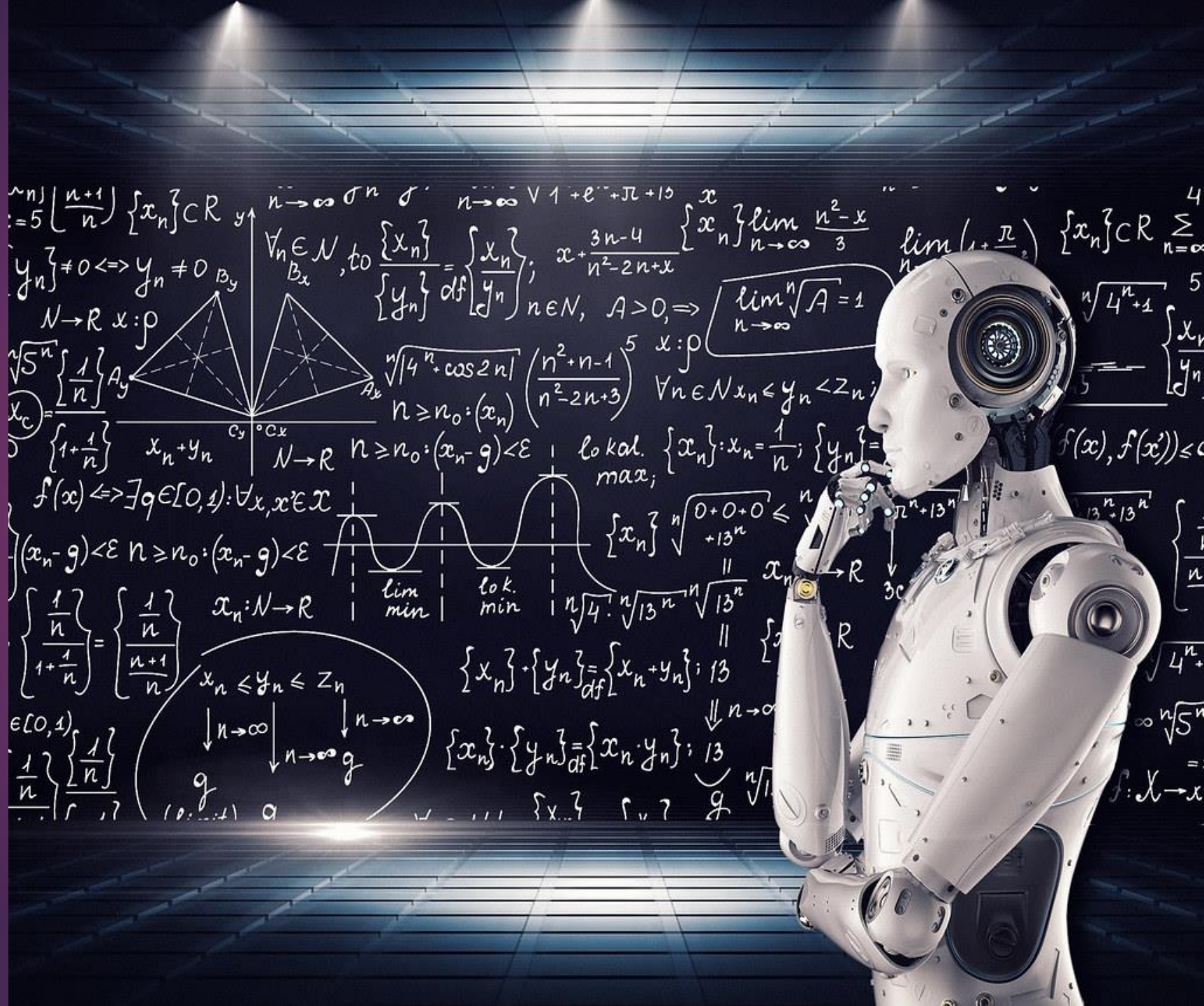


Data Science



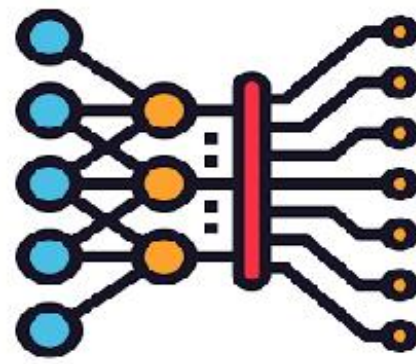
Artificial Intelligence



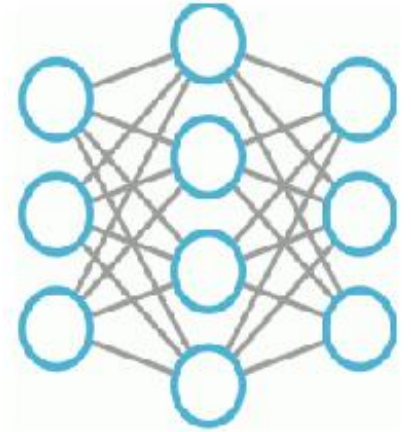
Machine Learning



Deep Learning



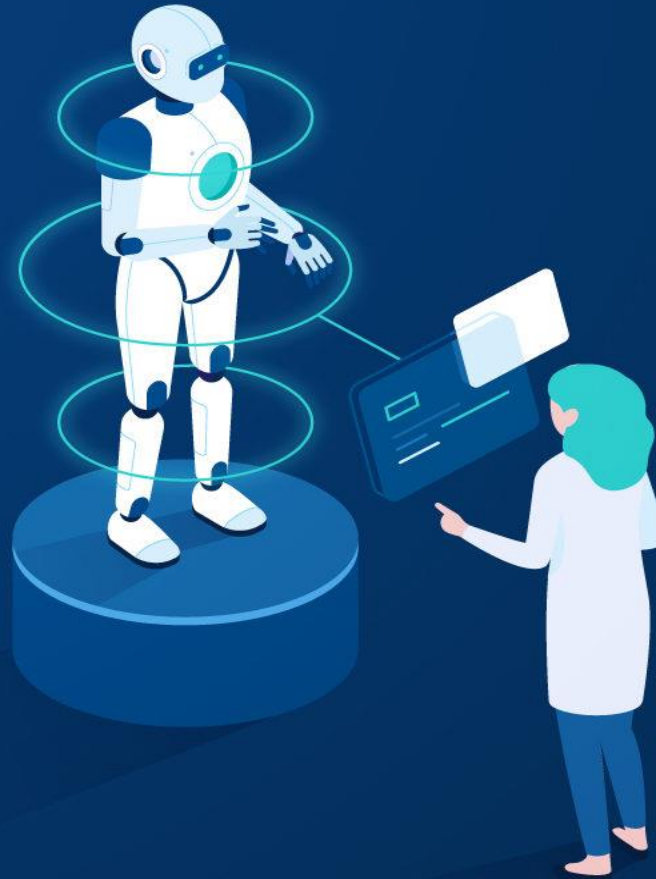
Neural Networks



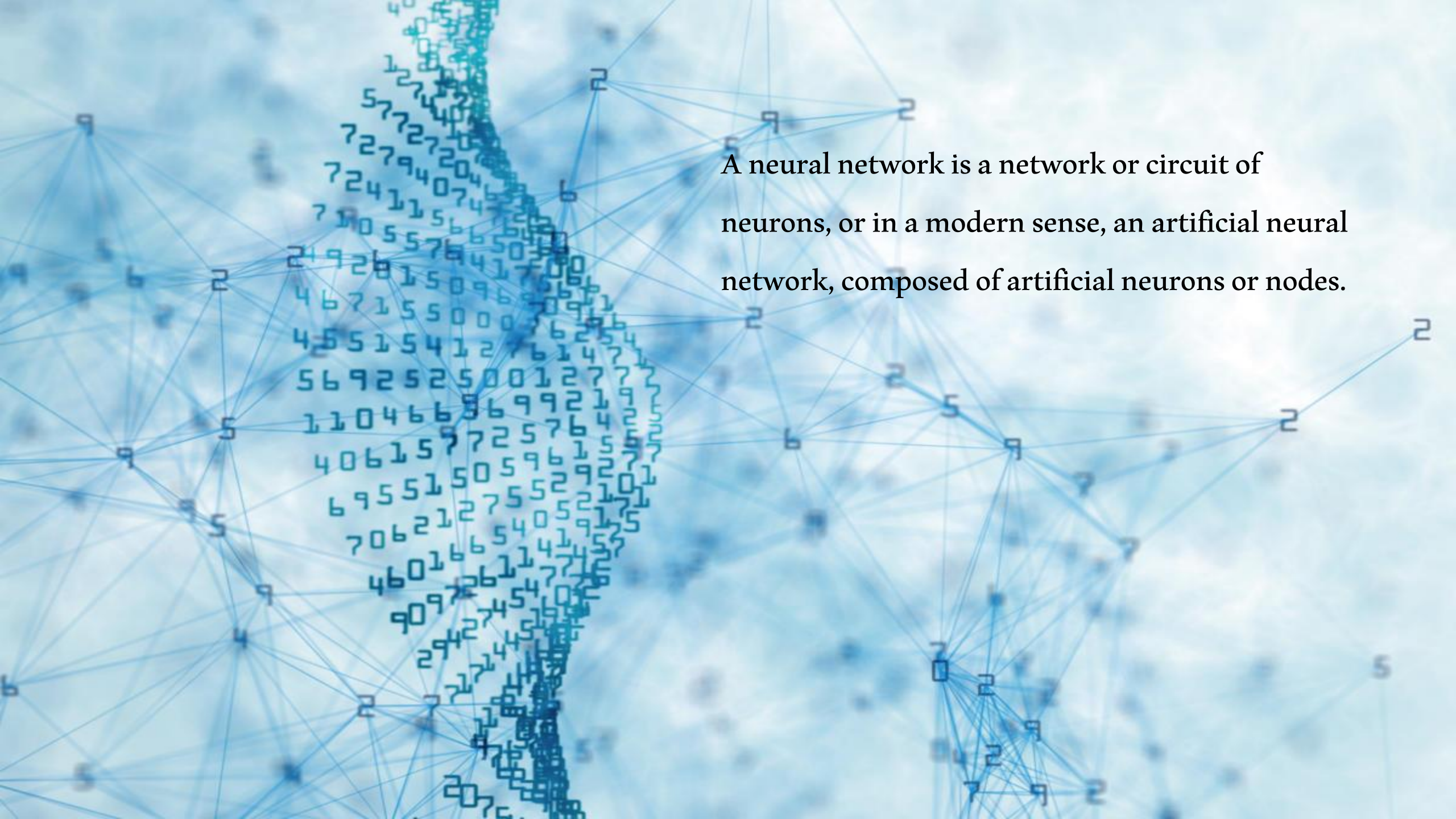


