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## Understanding Key terms in AI



Rajesh Narayanan · Follow

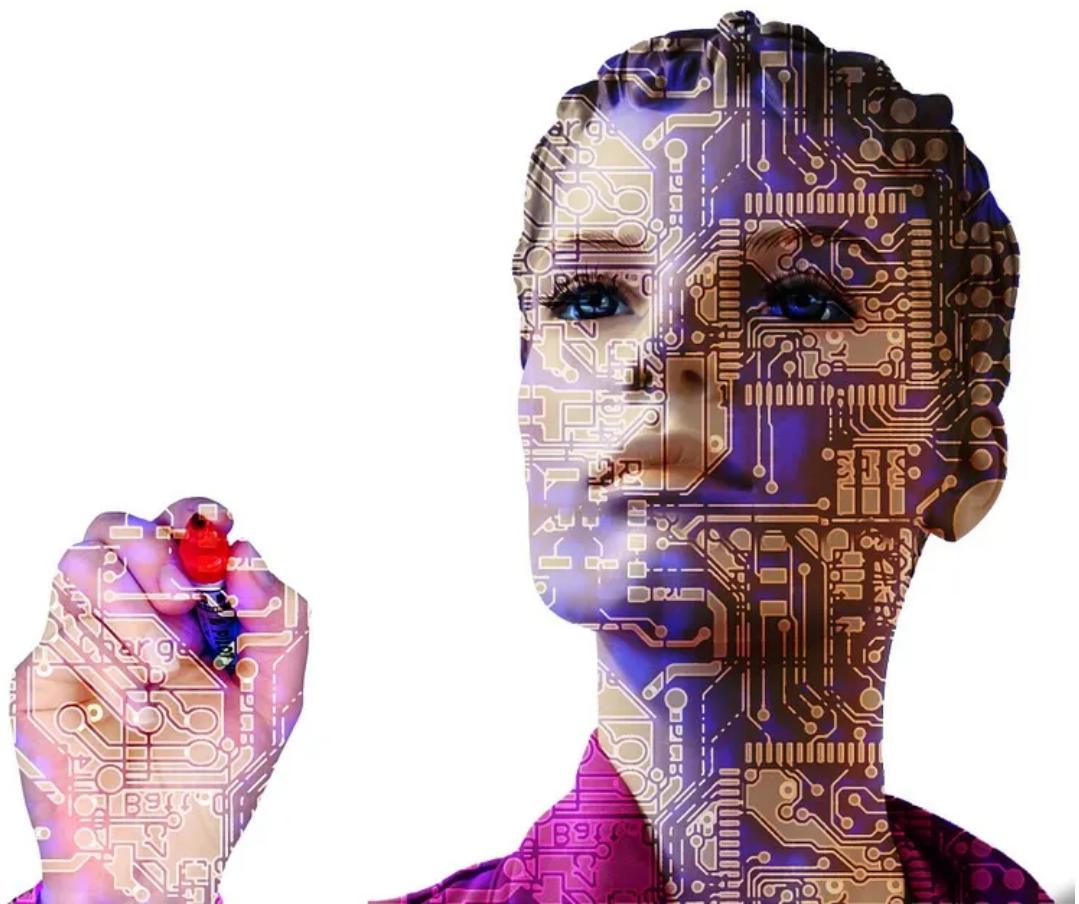
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Check out the previous article [A Brief Introduction to Artificial Intelligence](#) before reading this.

## ABC of AI

**Algorithm** is the sequence of steps that are performed using code to work on data and give output.

**Bias** is the tendency of humans to be more inclined to certain things.

**Cognition** is the process of acquiring knowledge and understanding to give a human perception.

Check out this interesting video from Google:

## Machine Learning and Human Bias

The efficiency of the algorithm, the consideration of bias and the implementation of cognition determines the accuracy of output.

### Machine Learning

Machine learning in simple words is using data to mimic what we do and understand.

Here are the various types of Machine Learning.

