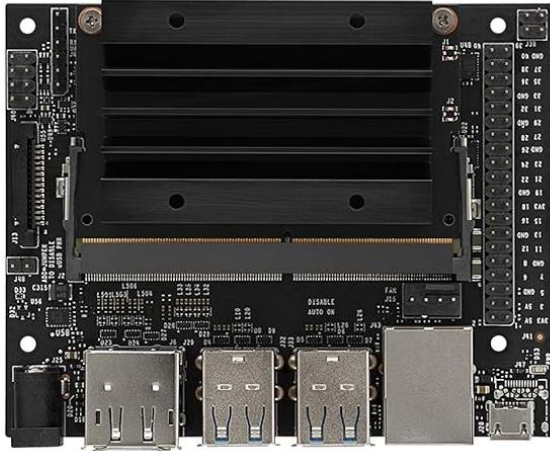




MACHINE LEARNING TRAINER

MODEL-ML100



This trainer has been designed with a view to provide practical and experimental knowledge of Machine Learning with Artificial Intelligence (AI) with hardware and software programming.

SPECIFICATIONS

A. Microcontroller

1. A57 Microcontroller
2. CPU : Quad-core ARM A57 @ 1.43 GHz
3. OS : Linux
4. RAM : 4 GB 64-bit LPDDR4 25.6 GB/s
5. Ethernet Connectivity : Gigabit Ethernet
6. Wifi Connectivity : 802.11 b/g Wireless LAN Dual-Band 2.4/5.0 GHz, 3G
7. Bluetooth Connectivity : Bluetooth 5.0
8. USB Connectivity : USB 3.0 – 4 Nos. – Micro USB Port
9. Storage : microSD – 32 GB
10. Camera : 2 x MIPI CSI-2 DPHY lanes
11. Display : HDMI and Display port
12. Protocols : GPIO, I2C, I2S, SPI, UART
13. Power - 5V, 4A DC

B. Other Parts

1. Wifi Node : Wireless 2.4GHz Wifi Module – ESP32
2. LCD Display : 20 X 4
3. Display Monitor : 15 Inch LED
4. Storage : External SSD - 128GB
5. Camera : External Logitech – 270 – USB
6. Key Board : External Wireless
7. Mouse : External Wireless

C. Accessories:

1. 2 mm interconnection Sockets : On Board
2. 2 mm Banana Jumper Cable : 20 Nos
3. 2mm Banana Jack to Single pin jumpers : 2 Nos
4. USB to Micro USB Cable : 2 Nos
5. Ethernet Cable : 1 No
6. HDMI to HDMI Cable : 1 No
7. VGA 15 pin Male to HDMI Converter : 1 No
8. Power Supply Adaptor : 5V, 4A DC
9. SD Memory Card with Codes for All Experiments : 32 GB - 2 No
10. 16 GB Pen Drive : 1No
with Software, Library, Drivers, Codes, Soft Copy of Manual & Mobile App
11. Printed Practical Manual : 1 No
12. E-Books for AI Subject : 10 Nos
13. Mp4 Video Class for AI Subjects : 100 Nos
14. Power Supply : 230V AC, 50 Hz
15. Operating Conditions : 0-40 °C, 85% RH
16. Mains Cord : 1 No – On Board

EXPERIMENTS

A. Theory Experiments

1. To understand theory and working of Machine Learning
2. To understand Operating System for Machine Learning
3. To understand Protocols used for Machine Learning
4. To understand USB, HDMI, Display Port Interface of Machine Learning
5. To understand Ethernet Cable Interface for Machine Learning
6. To understand micro SD Card Interface for Machine Learning
7. To understand that how to connect 20 x 4 LCD Display to Machine Learning
8. To understand theory of Block diagram and its internal Structure of Machine Learning
9. To understand History of Machine Learning
10. To understand Fundamentals of Machine Learning
11. To understand theory of Basic of Machine Learning and its architecture
12. To understand Machine Learning Programming Language – C, C++, Python and R
13. To understand Libraries and Algorithms used for Machine Learning
14. To understand Machine Learning Protocols
15. To understand Machine Learning **Applications** in following Areas :
 - a. Natural Language Processing – NLP
 - b. Internet of Things – IOT
 - c. Preventive Maintenance
 - d. Cyber Security
 - e. Agriculture and Food Industry
 - f. Remote Healthcare Monitoring and Telemedicine
 - g. Environment Monitoring and Forecast
 - h. Warehouse and Logistics Monitoring
 - i. Retail Analysis
 - j. Intelligent Traffic Management
 - k. Energy Monitoring and Control
 - l. Home and Building Automation
16. To understand **algorithms** used for applications in Machine Learning :
 - a. TensorFlow – To make AI Frame work
 - b. Keras - For High Performance Numerical Computation
 - c. PyTorch
 - d. GoogleAI

- e. Amazon web services - AWS
- f. Caffe
- g. Anaconda Navigator

17. To understand **software** used for Machine Learning :

- a. Linux OS
- b. NVIDIA JetPack having Board support package - BSP
- c. NVIDIA CUDA
- d. cuDNN
- e. TensorRT
- f. Anaconda Navigator
- g. Jupyter Notebook
- h. Computer Vision
- i. GPU computing
- j. Multimedia Processing

18. To understand **Libraries** for applications in Machine Learning :

- a. numpy
- b. pandas
- c. scikit-learn
- d. matplotlib
- e. seaborn
- f. pycuda
- g. cv2
- h. caffe
- i. torch
- j. pytorch
- k. TensorRt

