

MACHINE LEARNING

SESSION - 2





SESSION FLOW

01

What is Machine Learning?

02

How does Machine Learning work?

03

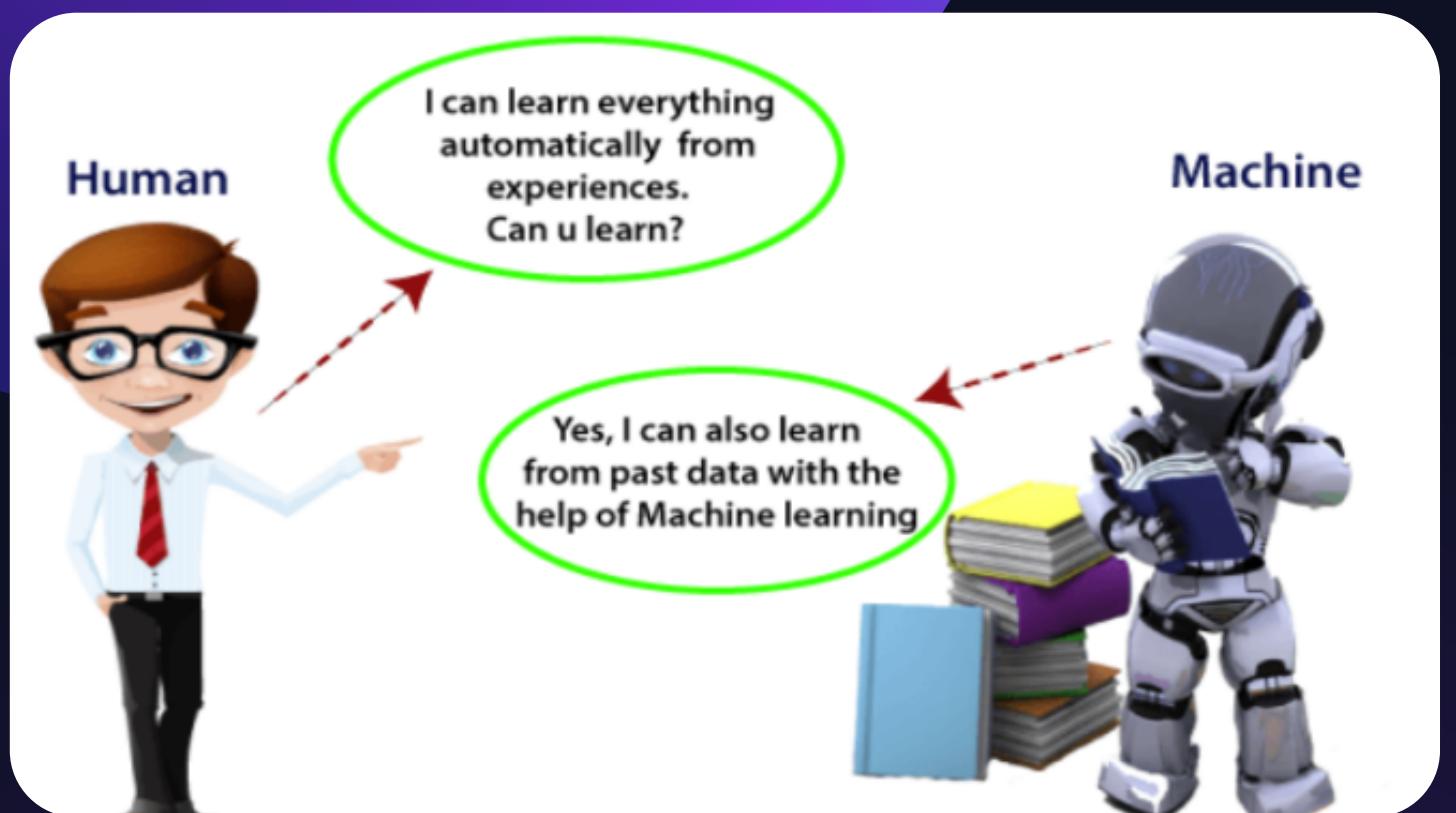
Classification of Machine Learning.

