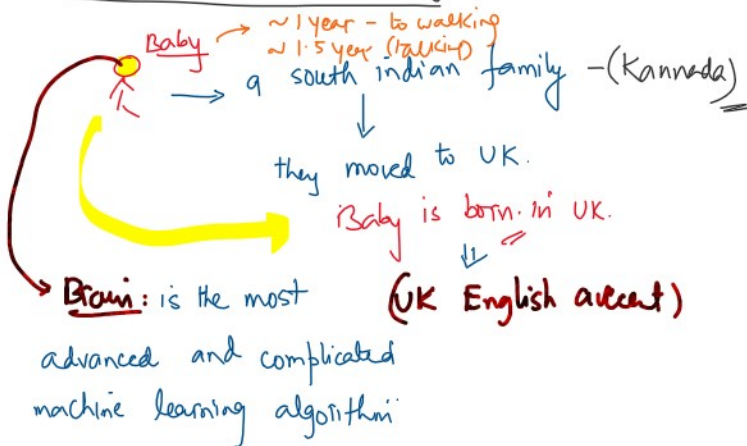


Overview - Machine Learning

14 December 2023 07:11

Introduction to Machine learning:



Driving: a skill.

Basic: cycling



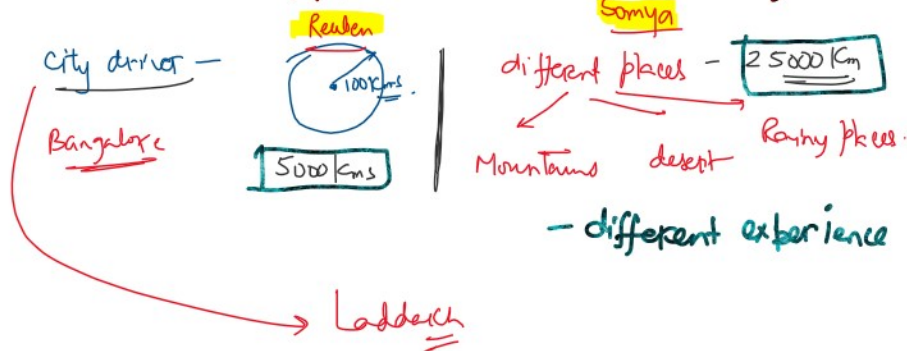
a couple of days
(a complicated thing)



a few weeks

Music → little distracted
↓
still driving like Michael.

— **ENVIRONMENT** — is the common factor.



Bias vs Variance → (Robustness of the model)

EXPERIENCE

— abundant datasets

+

ENVIRONMENT

— input features 30% feature engineering

- abundant datasets

40-50% data prep

- input features

30% feature engineering

a better machine learning model.

↓
(Performance)

chat GPT : Generative Pre-trained Transformers

↳ trained on billions of data points

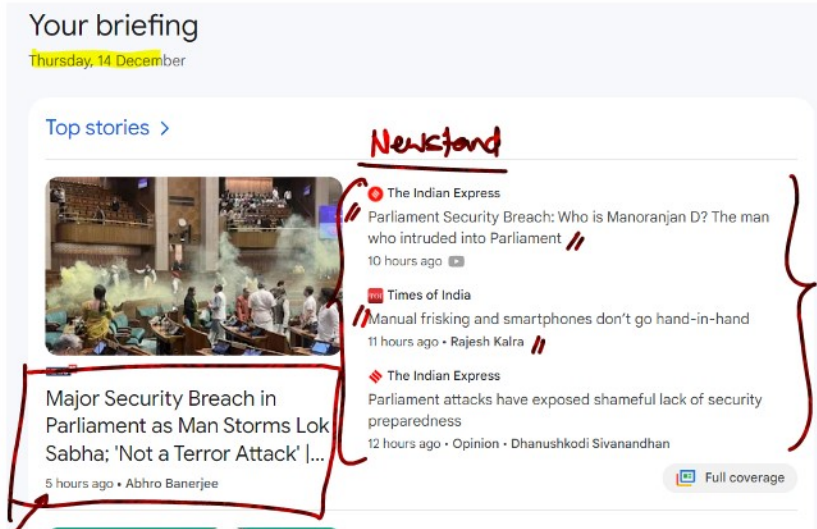
[Machine learning #101 ~ 8th grade]