Artificial intelligence (AI) refers to the simulation of human **intelligence** in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.

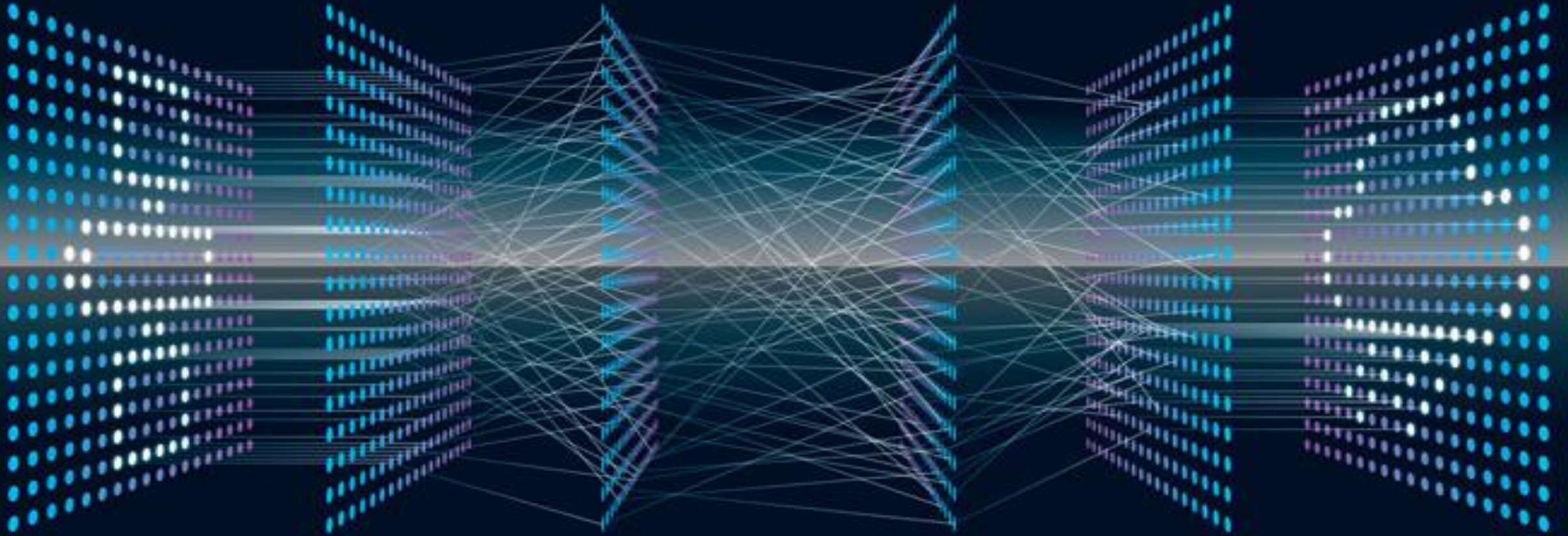


Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

The background is a complex, abstract network of thin blue lines connecting various nodes. The nodes are represented by small, semi-transparent numbers (0-9) scattered across the frame. A prominent feature is a dense, vertical column of numbers on the left side, which appears to be a data stream or a specific path within the network. The overall aesthetic is technological and digital, with a light blue and white color palette.