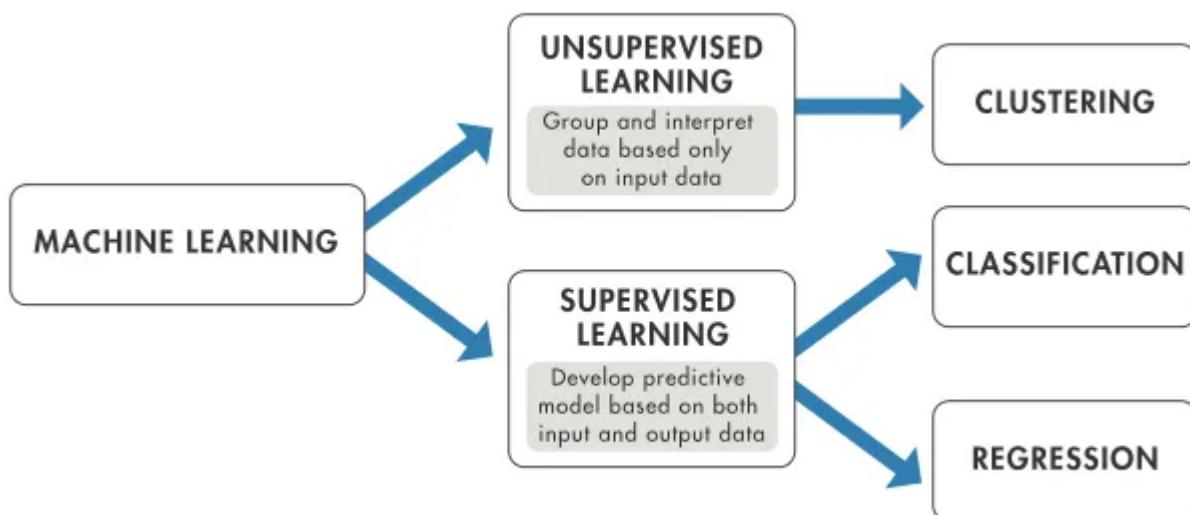
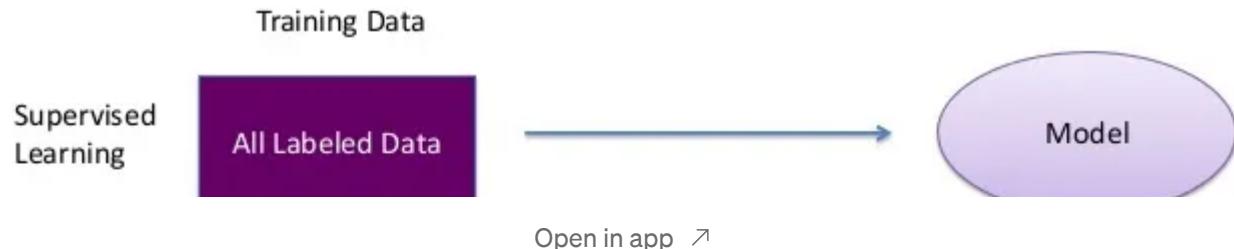


Image from mathworks.com

Take a look at how the ML model is trained.



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Learning

Lots of Unlabeled Data

Model

Unsupervised Learning

All Unlabeled Data

Model

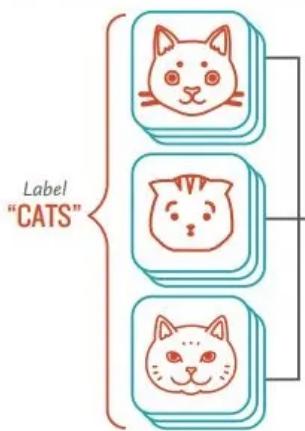
## Supervised Learning

This is a type of learning process that develops a predictive model based on both input and output data. It requires people to check the accuracy of output data.