Google News

Your briefing
Thursday, 14 December

Top stories >

Newsfeed



Major Security Breach in Parliament as Man Storms Lok Sabha; 'Not a Terror Attack' [...]
5 hours ago • Abhiro Banerjee

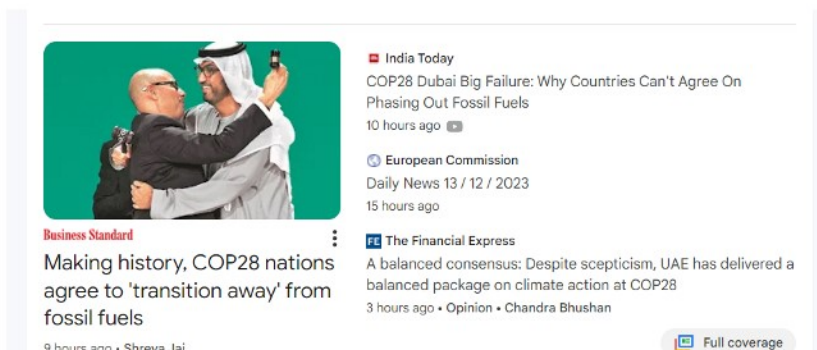
Parliament Security Breach: Who is Manoranjan D? The man who intruded into Parliament
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Manual frisking and smartphones don't go hand-in-hand
11 hours ago • Rajesh Kalra

Parliament attacks have exposed shameful lack of security preparedness
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Full coverage

NLP + clustering



Making history, COP28 nations agree to 'transition away' from fossil fuels
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COP28 Dubai Big Failure: Why Countries Can't Agree On Phasing Out Fossil Fuels
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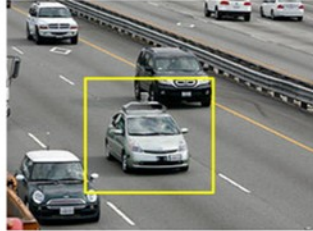
Daily News 13 / 12 / 2023
15 hours ago

A balanced consensus: Despite scepticism, UAE has delivered a balanced package on climate action at COP28
3 hours ago • Opinion • Chandra Bhushan

Full coverage

Autonomous Cars

Autonomous Cars



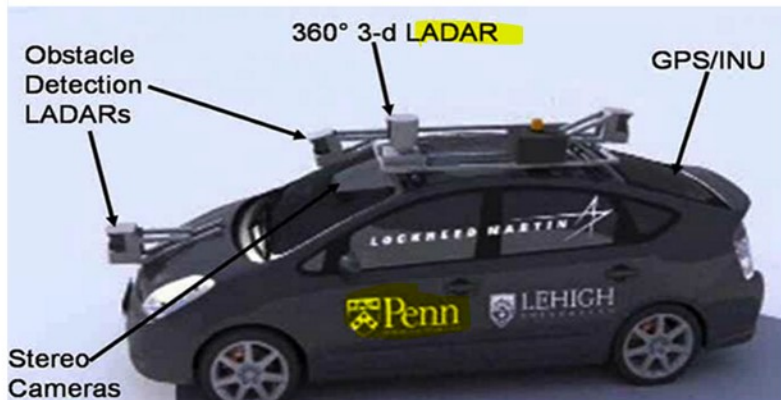
- Nevada made it legal for autonomous cars to drive on roads in June 2011
- As of 2013, four states (Nevada, Florida, California, and Michigan) have legalized autonomous cars

Penn's Autonomous Car →
(Ben Franklin Racing Team)



12

Autonomous Car Sensors



(SONAR)

Trending / Technology / Can Bat Sonar Inspire Better Self-Driving Cars?

DEC 13, 2017 4:50 PM PST

Share

Can Bat Sonar Inspire Better Self-Driving Cars?

