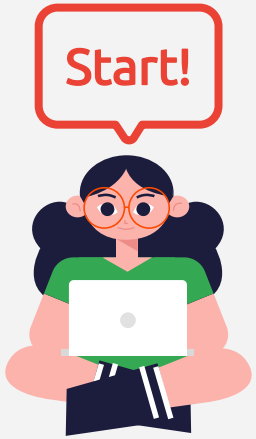
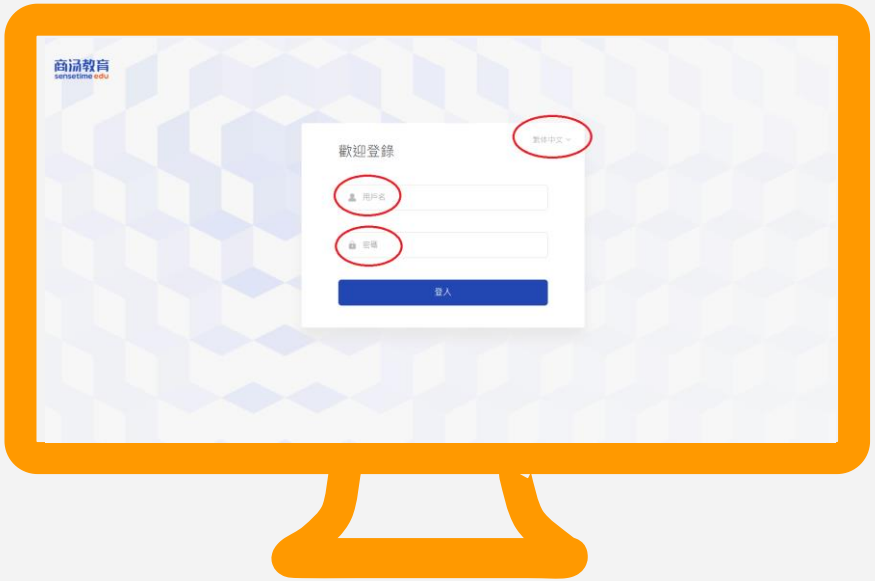
商汤 sensetime

SenseTime AI Education

Secondary School AI Course Curriculum



Preparations



Training Notes Download:

https://cutt.ly/Un0sQV9

Login Platform Website:

https://hk.study.sensetime.com/abc/login

Username: chappie20 ~ chappie39

Password: SenseStudy123

M T X T F

Lesson Topics

- 1. SenseStudy Chapter 6
- 2. SenseStudy Chapter 7
- 3. IOT & IFTTT
- 4. Computer Vision/Image Processing
- 5. Big Data and Cloud Computing

1. SenseStudy Chapter 6

Basic concepts:

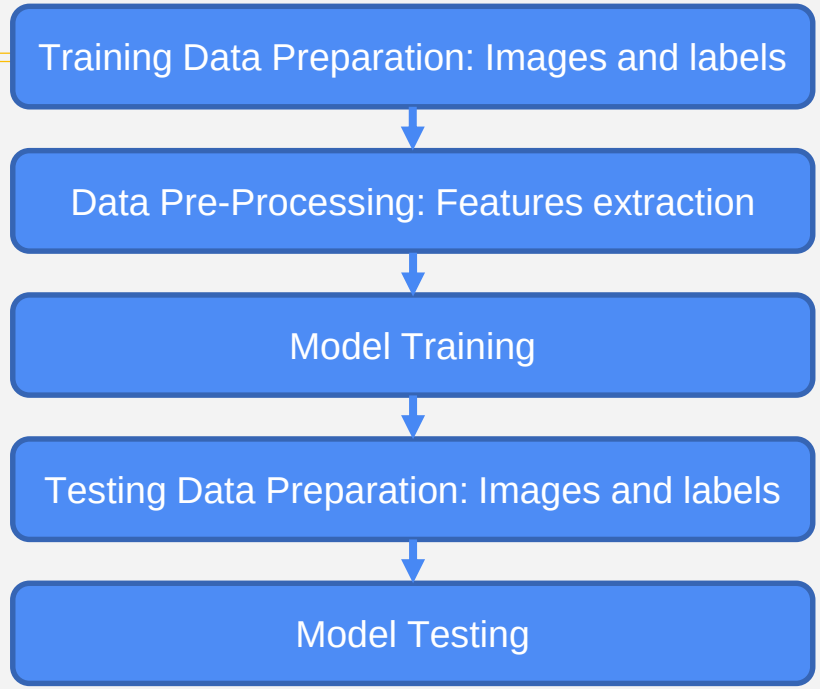
Python string
Python list
Python dictionary