# How Supervised Machine Learning Works

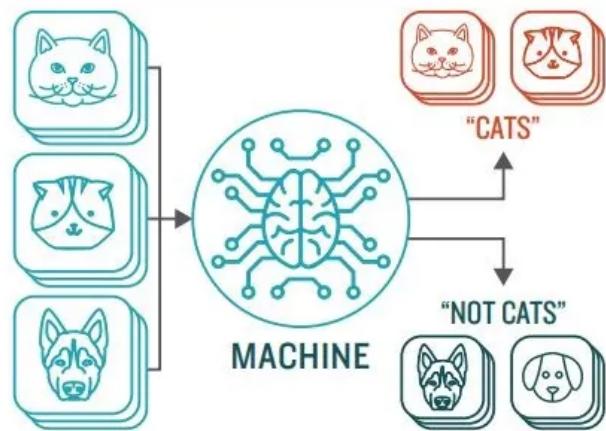
## STEP 1

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

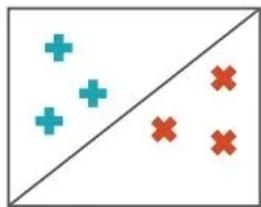


## STEP 2

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

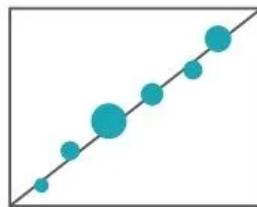


## TYPES OF PROBLEMS TO WHICH IT'S SUITED



### CLASSIFICATION

Sorting items into categories (cars, bikes, etc.)



### REGRESSION

Identifying real values (dollars, weight, etc.)

Image from boozallen.com

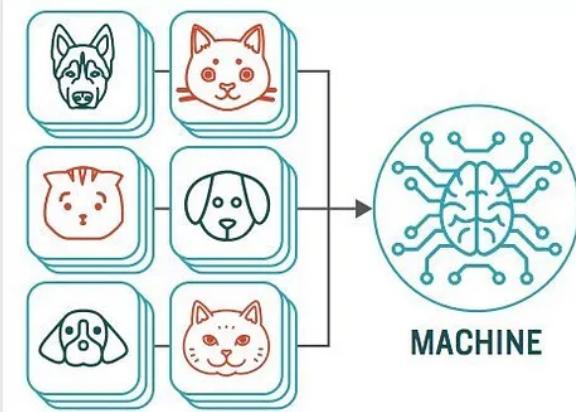
## Unsupervised Learning

This is a type of learning process that consists of automatic grouping, finding patterns and interpreting data based on only input and not output.

# How Unsupervised Machine Learning Works

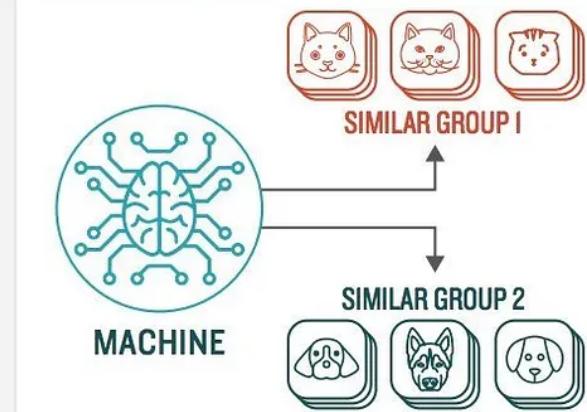
## STEP 1

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

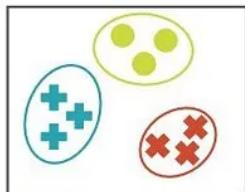


## STEP 2

Observe and learn from the patterns the machine identifies



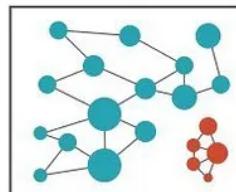
## TYPES OF PROBLEMS TO WHICH IT'S SUITED



### 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?

Image from boozallen.com

## Semi-Supervised Learning

It depends on some labelled data to work on a huge amount of non-labelled data. It saves time on labelling as well as improves the accuracy of learning.

## Reinforcement Learning

The software agent takes actions to find the best possible solution to a problem. It is similar to playing a video game, you end up in a trap or getting killed. Later you learn to avoid that and move on to the next level.