04

Neural Networks

05

Application of Machine Learning



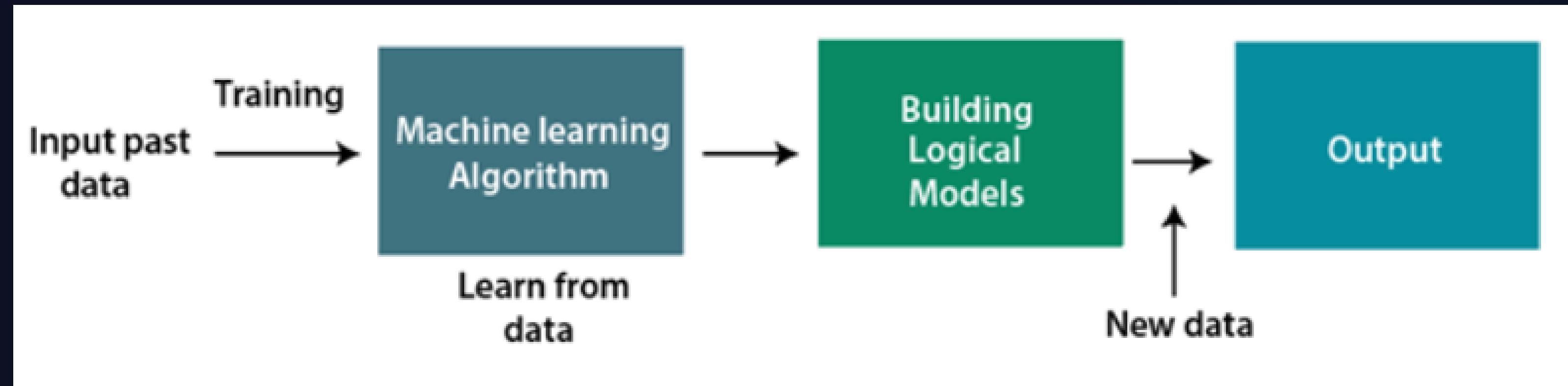
What is Machine learning?

- Machine learning is a technique/technology that imitates the process of learning as such humans do while learning to improve accuracies.
- It uses various algorithms for building mathematical models and making predictions using historical data or information.

How does Machine Learning work?

A Machine Learning system learns from historical data, builds the prediction models, and whenever it receives new data, predicts the output for it. The accuracy of predicted output depends upon the amount of data, as the huge amount of balanced data helps to build a better model which predicts the output more accurately.





Classifications of Machine Learning

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SUPERVISED LEARNING

Supervised learning algorithms are trained using labeled data

2

UNSUPERVISED LEARNING

Unsupervised learning algorithms are trained using unlabeled data

3

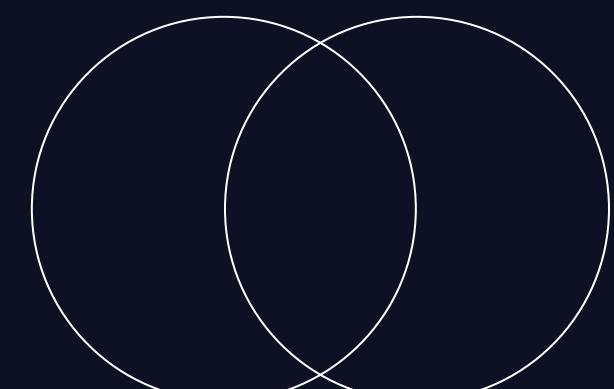
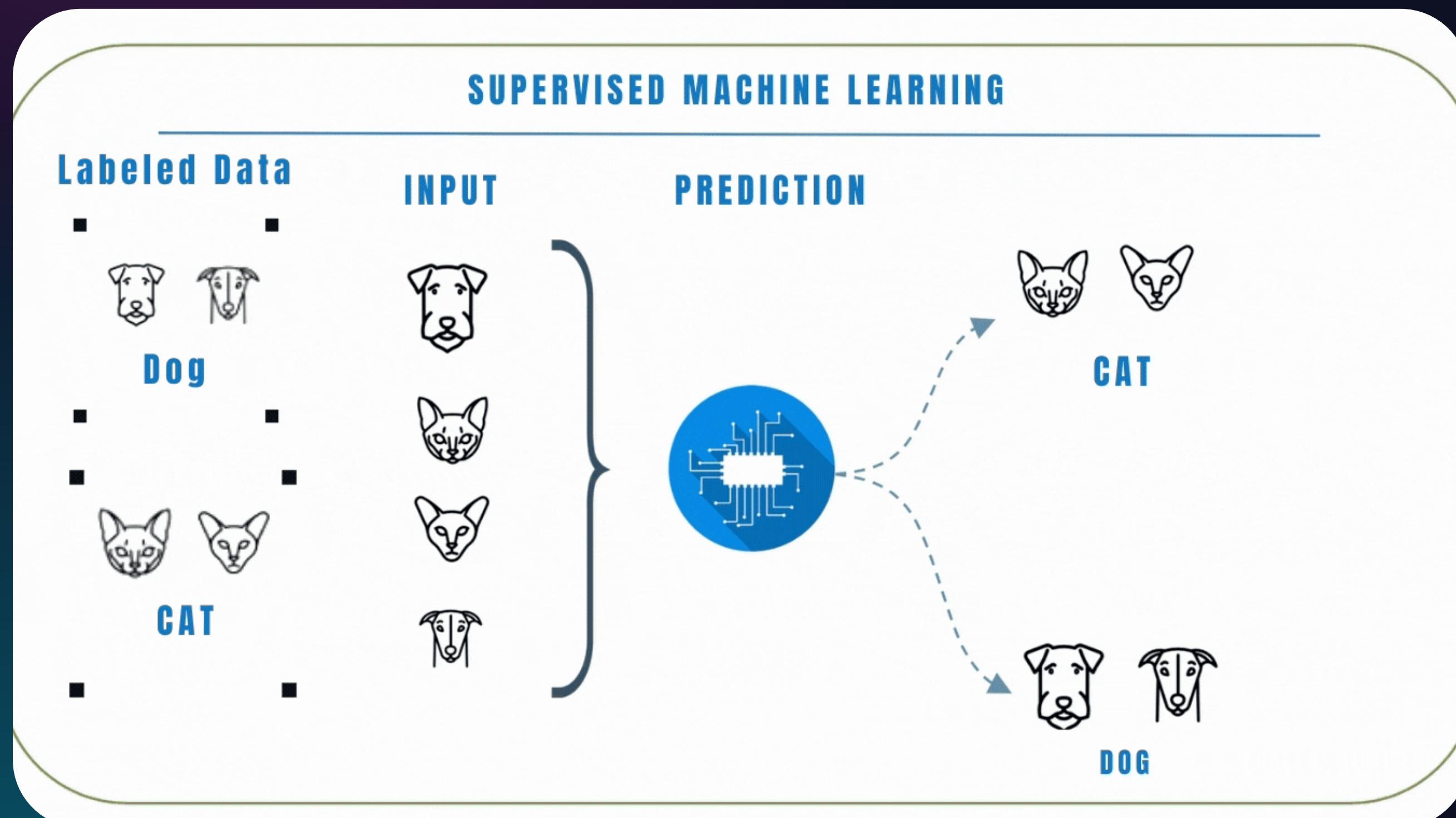
REINFORCEMENT LEARNING