WRITTEN BY: [Julia Travers](#)

2

Along with some whales, dolphins, porpoises and birds, bats use a special navigation system called **echolocation**. This special skill set is a **natural form of sonar**, in which they rely on their hearing to navigate and find things in the dark. Cars with park-assist and **rear-bumper detection systems** also **rely on sonar**. One of the most interesting things bats can do with these skills is move in large groups without hitting each other, and that's something self-driving cars need to be able to do as well. A group of scientists from **Saint Mary's College in Indiana** are

hearing to navigate and find things in the dark. Cars with park-assist and rear-bumper detection systems also rely on sonar. One of the most interesting things bats can do with these skills is move in large groups without hitting each other, and that's something self-driving cars need to be able to do as well. A group of scientists from Saint Mary's College in Indiana are studying how bats travel in groups so effortlessly.



India Traffic
↓
(Bangalore)
∞
i

What is Machine Learning?

"Learning is any process by which a system improves performance from experience."

- Herbert Simon

Definition by Tom Mitchell (1998):

Machine Learning is the study of algorithms that

- improve their performance P
- at some task T
- with experience E .

A well-defined learning task is given by $\langle P, T, E \rangle$.

(Google scholar)

Spam mail detection

T: Categorize email messages as spam or legitimate.

P: Percentage of email messages correctly classified.

E: Database of emails, some with human-given labels

Ham vs spam
↓
(not a spam)

Gmail { Junk mail
spam mail } vs { Primary
Social
Promotions }

Gmail latest feature

Use Smart Compose

You can let Gmail help you write emails faster. The Smart Compose feature is powered by machine learning and will offer suggestions as you type.

Note: Smart Compose is a Google Account-level setting. Changes to Smart Compose settings are applied on any device where your account is signed in.

* Gmail — Gemini *

Alexa → Amazon //

Smart watches // Mobile — Amazing ML use-cases
(10,000 steps) — 10 days

ML course flow

Supervised ML Technique

- Linear Regression
- Logistic Regression
- Decision Trees
- Random Forest

- Miscellaneous topics

Time-Series

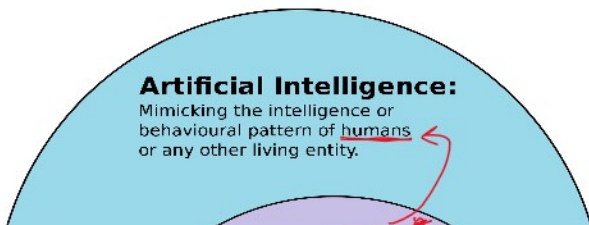
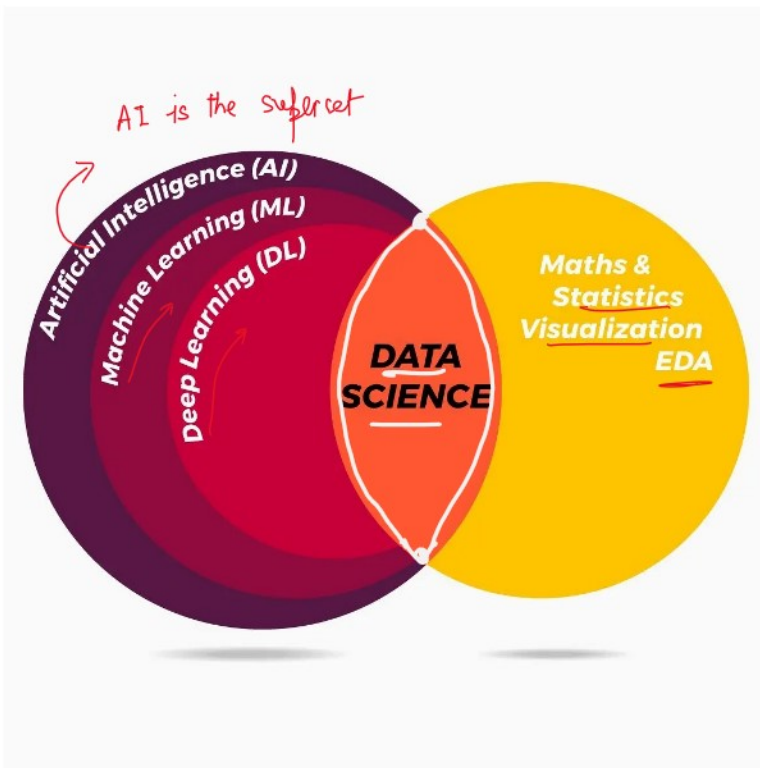
Unsupervised ML Technique