## How does Machine Learning work?

Let us consider a new-born baby. The entire world is new to him. He begins learning as he starts observing things around him. The eyes and ears take input. The brain processes it. The mouth gives output in the form of sound and eyes, hands and legs in

the form of action. It takes about 1 year for him to get the full vision. Slowly he develops to respond to our actions like calling him by name, speaking and he performs own actions like playing, crawling and indicating things to us. What is happening around him serves as data to develop and grow. As the baby grows up he learns to speak, identify things like apple and living things like a cat, dog etc. This is **unsupervised learning** as here we don't tell the baby everything explicitly he rather understands things from observation.

Consider a computer. It is just like a newborn baby. So, data is provided to it. When it comes across a huge amount of data, it analyses patterns based on Machine Learning algorithms and creates a model. This model can be used for achieving the purpose by linking it with the intended application. It can easily identify an apple, a cat or a dog but unlike a growing up child, it does not take 2 or 3 years to do that. It doesn't need much time, it only needs relevant data along with an appropriate algorithm. This is an example of **Supervised Learning**.

Here is an example of **labelled data** for a Supervised ML process. Here we already know the pattern i.e. cars. These are pictures taken in different environments with different angles, background and lighting conditions. If you provide sufficient data of images of cars, the model will be able to identify that an object is a car based on some common characteristics, just like how we do it.





Sample data of Different cars

## Deep Learning

It is the process of analysing unstructured data( image, text, audio or video) that does not have any labels to find matches and provide necessary information to identify patterns. It is a constituent of Machine Learning. While training the model by providing data can be **Supervised** or **Unsupervised** Learning, Deep Learning algorithms are mainly used for **Unsupervised** Learning tasks.

## Artificial Neural Network

ANN consists of connected units or nodes called **artificial neurons**, which are modelled on neurons in the biological brain. Each connection can be used to pass a signal between the artificial neurons.

The neural network keeps learning and improving itself based on input and output.

## Data Science

Data Science is the process of using various tools, algorithms and learning objectives to make use of raw data to solve a purpose. People who have good experience in Data

Science are called Data Scientists.

## Data Analytics

Data Analytics is the process of analysing data, obtaining actionable insights and processing them for the necessary outcome. Data can be processed using an algorithm. It comes under Data Science.

Companies have a lot of client or customer data available that lies unused. When put to good use it can be beneficial and make a difference.

If the emphasis is on technical aspects, then the person who performs analytics is a Data Analyst whereas if the emphasis is on business he is a Business Analyst.

## Business Intelligence

Key business decisions can be influenced by Data Analytics and this process is called BI.

It can be used to improve the business in many ways:

- Knowing Customers and Clients
- Marketing and reaching out
- Bring higher gains
- Resolving issues
- Prediction

## Chatbot

A chatbot is a chat application powered by AI. It can give automated responses.

It learns from existing data. It also keeps optimising itself for accuracy as it comes across new data. It essentially learns from the past and can perform prediction as well.

User Interface– Messenger, WhatsApp or standalone web/mobile application

## Natural Language Processing

Natural Language Processing is the process of converting text to speech and vice versa. It processes the text to understand human language. Making a machine to learn any language is akin to a baby learning mother tongue.

Previously Google Translate used to do word by word translation, now it has become much more accurate as it translates the whole sentence in its context.

