**What is Machine Learning:**

Machine Learning (ML) consists of statistical tools to analyse, to visualize and to predict the data.

Examples: Histograms, Barchats, Piecharts, Mean, Median, Mode standard deviation, Ztest, P-test, T-test etc.

**Why Machine Learning Required:**

Now a days data is becoming very huge. To understand that data and to make use of that in real world (like, summarization of that data, prediction of the data etc) takes lot of time for us as a human being. It includes lot of efforts with more number of people. So we need something to automate our work with little human intervention.

**Uses of Machine Learning:**

Machine Learning (ML) has a wide range of uses across various industries and fields due to its ability to learn from data and make predictions or decisions. Here are some key uses of machine learning:

**1. Healthcare**

* **Diagnosis & Treatment**: ML models help diagnose diseases like cancer, diabetes, and cardiovascular diseases from medical images or data.
* **Personalized Medicine**: Algorithms can suggest personalized treatment plans based on patient data and genetic information.
* **Predicting Disease Outbreaks**: ML can analyze data trends to predict and manage the spread of infectious diseases.

**2. Finance**

* **Fraud Detection**: ML models detect unusual patterns in transactions that may indicate fraudulent activities.
* **Algorithmic Trading**: ML is used to develop trading algorithms that predict stock price movements and execute trades.
* **Credit Scoring**: Banks and financial institutions use ML to assess the creditworthiness of applicants based on their financial history.

**3. Retail & E-commerce**

* **Recommendation Systems**: Online retailers like Amazon and Netflix use ML to recommend products or movies based on user behavior.
* **Customer Service Chatbots**: ML-powered chatbots provide customer support, answering queries, and offering assistance.
* **Demand Forecasting**: Retailers use ML to predict demand for products, optimizing inventory management and supply chains.

**4. Autonomous Vehicles**

* **Self-Driving Cars**: ML is used to help vehicles recognize objects, interpret traffic signals, and make decisions in real-time.
* **Predictive Maintenance**: It helps predict when parts of a vehicle might fail, reducing downtime and maintenance costs.

**5. Natural Language Processing (NLP)**

* **Speech Recognition**: ML is used in applications like virtual assistants (e.g., Siri, Alexa) to convert spoken language into text.
* **Language Translation**: Tools like Google Translate use ML to translate text from one language to another.
* **Sentiment Analysis**: Businesses use ML to analyze customer reviews, social media, and survey responses to understand user sentiment.

**6. Cybersecurity**

* **Anomaly Detection**: ML helps detect unusual network behavior that may indicate a cyber attack or data breach.
* **Spam Filtering**: Email services use ML to identify and filter out spam and phishing emails.
* **Threat Detection**: It helps identify new and evolving threats by analyzing patterns in network traffic and system logs.

**7. Manufacturing & Industry**

* **Predictive Maintenance**: ML is used to predict equipment failures, allowing companies to maintain machines before breakdowns occur.
* **Quality Control**: ML models can analyze images of products to detect defects during the manufacturing process.
* **Supply Chain Optimization**: It helps in optimizing logistics and supply chains by predicting delays and optimizing routes.

**8. Marketing & Advertising**

* **Customer Segmentation**: ML helps marketers segment customers based on behavior, demographics, and preferences for targeted campaigns.
* **Ad Targeting**: Online ads are shown to users based on their browsing history and preferences using ML.
* **Sales Forecasting**: Companies use ML to predict future sales trends and adjust their marketing strategies accordingly.

**9. Energy Sector**

* **Smart Grids**: ML helps in managing energy distribution in smart grids by predicting energy consumption patterns.
* **Renewable Energy Forecasting**: It is used to predict energy production from renewable sources like wind and solar.
* **Optimizing Energy Usage**: ML models optimize energy usage in large buildings and industries to reduce costs.

**10. Entertainment & Media**

* **Content Recommendation**: Platforms like YouTube and Spotify use ML to recommend videos and music based on user preferences.
* **Video Analytics**: ML helps in analyzing video content for categorization, facial recognition, and content moderation.
* **Game AI**: In gaming, ML is used to create non-player characters (NPCs) that can adapt to the player's style.

These examples demonstrate how machine learning can enhance efficiency, accuracy, and decision-making across various sectors, making it a crucial tool for modern technological development.

**ML algorithms:** There are 2 types of ML algorithms are there **.**

1. Supervised and
2. Unsupervised