Reinforcement learning refers to how certain behaviors are encouraged, and others discouraged

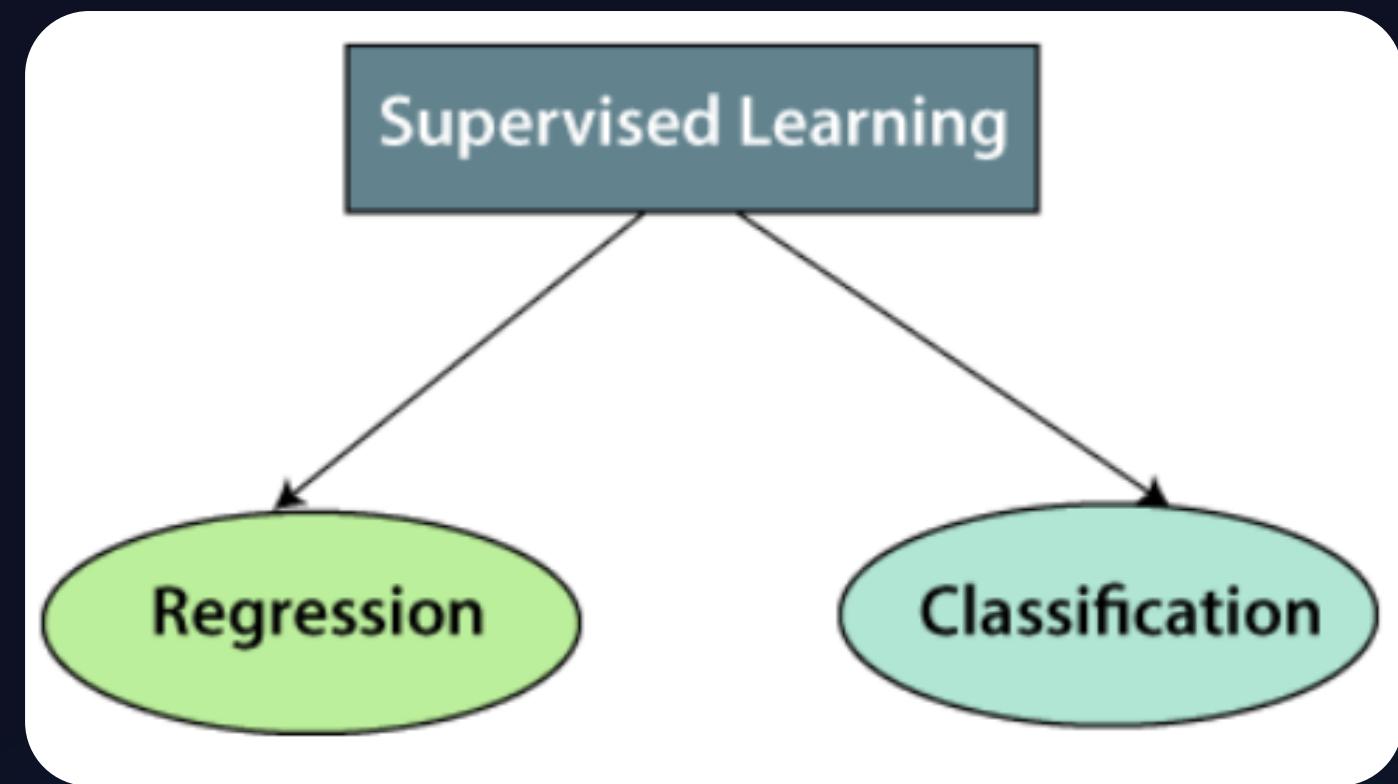
SUPERVISED LEARNING

- Supervised learning is a type of machine learning method in which we provide sample labeled data to the machine learning system in order to train it, and on that basis, it predicts the output.
- The goal of supervised learning is to map input data with the output data. The supervised learning is based on supervision, and it is the same as when a student learns things in the supervision of the teacher. One of the examples is spam filtering