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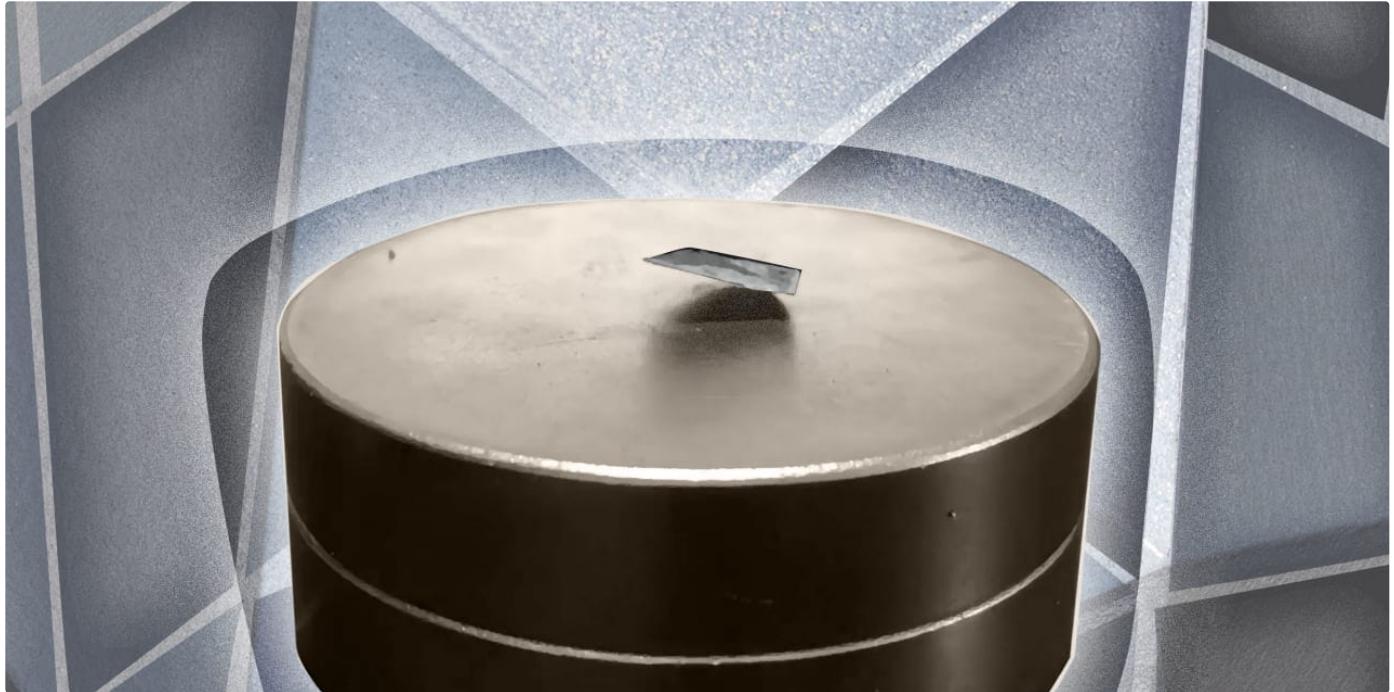
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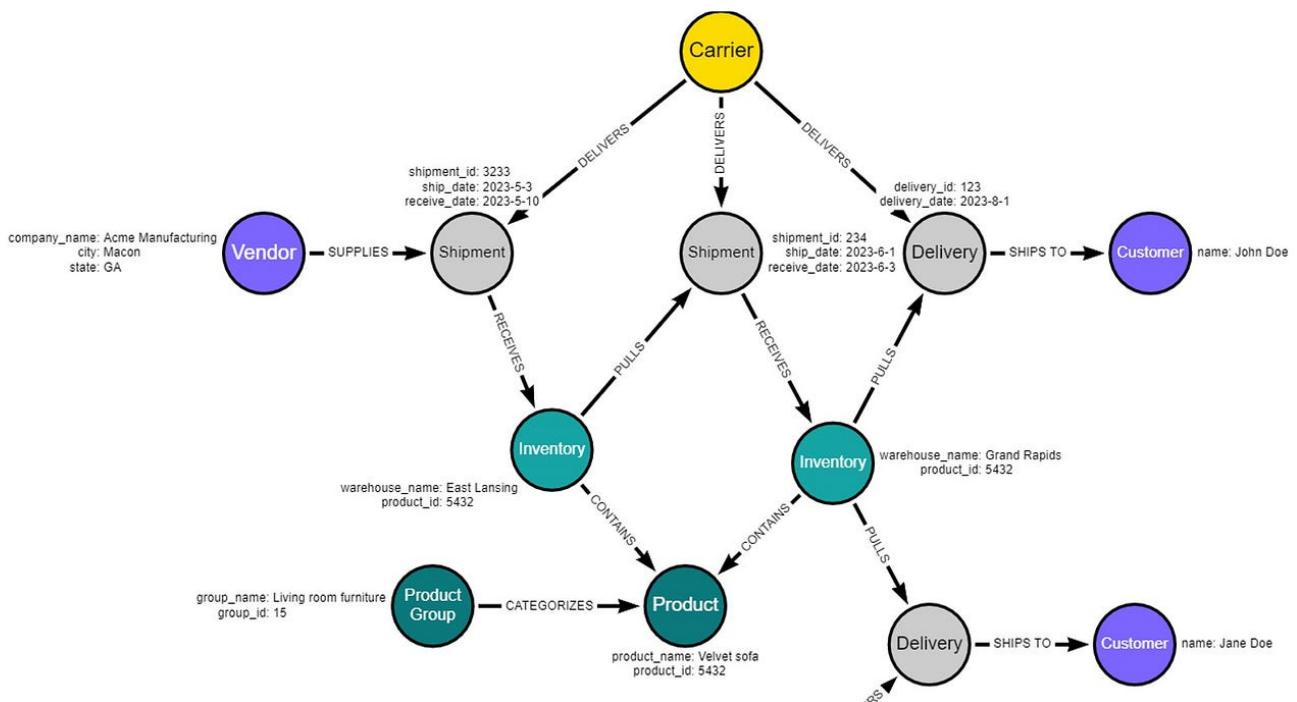