A neural network is a network or circuit of neurons, or in a modern sense, an artificial neural network, composed of artificial neurons or nodes.

Deep learning is an AI function that mimics the workings of the human brain in processing data for use in detecting objects, recognizing speech, translating languages, and making **decisions**. **Deep learning AI can learn without human supervision, drawing from data that is both unstructured and unlabeled.**



Data Science

- ▶ Data science is the process of extracting knowledge and insight from large volume of Data.
- ▶ Data science is an inter-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data.
- ▶ Data science is related to data mining, machine learning and big data.

Why Data science



Decision Making is fact based



Intuition might not work well



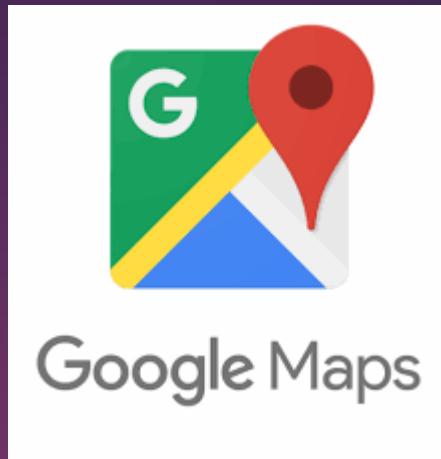
Real time decisions



Intense competition

What Does Data Scientist Do?

- ▶ Identifying the data-analytics problems that offer the greatest opportunities to the organization
- ▶ Determining the correct data sets and variables
- ▶ Collecting large sets of structured and unstructured data from disparate sources
- ▶ Cleaning and validating the data to ensure accuracy, completeness, and uniformity
- ▶ Devising and applying models and algorithms to mine the stores of big data
- ▶ Analyzing the data to identify patterns and trends
- ▶ Interpreting the data to discover solutions and opportunities
- ▶ Communicating findings to stakeholders using visualization and other means



Tesla Self Driving Cars

Object / Face / Speech
Recognition



What is Machine Learning?

- ▶ Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.
- ▶ Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

Where is Machine Learning used?

- ▶ The heavily hyped, self-driving Google car? The essence of machine learning.
- ▶ Online recommendation offers such as those from Amazon and Netflix? Machine learning applications for everyday life.
- ▶ Knowing what customers are saying about you on Twitter? Machine learning combined with linguistic rule creation.
- ▶ Fraud detection? One of the more obvious, important uses in our world today.

Supervised Learning

- Makes machine Learn explicitly
- Data with clearly defined output is given
- Direct feedback is given
- Predicts outcome/future
- Resolves classification and regression problems



Unsupervised Learning

- Machine understands the data (Identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific



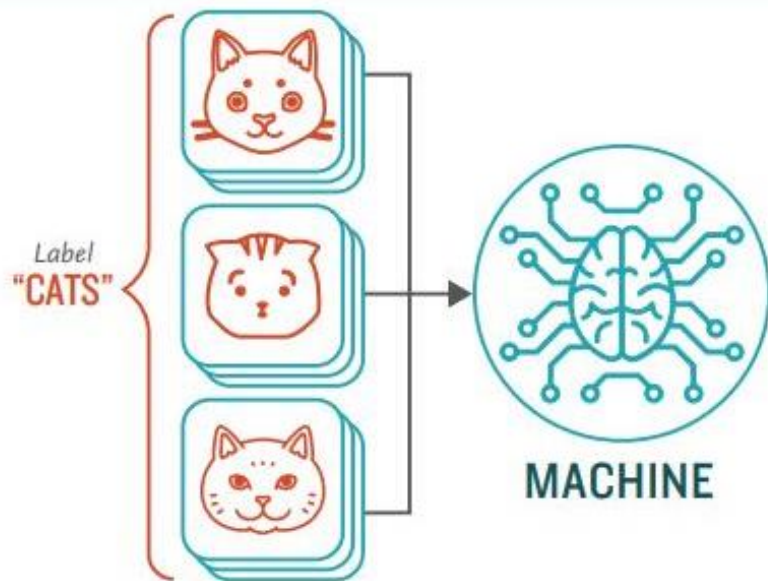
Reinforcement Learning

- An approach to AI
- Reward based learning
- Learning from +ve & -ve reinforcement
- Machine Learns how to act in a certain environment
- To maximize rewards