EXAMPLE:

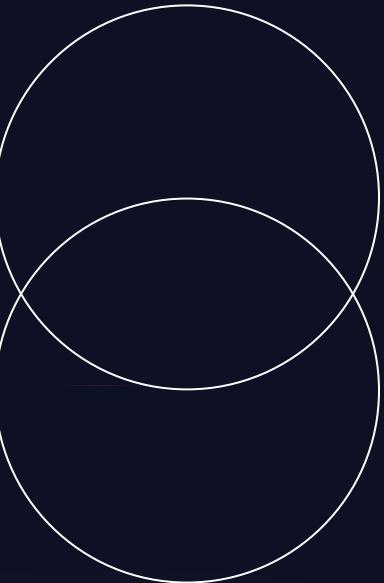


TYPES OF SUPERVISED LEARNING



Regression algorithms are used if the decision class values are real values (continuous in nature). It is used for the prediction of continuous variables, such as Weather forecasting, Market Trends, etc.

Classification algorithms are used when the output variable is categorical, which means there are two or more classes such as Yes-No, Male-Female, True-false, High-Medium-Low etc.



Steps involved in **SUPERVISED LEARNING**

- Collect/Gather the labelled training data and perform preprocessing.
- Split the training dataset into training dataset, test dataset, and validation dataset.
- Determine the input features of the training dataset, which should have enough knowledge so that the model can accurately predict the output known as feature engineering
- Determine the suitable algorithm for the model, such as support vector machine, decision tree, etc.
- Execute the algorithm on the training dataset.

Why use Unsupervised Learning?

It is helpful for finding useful insights from the data.

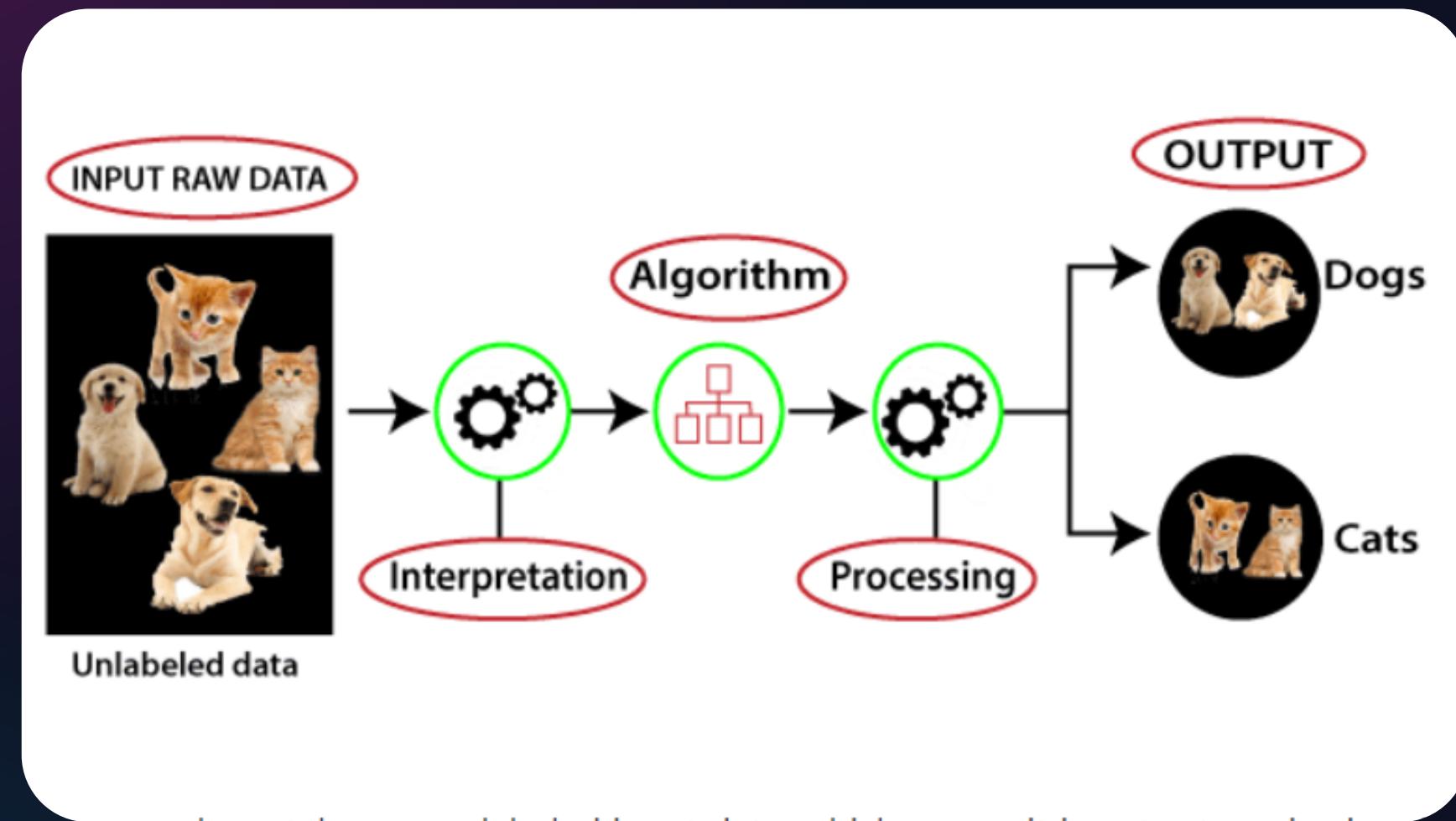
In real-world, we do not always have input data with the corresponding output so to solve such cases, we need unsupervised learning.