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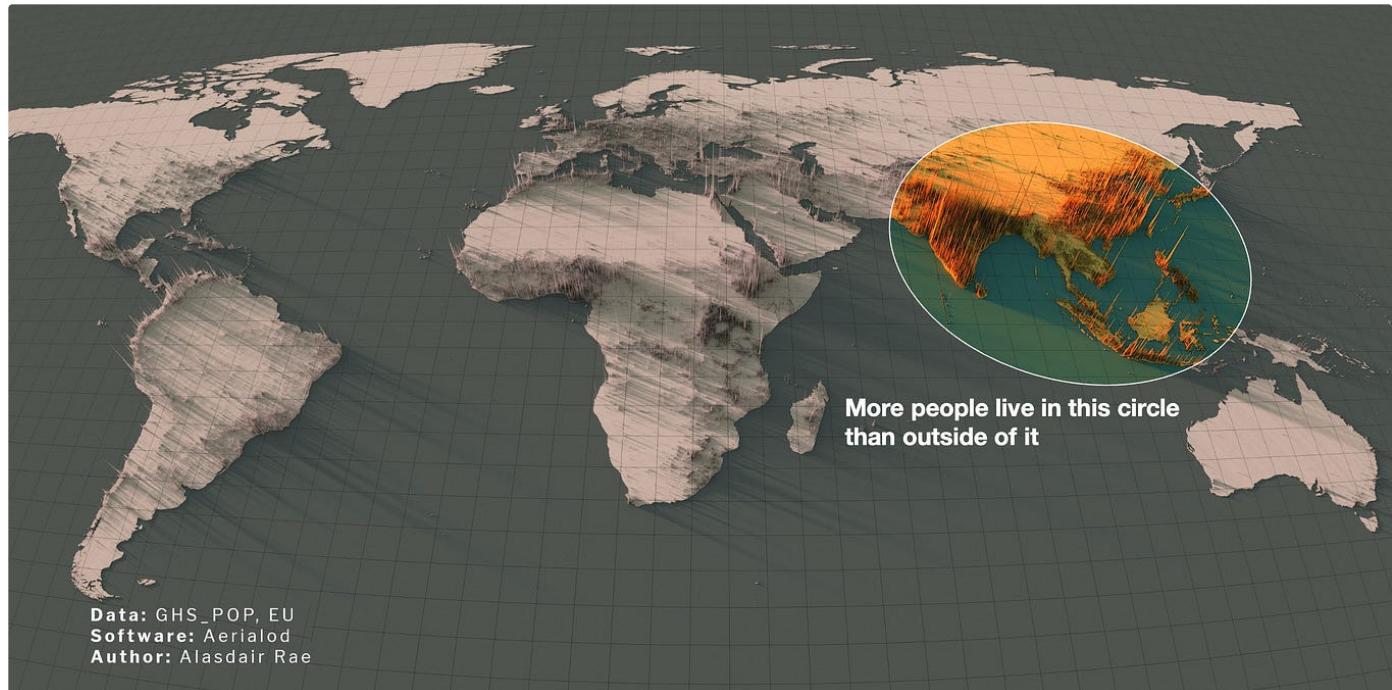
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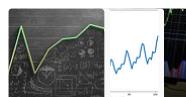
