INTRODUCTION TO MACHINE LEARNING

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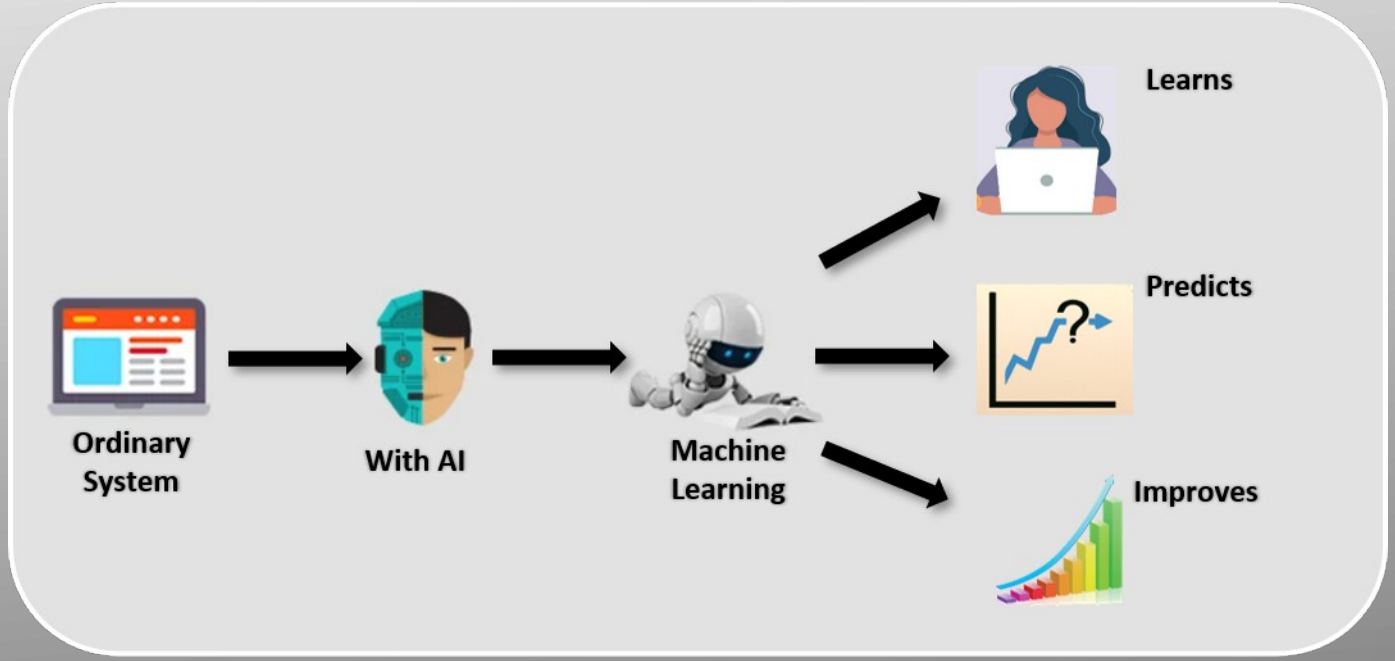


https://data-flair.training/blogs/machine-learning-tutorial/

WHAT IS ML?

- In, 1959 Arthur Samuel defined machine learning as a *"Field of study that gives computers the ability to learn without being explicitly programmed"*
- Machine learning (ML) is a branch of artificial intelligence (AI) that enables computers to "self-learn" from training data and improve over time, without being explicitly programmed.
- Machine learning is programming computers to optimize a performance criterion using example data or past experience. We have a model defined up to some parameters, and learning is the execution of a computer program to optimize the parameters of the model using the training data or past experience. The model may be predictive to make predictions in the future, or descriptive to gain knowledge from data.
- The field of study known as machine learning is concerned with the question of how to construct computer programs that automatically improve with experience.

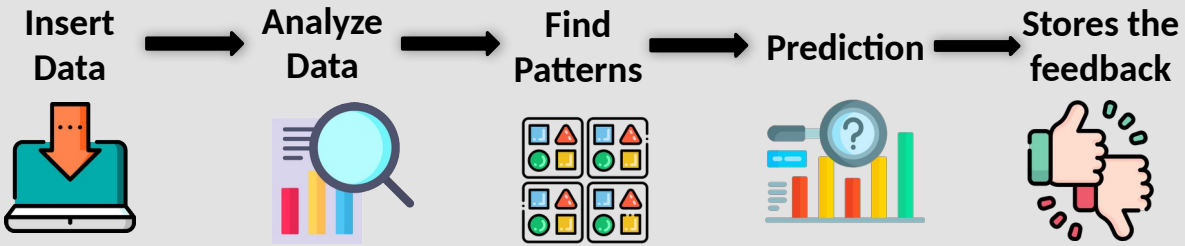
https://en.wikipedia.org/wiki/Arthur_Samuel
https://www.geeksforgeeks.org/introduction-machine-learning/

TRADITIONAL VS MACHINE LEARNING

In traditional programming, a computer engineer writes a series of directions that instruct a computer how to transform input data into a desired output.	Machine learning, on the other hand, is an automated process that enables machines to solve problems with little or no human input, and take actions based on past observations.

https://monkeylearn.com/machine-learning/#:~:text=Machine%20learning%20(ML)%20is%20a,to%20make%20their%20own%20predictions.