Much similar as a human learns to think by their own experiences, which makes it closer to the real AI.

ADVANTAGES:

- Used for complex task
- It is easy to get unlabeled data in comparison to labeled data

EXAMPLE

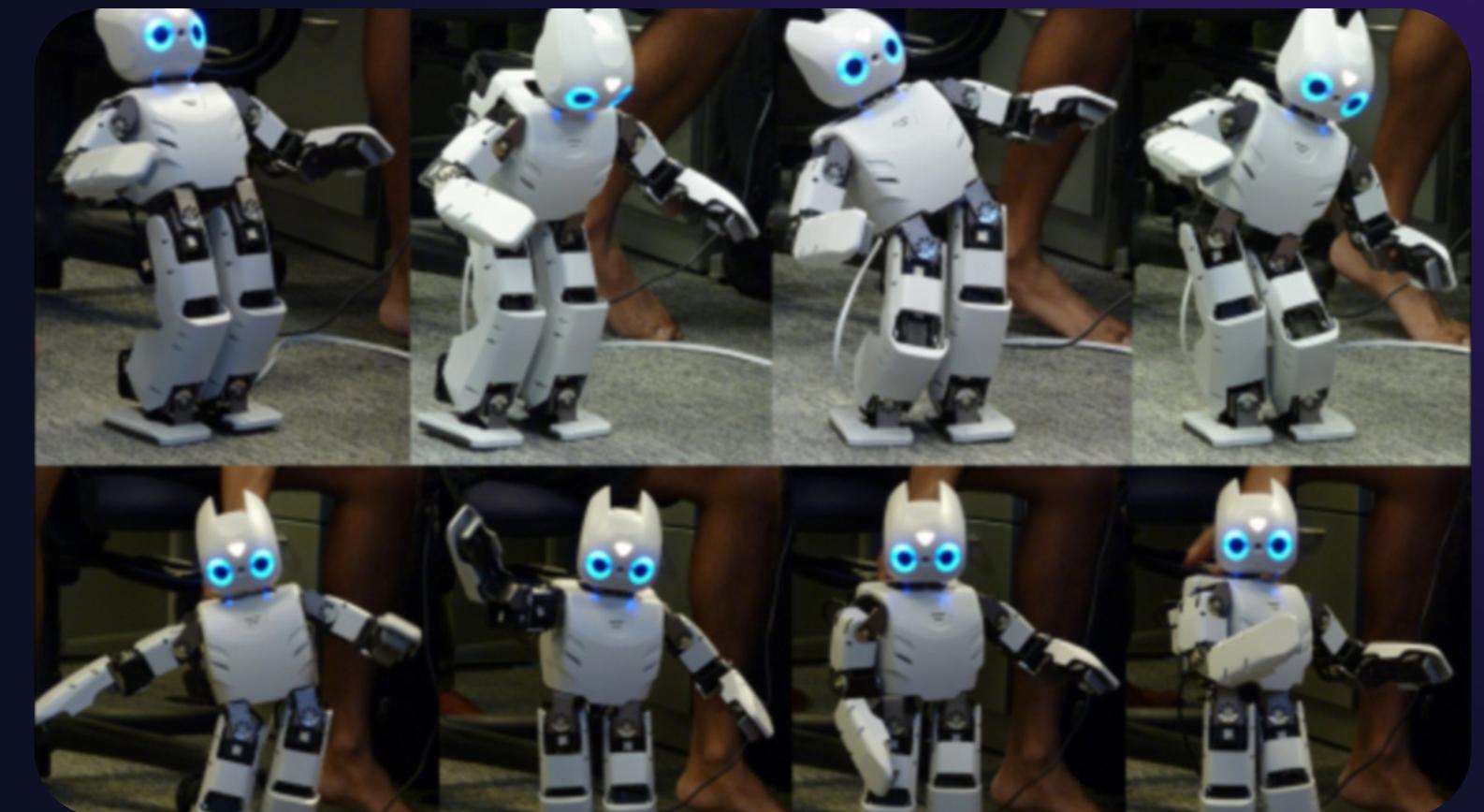


Suppose the unsupervised learning algorithm is given an input dataset containing images of different types of cats and dogs. The algorithm is never trained upon the given dataset, which means it does not have any idea about the features of the dataset. The task of the unsupervised learning algorithm is to identify the image features on their own.