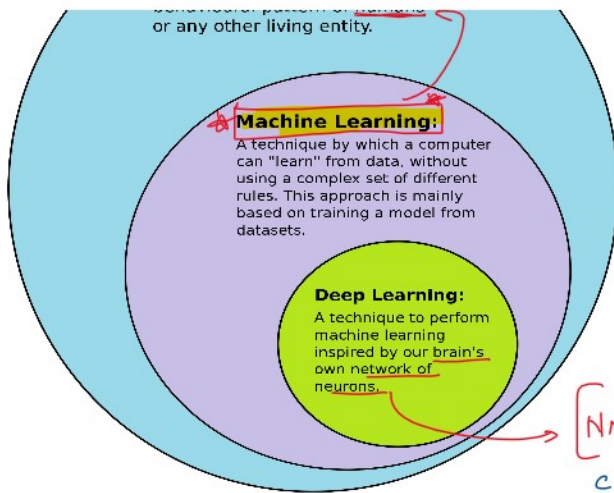
- K-Means clustering
- Hierarchical clustering
- Association Rule: (Linear Algebra)
- PCA & LDA - (Linear Discriminant Analysis)

Principal Component Analysis

* Latest thing
Large Language Model (LLM)
↓
(Gen AI)

Data Science, ML, Deep Learning, AI





Neural Networks \leftrightarrow Human brain neurons

[NNet: Neural networks]

CNN

Key areas of Machine learning Applications

90% \rightarrow (weather forecast, weekly sales, fraud detection)

Prediction — Machine learning can also be used in the prediction systems. Considering the loan example, to compute the probability of a default, the system will need to classify the available data in groups.

Image recognition — Machine learning can be used for face detection in an image as well. There is a separate category for each person in a database of several people.

Speech Recognition — It is the translation of spoken words into the text. It is used in voice searches and more. Voice user interfaces include voice dialing, call routing, and appliance control. It can also be used a simple data entry and the preparation of structured documents.

Medical diagnoses — ML is trained to recognize cancerous tissues.

Financial industry and trading — companies use ML in fraud investigations and credit checks.

(Phishing scams)

HP Inc — Internal Auditor / Data Scientist

(\$500K \rightarrow \$1M - fraud)

Fraud prevention data science

Attending a wedding — different city

credit card \rightarrow ICICI

shift in geo location

Bangalore

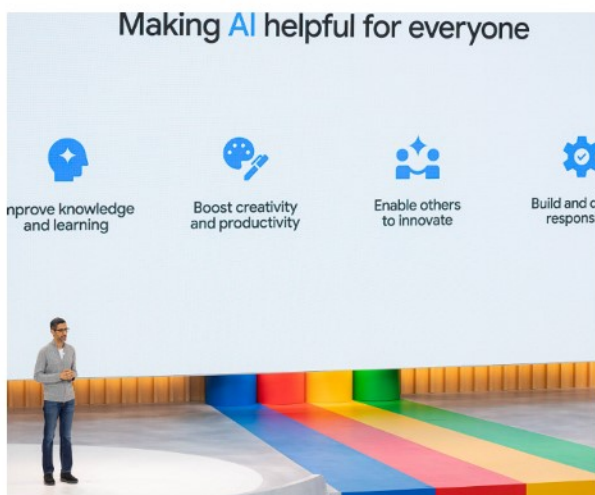
IP Address

POS system

automated call

assigned to customer exec.

APR

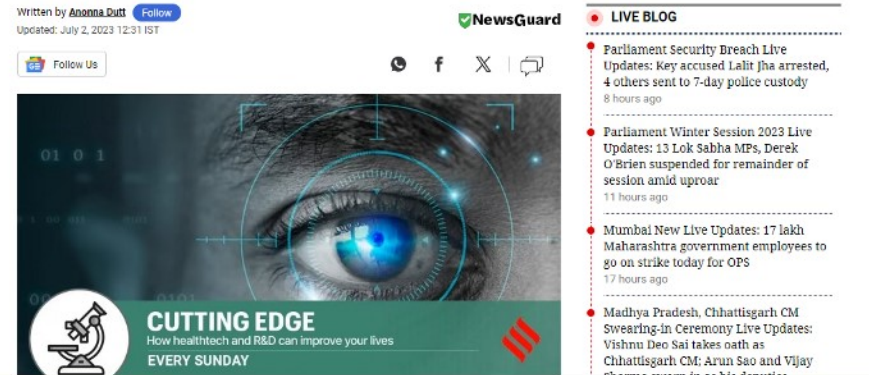


News / Health And Wellness / Google AI tool for retinal scan can predict cardiovascular risk

Premium

Google AI tool for retinal scan can predict cardiovascular risk

The technology could reveal the heart's health condition after matching the eye scans with a matrix for cardiovascular risks. The algorithm has proved to be correct in 70 per cent of the cases where it has been tested so far.