19. To understand **Mathematics** used for Machine Learning :

- a. Linear Algebra – Linear Equations, Matrixs, Vectors
- b. Calculus – Differentiation, Integration, Gradient Descent,
- c. Statistics – Population, Parameter, Sample, Variable, Probability

B. Practical Experiments

1. To understand theory of [Supervised Learning](#)
 - a. Linear Regression
 - b. Logistic Regression
 - c. Polynomial Regression
 - d. Gradient Descent
 - e. Decision Trees
 - f. Random Forest
 - g. Bagging & Boosting
 - h. K Nearest Neighbors – KNN
 - i. Bayesian Linear Regression
 - j. Non-Linear Regression
 - k. Support Vector Machine
 - l. Newton's Method
 - m. MLE (Maximum Likelihood Estimation)
 - n. MAP (Maximum A Posteriori)
 - o. PCA (Principal Component Analysis)
 - p. L1 Regularization (Lasso Regression)
 - q. L2 Regularization (Ridge Regression)

2. To understand theory of [Unsupervised Learning](#)
 - a. K-Means
 - b. Hierarchical Clustering

3. To install and understand Anaconda Dashboard
4. To demonstrate Machine Learning Framework Experiment using [TensorFlow](#)
5. To demonstrate Machine Learning Framework Experiment using [PyTorch](#)
6. To demonstrate Machine Learning Framework Experiment using [Keras](#)

7. To understand theory of following Applications using OpenCV and Machine Learning
 - a. Face Detection and Tracking
 - b. Face Recognition
 - c. Emotion Recognition
 - d. Gesture Recognition
 - e. Smile Detection
 - f. Vehicle Detection
 - g. Object Detection using Yolo algorithm
 - h. Drowsiness Detection
 - i. License Plate Detection
 - j. Fingerprint Recognition
 - k. Text identification
 - l. Traffic Sign Recognition
 - m. Motion Detection
 - n. Character Recognition
 - o. Edge Detection through Image processing
 - p. Handwritten Digit Classification using CNN
 - q. Leaf Disease Detection and Classification
 - r. Pattern Recognition
 - s. Fire Detection
 - t. Weather Forecasting
8. To understand theory of Real Time Sensors Interface using Machine Learning
9. To understand theory of Reinforcement Learning
10. To understand theory of Ensemble Learning
11. To understand theory of Gaussian Mixture Model – GMM
12. To understand theory of Support Vector Machine - SMM
13. To understand theory of MLOps – Machine Learning Operations
14. To understand theory of DevOps - Developments and Operations
15. To understand theory of PCA - Principal Component Analysis
16. To understand theory of Cost Function
17. To understand theory of Text Classification Using Naive
18. To understand theory of Polynomial Regression Algorithm
19. To understand theory of Back propagation and Gradient Descent
20. To understand theory of Filters used to detect Spam Emails

21. To understand theory of Entropy In Decision Tree Intuition
22. To understand theory of Gini Impurity Intuition In Depth In Decision Tree
23. To understand theory of Ensemble - What is Bagging (Bootstrap Aggregation)
24. To understand theory of DBSCAN Clustering
25. To understand theory of Silhouette Clustering
26. To understand theory of What is Cross Validation and its types
27. To understand theory of Bayes' Theorem for Conditional Probability
28. To understand theory of Xgboost Regression
29. To Deploy ML Models using PyWebIO and Flask in Heroku
30. To understand theory of R Squared Theory
31. To understand theory of Euclidean Distance
32. To understand theory of Overfitting And Underfitting Machine Learning
33. To understand theory of Gaussian Mixture Model
34. To understand theory of Machine Learning Life Cycle
35. To understand theory of Supercharging Decision Making with Bayes
36. To understand theory of Multiple Linear Regression
37. To understand theory of Q-Learning Agent Analysis in Reinforcement Learning
38. To understand theory of Deep Reinforcement Learning (DQN)

C. Machine Learning Applications

1. Building a Sales Prediction using Machine Learning
2. Customer Segmentation using Machine Learning
3. Mastering Sentiment Analysis with Machine Learning and Flask
4. Credit Card Fraud Detection using Machine Learning
5. Credit Card Risk Assessment using Machine Learning
6. Hate Speech Detection Using Machine Learning
7. Fake News Detection Using Machine Learning
8. Predicting Heart Disease using Machine Learning
9. Diabetes Prediction using Machine Learning
10. Parkinson's Disease Detection using Machine Learning
11. Faringham Disease Prediction Using Machine Learning
12. DNA Sequencing Classifier using Machine Learning
13. Breast Cancer Classification with Machine Learning
14. Email Spam Detection
15. Autocorrect Spell Checking using Machine Learning
16. Building Grammar and Spell Checker using Machine Learning
17. Crop Recommendation System using Machine Learning
18. How Netflix Uses Machine Learning to Show movie Prediction
19. Movie Recommender System Using Machine Learning
20. How Does YouTube Recommend Videos
21. Building a Music Recommendation Engine
22. Amazon products recommendations system using Machine Learning

CLASS ROOM TRAINING – ONLINE AND OFFLINE

The training includes Single user Classroom / laboratory teaching, learning and simulation software module. The content has easy explanation of various complex topics with animation and simulation for ease of student learning. It also supports learning through videos, graphs, charts, along with mandatory rich content and theory to understand fundamental concepts, interactive learning objects, FAQ, MCQ etc. The content is supplied in digital online access or license protection.

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