Unsupervised learning algorithm will perform this task by clustering the image dataset into the groups according to similarities between images.

Steps involved in UNSUPERVISED LEARNING

- It is a machine learning technique in which models are not supervised using training dataset(labels are absent).
- Instead, model itself finds the hidden patterns and insights from the given data.
- It can be compared to learning which takes place in the Human brain while learning new things.

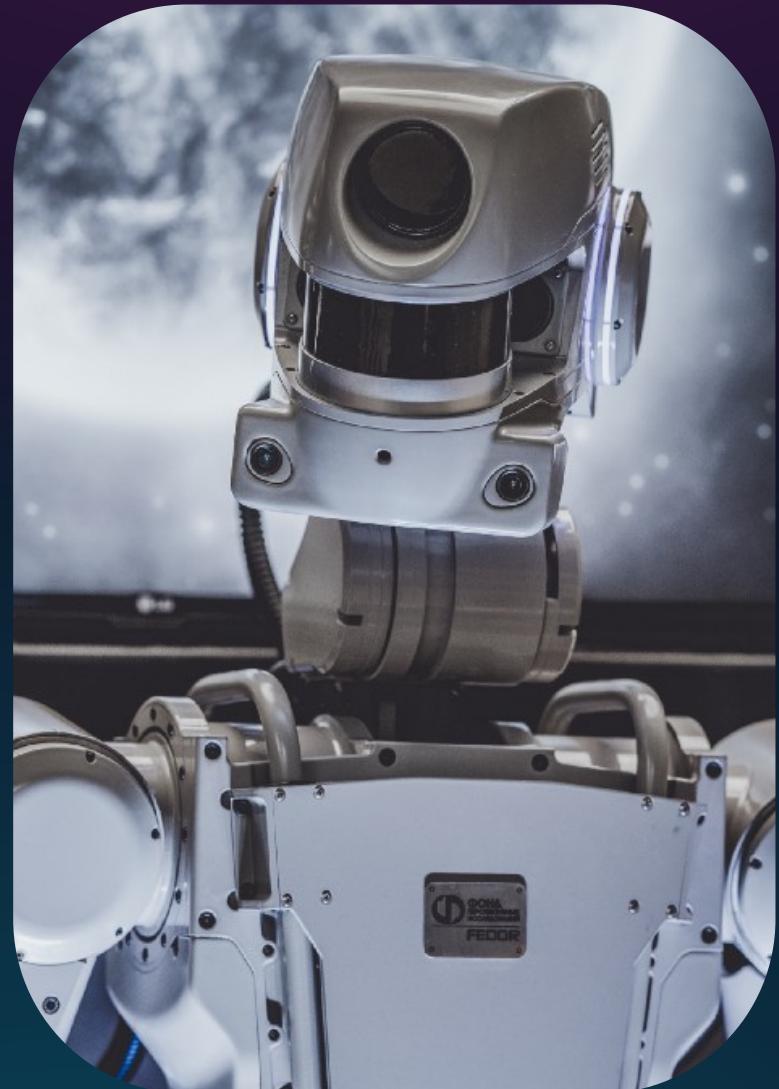


SUPERVISED LEARNING

- Supervised learning algorithms are trained using labeled data.
- Supervised learning model takes direct feedback to check if it is predicting correct output or not.
- Supervised learning model predicts the output
- Supervised learning model produces an accurate result.

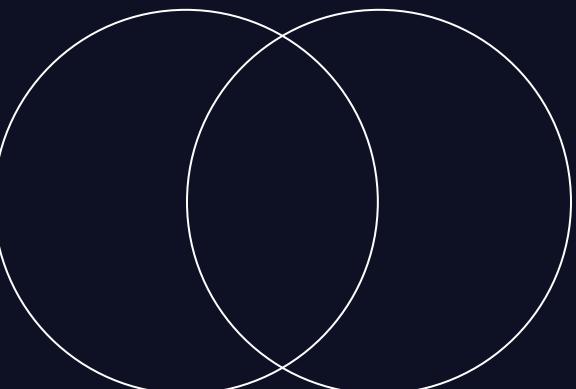
UNSUPERVISED LEARNING

- Unsupervised learning algorithms are trained using unlabeled data.
- Unsupervised learning model does not take any feedback.
- Unsupervised learning model finds the hidden patterns in data.
- Unsupervised learning model may give less accurate result as compared to supervised learning.