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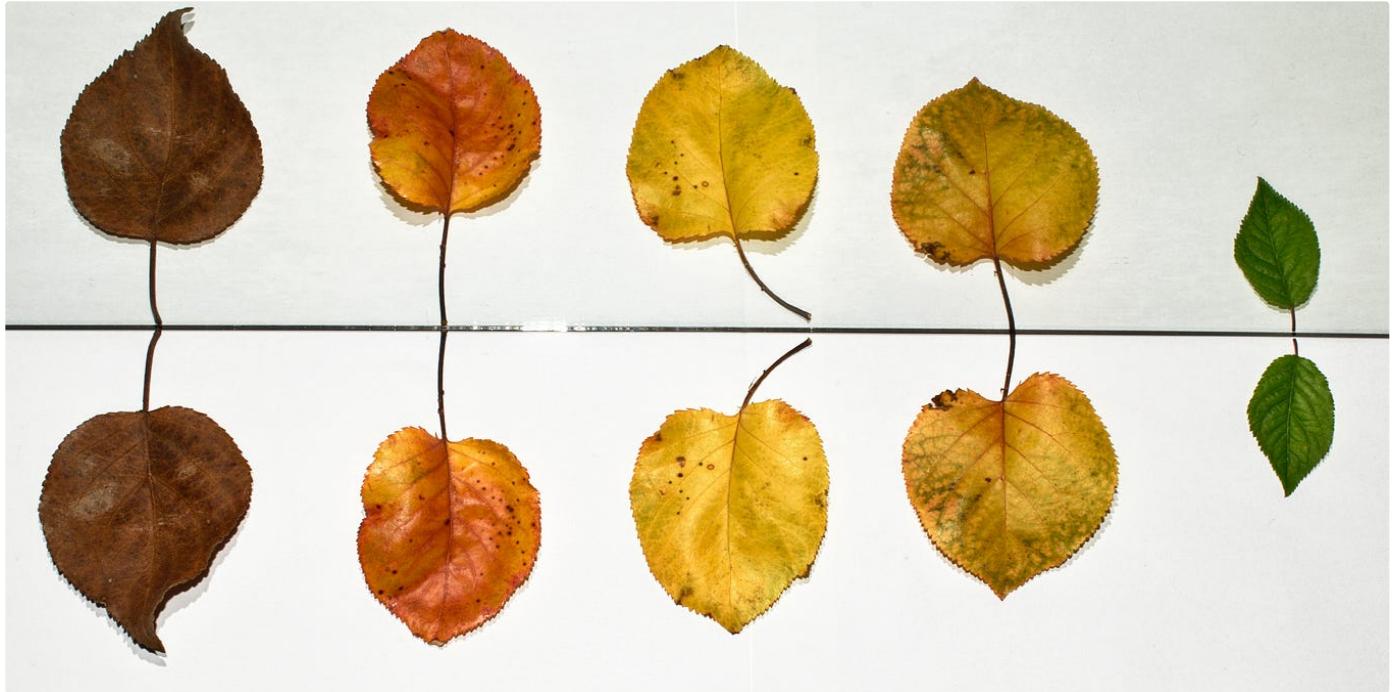
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