and Apache SparkML
- Using BigQuery ML
- Implementing IoT system with Pub/Sub, Dataflow, and Data Studio – Classifying Images of Clouds in the Cloud with AutoML Vision

ML Using AWS
- Amazon Polly (Text-to-Speech)
- Amazon Transcribe (Amazon Transcribe)
- Amazon SageMaker (Build and Deploy ML Models)
- Amazon Lex (AI for Chatbots)
- Amazon Rekognition (Image and Video Analysis)
- Amazon Comprehend (Natural-Language Processing) – Amazon Translate (Translation)
- AWS DeepLens (Deep-Learning enabled video camera)

ML/AI Learning Path Track 6: Artificial Intelligence Essentials

Introduction to Artificial Intelligence (AI)
- Elements Of Intelligence
- Intelligent Systems
- Research Areas of AI
- Agents and Environments
- Popular Search Algorithms
- Industry Applications of Artificial Intelligence – Fuzzy Logic Systems
- Expert systems

ML/AI Learning Path Track 7: Artificial Intelligence Systems

Robotics (basic)
- Aspects of Robotics
- Applications of Robotics – Project 1

Speech Recognition
- Speech synthesis
- Speech recognition
- Semantic understanding – Project 2

Cognitive Computing
- Features of cognitive systems – Sentiment analysis
- Risk assessment
- Fraud detection
- Project 3

Natural Language Processing
- Computer translation
- Information Retrieval
- Intelligent customer service – Project 4

ML/AI Learning Path Track 8: MLOps

Learning Objectives

- Understand the need for MLOps in the world of datascience

- Familiarise yourself with Docker and the need for containerisation

- Become familiar with DVC and MLOPS and its various components

- Build data ingestion, validation pipelines

- Build orchestrated ML pipelines

- Gain a deep understanding of Kubernetes clusters and how they operate

- Deploy models in the cloud platforms

- Operational AI Introduction and Environment Setup
  Model artifacts management using Git
  Python & Flask
  Strategy, Environment overview
  Model Deployment Architectures Model Deployment Pipeline

Model & RESTful web services
INTRODUCTION
GIT
DVC
GITHUB FLOW FLASK DEPLOYMENT FAST API
DATA CONTAINERS
MODEL DEPLOYMENT ARCHITECTURE PIPELINES
FEATURE ENGINEERING
FEATURE SELECTION
HYPER PARAMETER
HYPER PARAMETER TUNING CREATING PIPELINE BASED PROJECT DATA
SELECTION
DATA VALIDATION
HYPER SEARCH
ML TO GITHUB RETAINING PHRASE
SERVICES
DATA INJESTION
DATA VALIDATION
DATA CONTAINERISATION
Introduction to MLFLOW MODEL VERSIONING MLFLOW PROJECT
HYPER PARAMETER TUNING NEURAL SEARCH
HYPER PARAM SEARCH
Model Performance Monitoring
Pre-Production
Post-Production
Pipeline Setup
Model Retraining
Automated and AutoML Techniques Model Versioning
Configuration Management