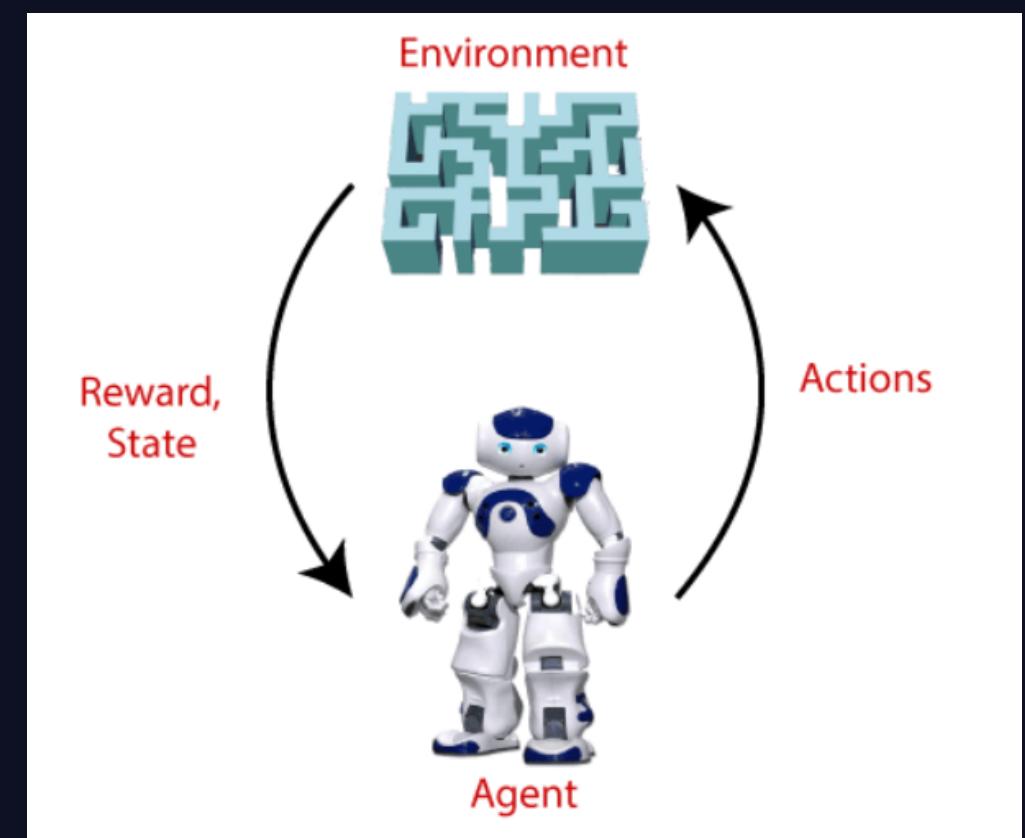
REINFORCEMENT LEARNING

It is a feedback-based Machine learning technique in which an agent learns to behave in an environment by performing the actions and seeing the results of actions. For each good action, the agent gets positive feedback, and for each bad action, the agent gets negative feedback or penalty.



EXAMPLE

- Suppose there is an AI agent present within a maze environment, and his goal is to find the diamond. The agent interacts with the environment by performing some actions, and based on those actions, the state of the agent gets changed, and it also receives a reward or penalty as feedback.
- The agent continues doing these three things (take action, change state/remain in the same state, and get feedback), and by doing these actions, he learns and explores the environment.
- The agent learns that what actions lead to positive feedback or rewards and what actions lead to negative feedback penalty. As a positive reward, the agent gets a positive point, and as a penalty, it gets a negative point.



KEY FEATURES OF REINFORCEMENT LEARNING

- In RL, the agent is not instructed about the environment and what actions need to be taken.
- It is based on the hit and trial process.
- The agent takes the next action and changes states according to the feedback of the previous action.



REINFORCEMENT LEARNING

- RL works by interacting with the environment.
- The RL algorithm works like the human brain works when making some decisions.
- There is no labeled dataset used.
- No previous training is provided to the learning agent.
- RL helps to take decisions sequentially.

SUPERVISED LEARNING

- Supervised learning just needs data labels.
- Supervised Learning works as when a human learns things in the supervision of a guide.
- The labeled dataset is used.
- Training is provided to the algorithm so that it can predict the output.
- In Supervised learning, decisions are made when input is given.