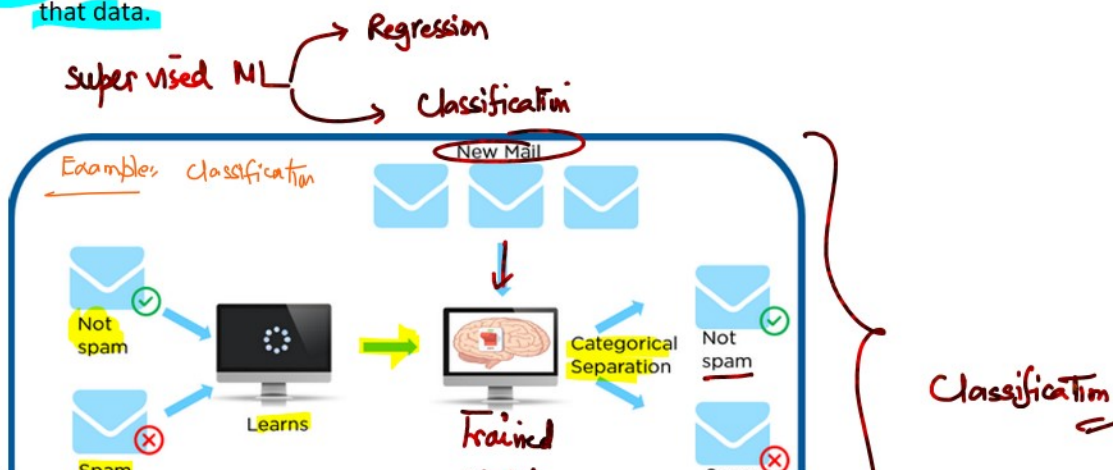
Types of ML:

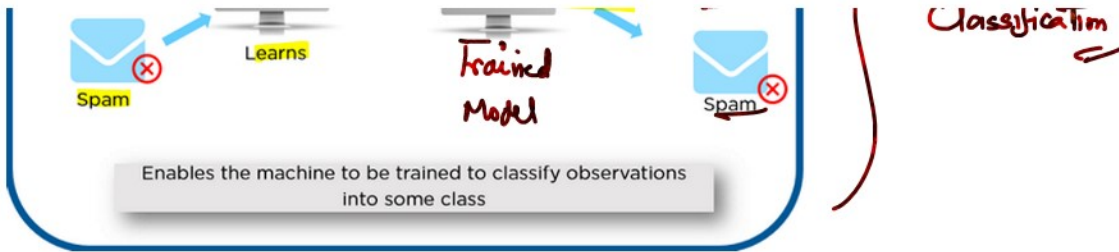
- ① supervised ML
- ② Unsupervised ML
- ③ Semi-supervised ML
- ④ Reinforcement learning

Overview of Supervised Learning Algorithm

In Supervised learning, an AI system is presented with data which is **labelled**, which means that each data tagged with the correct label.

The goal is to approximate the mapping function so well that when you have new input data (x) that you can predict the output variables (Y) for that data.





Mail → sender of the mail, subject of the mail, salutation, opening statement, suspicious links, & xxxxxx &?



In case, the model is doubtful about its accuracy -

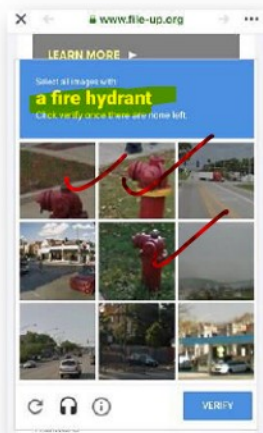


(is it a spam?) → validation with user.



so that the model gets trained in real time.