HOW DOES ML WORK?



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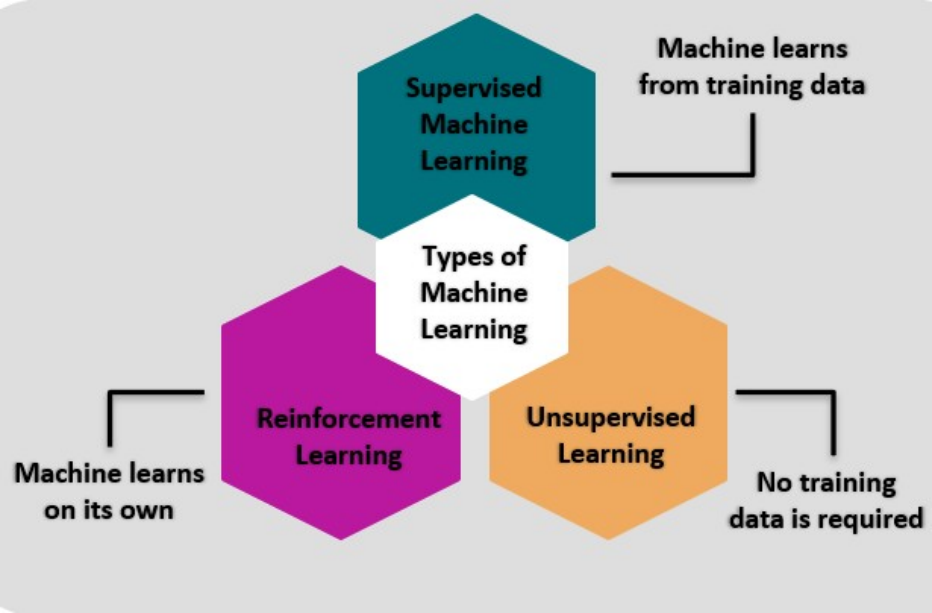
TYPES OF ML



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SUPERVISED LEARNING : WHAT IT IS

A type of machine learning where models learn from labeled data.

Each data point has an associated label or target value that the model aims to predict.

The model learns to map input features to the correct output labels

How It Works

- **Training:** Model learns patterns from labeled data.
- **Prediction:** Applies learned patterns to new data.

Types of Supervised Learning Tasks

- **Classification:** Predict a categorical label (e.g., spam/not spam, cat/dog).
- **Regression:** Predict a continuous numerical value (e.g., house price, sales forecast).

UNSUPERVISED LEARNING : WHAT IT IS

A type of machine learning where models learn from unlabeled data.

The goal is to discover hidden patterns, structure, or relationships within the data.

No pre-defined target labels for the model to predict.

How It Works

- **Exploration:** Model analyzes data to find similarities or groupings.
- **Clustering/Pattern Recognition:** Identifies patterns or segments data into clusters.

Types of Supervised Learning Tasks

- **Clustering:** Group similar data points together (e.g., customer segmentation).
- **Dimensionality Reduction:** Reduce the number of features in a dataset while retaining important information.

SUPERVISED LEARNING VS UNSUPERVISED LEARNING

Feature	*Supervised Learning*	*Unsupervised Learning*
Data	Labeled (input features + target labels)	Unlabeled (input features only)
Goal	Predict outcomes for new data	Discover hidden patterns or relationships
Examples	Classification, Regression	Clustering, Anomaly Detection

CLASSIFICATION VS REGRESSION

Feature	Classification	Regression
Output Type	Categorical (discrete labels or classes)	Continuous numerical value
Goal	Predict which category a data point belongs to	Predict a numerical value for a data point
Examples	Spam detection, image classification, sentiment analysis	House price prediction, stock price forecasting, sales forecasting
Visual Representation	Bar chart, confusion matrix	Scatter plot with a line of best fit, line graph

EXAMPLES

- Recommendation Systems - Amazon, Netflix, etc
- Self-driving Cars
- Online Search
- Healthcare
- GPS Traffic Predictions

- http://bi-insider.com/posts/definition-and-examples-of-machine-learning/