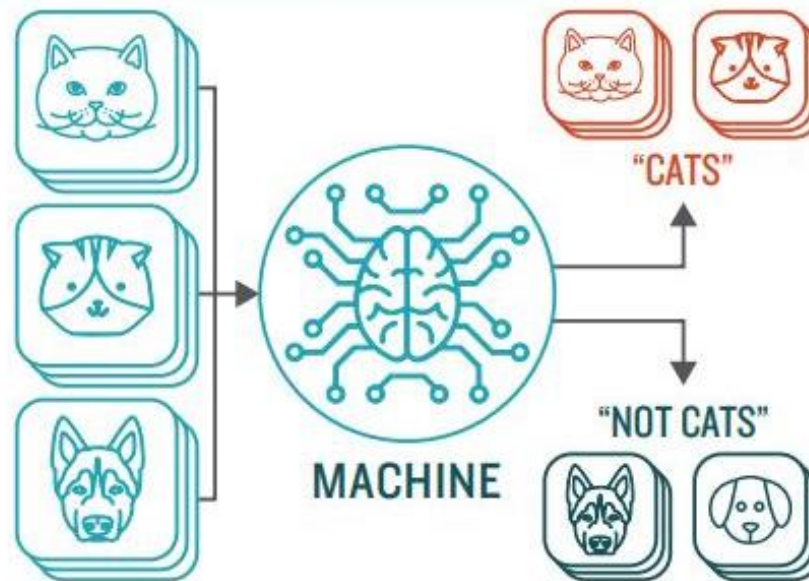
STEP 1

Provide the machine learning algorithm categorized or "labeled" input and output data from to learn

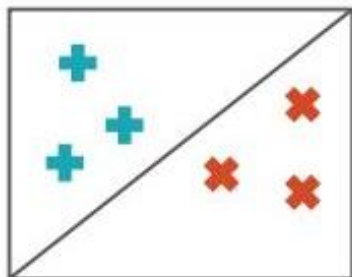


STEP 2

Feed the machine new, unlabeled information to see if it tags new data appropriately. If not, continue refining the algorithm

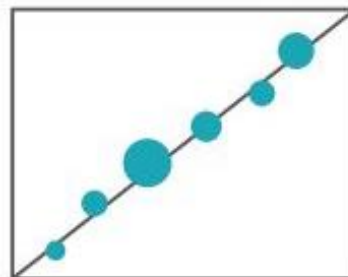


TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLASSIFICATION

Sorting items into categories

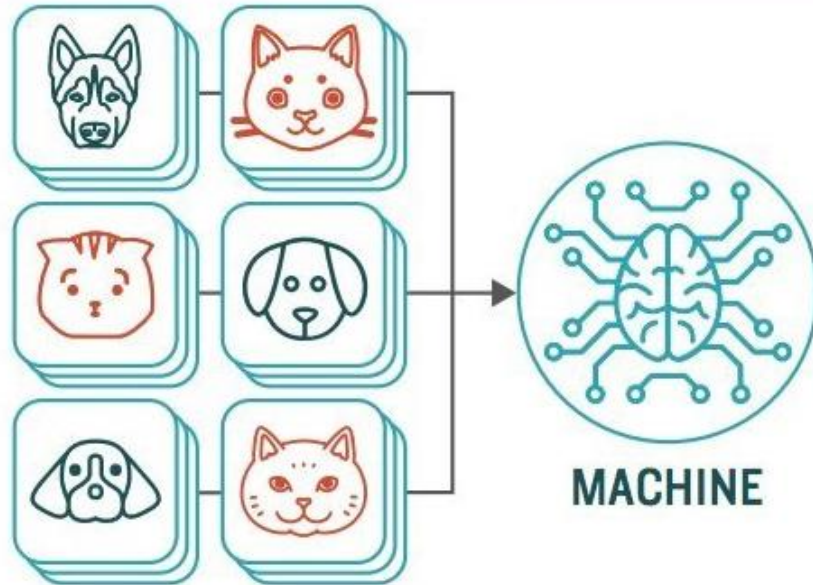


REGRESSION

Identifying real values (dollars, weight, etc.)

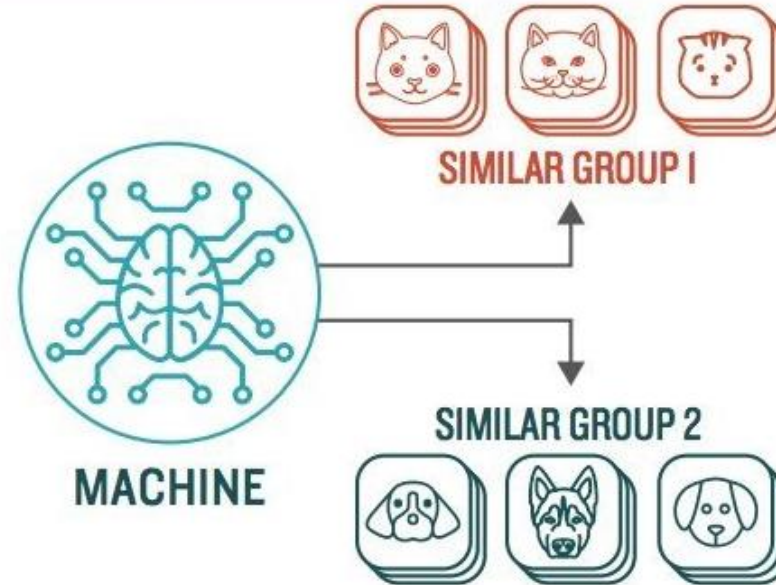
STEP 1

Provide the machine learning algorithm uncategorized, unlabeled input data to see what patterns it finds