Who knows we are already training a machine...



www.intellipaat.com

Machine works better with more data...



Types of supervised learning

Regression: A regression problem is when the output variable is a real value, such as "dollars" or "weight".

Classification: A classification problem is when the output variable is a category, such as "red" or "blue" or "disease" and "no disease".

Chance of rain 80.000154.
80%
100%
Continuous

Audi Show room → Dec'23, Jan'24, Feb'24, Mar'24
⊗ → 5 7 10 20
↓ Classification

Audi car - latest model → Y N N Y : classification

$$Y = \beta_0 + \beta_1 X : \text{Linear Regression}$$

depends on X

continuous real value → Regression

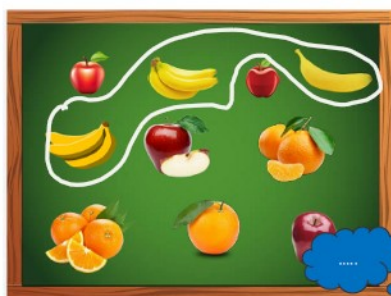
categorical value → Classification

Overview of Unsupervised Learning Algorithm

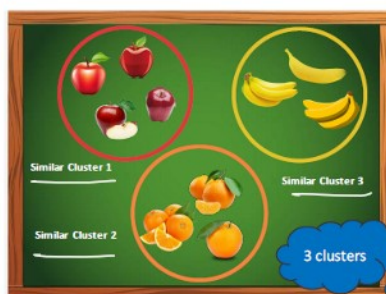
In unsupervised learning, an AI system is presented with unlabeled, uncategorized data and the system's algorithms act on the data without prior training. The output is dependent upon the coded algorithms. Subjecting a system to unsupervised learning is one way of testing AI.

clustering algorithm

2. Unsupervised Learning



2. Unsupervised Learning





Google News



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Full coverage

Types of Unsupervised learning

- **Clustering:** A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior. *→ (how much you earn)*
- **Association:** An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

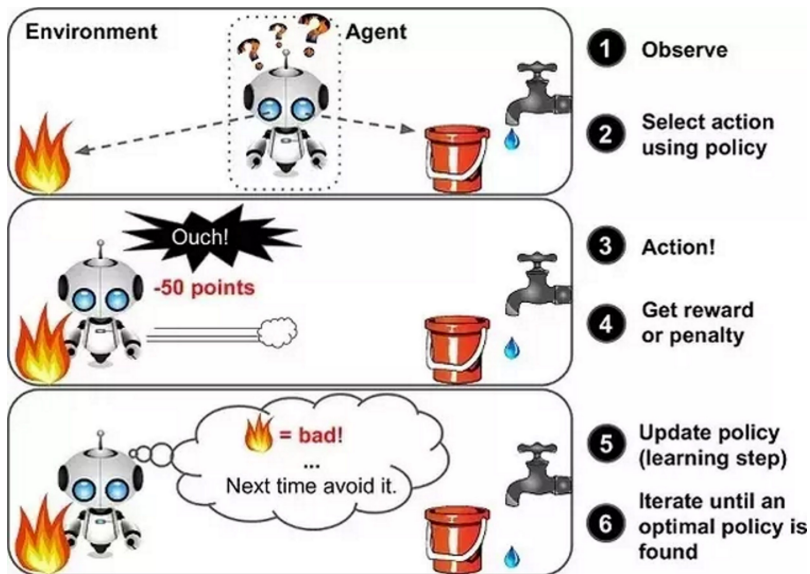


Toothpaste ↔ Tooth Brushes

↳ colgate → (Combo pack)

[Lizol + Harpic + Dettol]

- A reinforcement learning algorithm, or agent, learns by interacting with its environment.
- The agent receives rewards by performing correctly and penalties for performing incorrectly.
- The agent learns without intervention from a human by maximizing its reward and minimizing its penalty. It is a type of dynamic programming that trains algorithms using a system of reward and punishment.



Reinforcement learning used for self-driving cars. Reinforcement learning (RL) is a type of machine learning where an agent learns by exploring and interacting with the environment. In this case, the self-driving car is an agent.

[Reinforcement Learning example #deeplearning #shorts](#)