APPLICATIONS OF REINFORCEMENT LEARNING



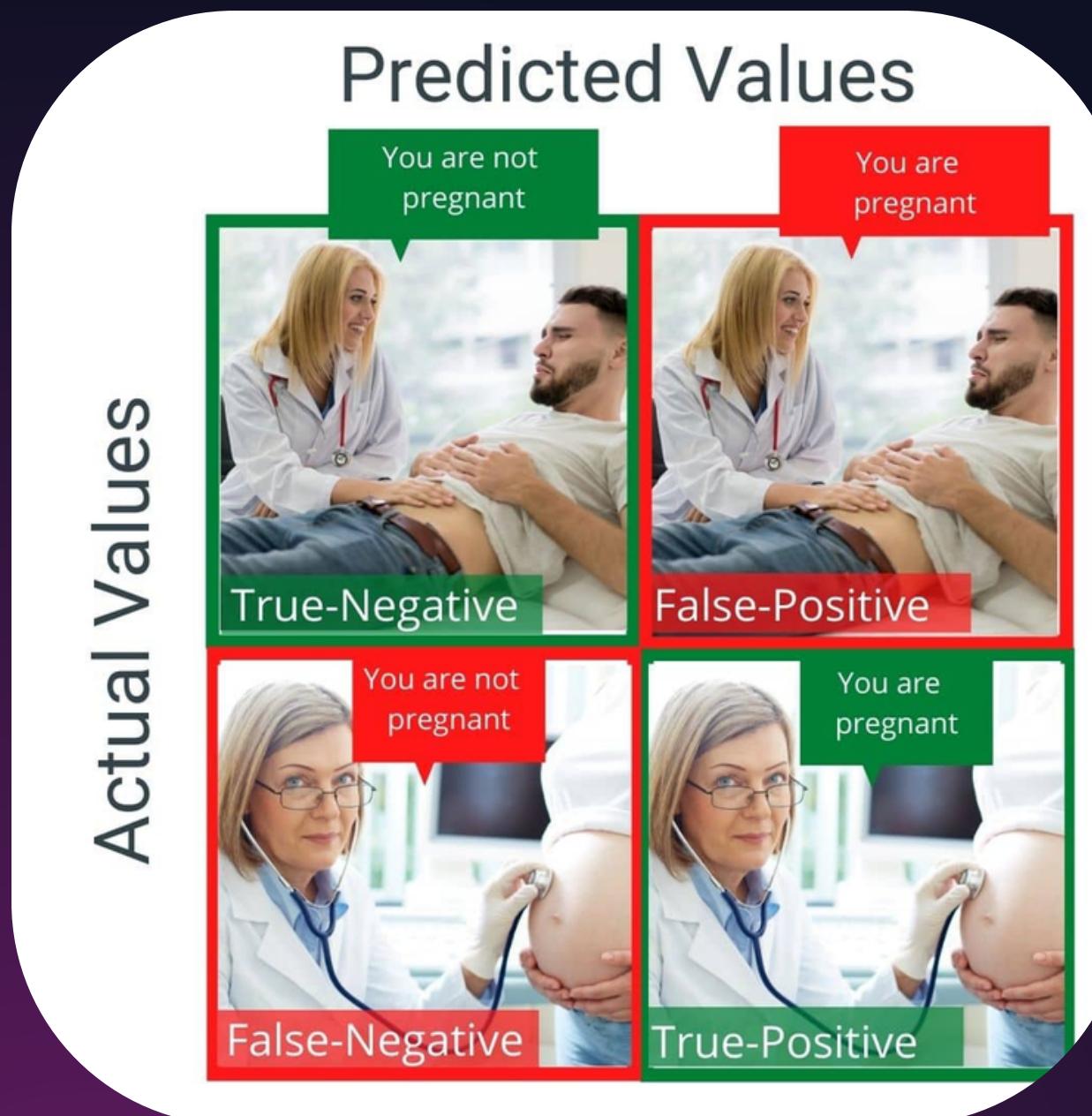
A screenshot of a chess game interface from a website. It shows a standard 8x8 chessboard with pieces in their starting positions. On the left, there's a sidebar with navigation links like Home, Play, Puzzles, Learn, Today, Connect, and more. On the right, a "Play vs..." section features a profile picture of "xQc (1000)" and a description: "xQc is a streaming superstar and former professional Overwatch player. He made his mark on the chess world in PegChamps - do you have what it takes to defeat the Canadian superstar?". Below this are sections for "STREAMERS" (with a red border around one profile), "TOP PLAYERS", and "PERSONALITIES". At the bottom is a green "Choose" button.

CLASSIFICATION VS REGRESSION



PARAMETER	REGRESSION	CLASSIFICATION
BASIC	Mapping function is used for mapping of values to continuous output	The mapping function is used for mapping values to predefined classes.
INVOLVES PREDICTION OF	Continuous values	Discrete values
NATURE OF PREDICTED DATA	Ordered	Unordered
DECISION MAKING PARAMETERS	By finding best fit line	By drawing decision boundaries
EXAMPLE ALGORITHMS	Regression tree (Random forest), Linear Regression	Decision tree, Logistic Regression etc...

Evaluating the model



- The Accuracy score (or simply Accuracy) in machine learning is a classification metric that includes a percentage of the predictions that a model correctly predicted.
- The metric is widely used since it is simple to calculate and understand.

	Predicted	Predicted
	0	1
Actual		
0	TN	FP
1	FN	TP

Few Models to be discussed

1

2

3

Linear
Regression

Logistic
Regression

Neural
Networks



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Thank You
Everyone



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