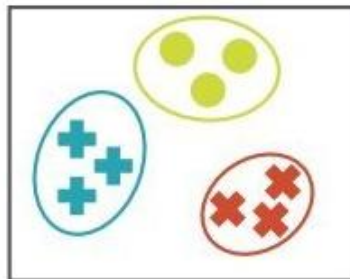


STEP 2

Observe and learn from the patterns the machine identifies



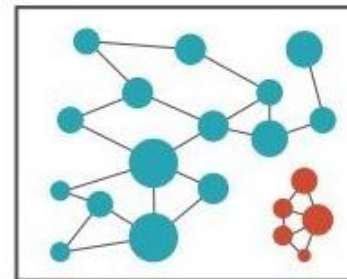
TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLUSTERING

Identifying similarities in groups

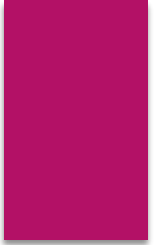
For Example: Are there patterns in the data to indicate certain patients will respond better to this treatment than others?



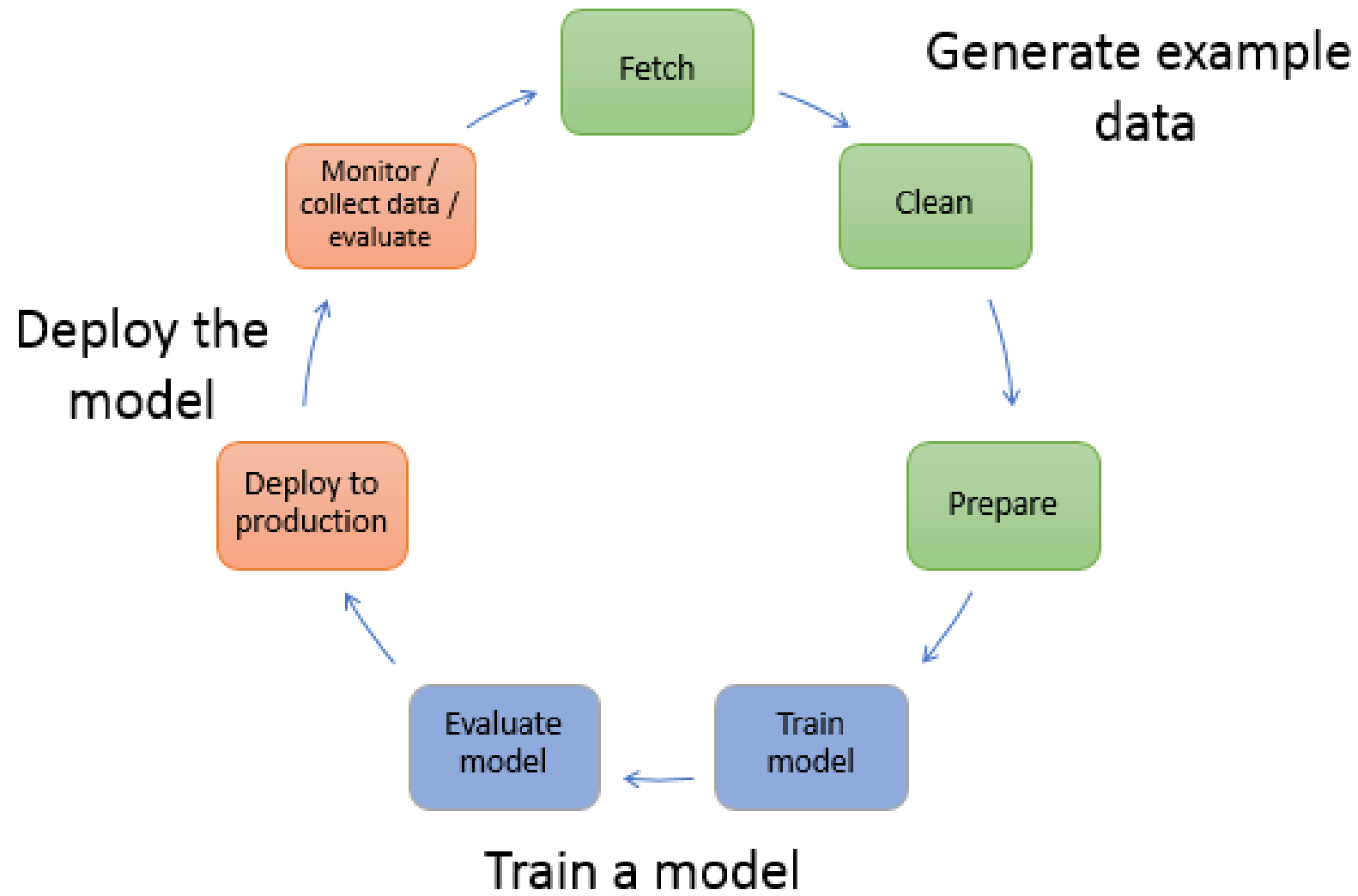
ANOMALY DETECTION

Identifying abnormalities in data

For Example: Is a hacker intruding in our network?

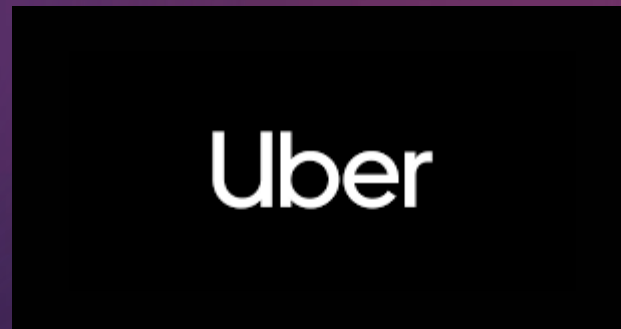
- 
- Explore data to find **actionable insights**.
 - Model data using ML algorithms to **predict** what is going to happen down the line.
 - **Report** to management about your analysis **outcome**.

What does Machine Learning Engineer Do?





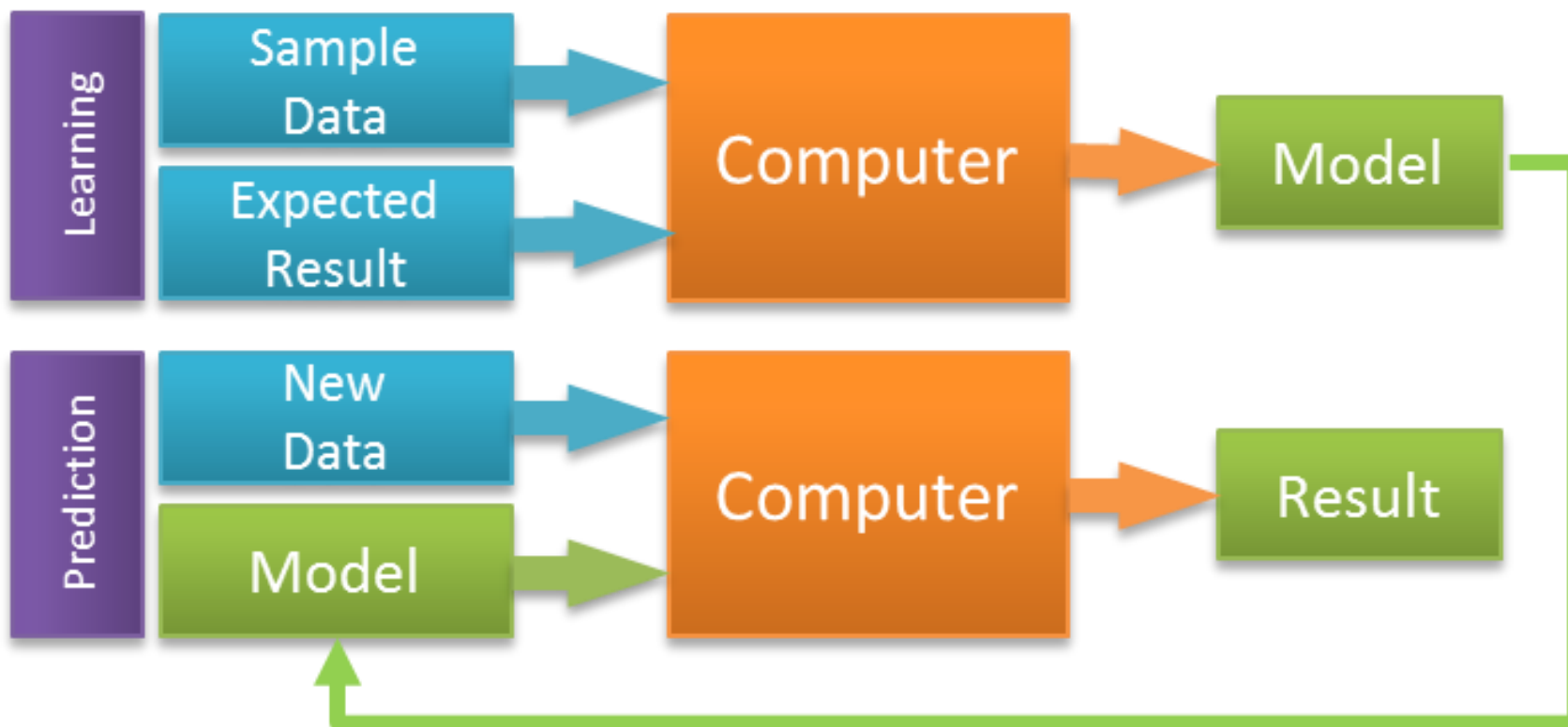
Tech Giants Investing in ML

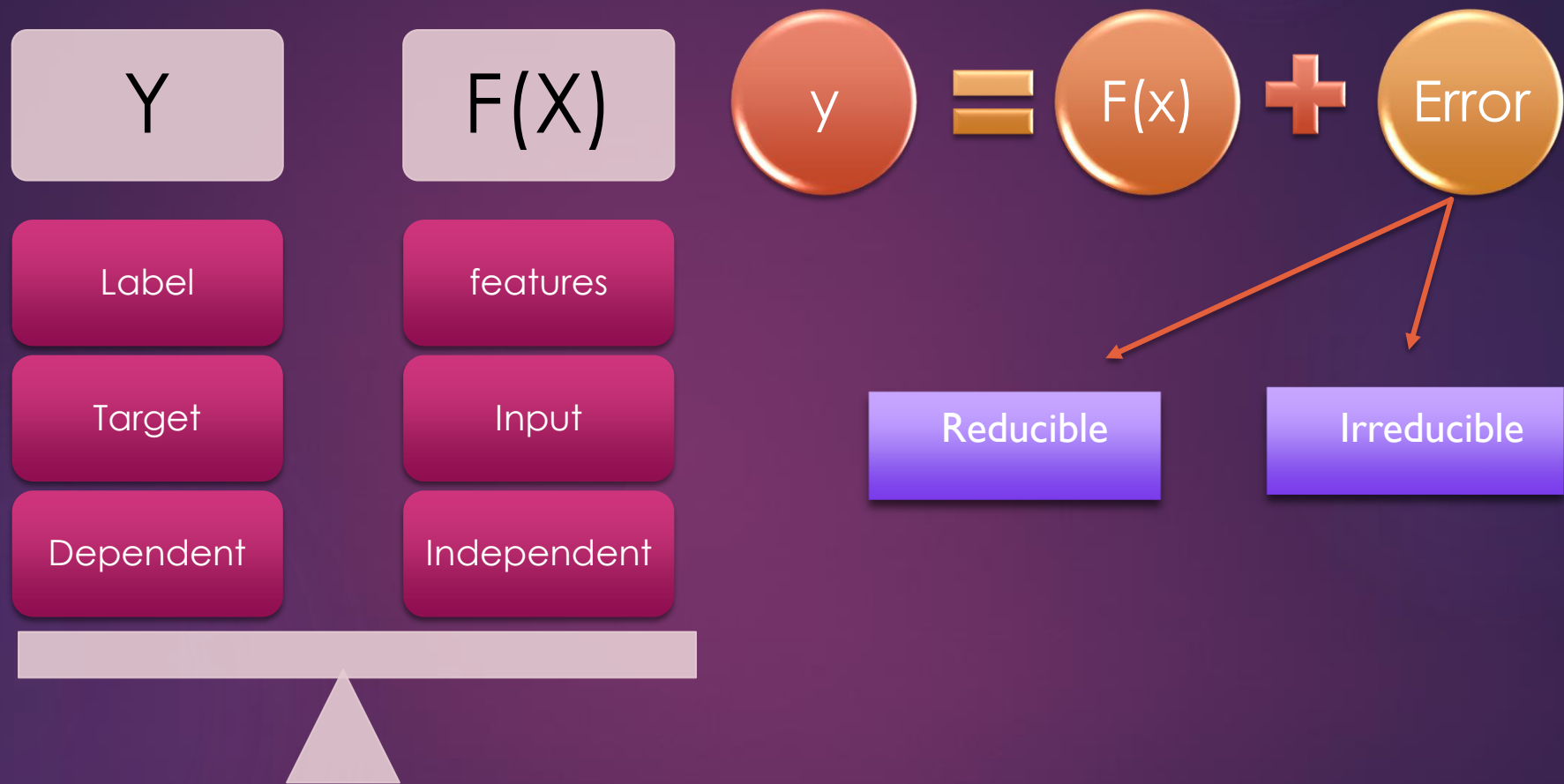


Traditional modeling:



Machine Learning:





Traditional modelling Methods used to have Biased rules, while the ML models find a general relationship to reduce error while finding the unknown.