Chapter 6 project:

Smart articles difficulty analysis by linear classification

Experiment 6.1 Python Codes
Experiment 6.2 Python Codes
Experiment 6.3 Python Codes
Experiment 6.4 Python Codes
Experiment 6.5 Python Codes
Experiment 6.6 Python Codes
Experiment 6.7 Python Codes

Procedure



Feature in this application:

The words occurrence frequency of different difficulty levels in an article

2. SenseStudy Chapter 7

Experiment 7.1 Python Codes
Experiment 7.2 Python Codes
Experiment 7.3 Python Codes
Experiment 7.4 Python Codes
Experiment 7.5 Python Codes
Experiment 7.6 Python Codes

3. IOT & IFTTT

IOT & IFTTT

3. IOT & IFTTT

M T X T F

IoT

I = Internet
O = of
T = Things

What is IoT?

IoT refers to **the network of objects** embedded with software which will coordinate small tasks between Internet and web services.

IoT

I = Internet
O = of
T = Things

M T X T F

History of IoT

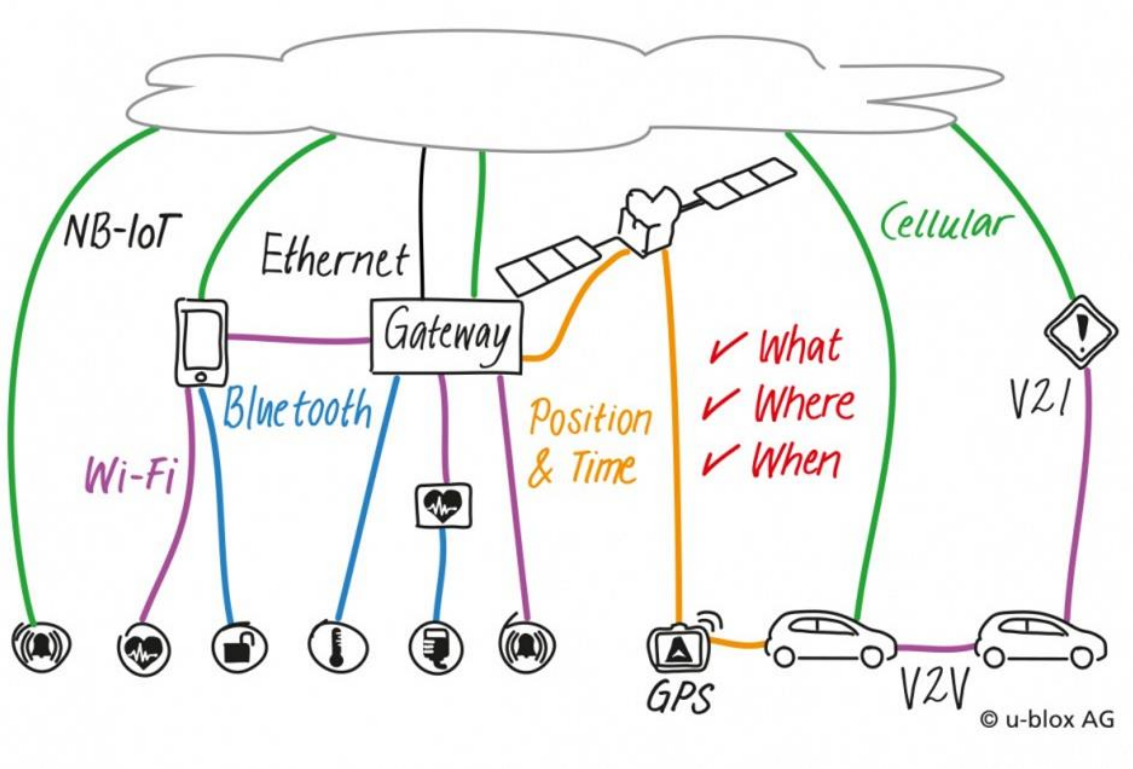
1970: The idea of connected devices was proposed.

1990: John Romkey created a toaster which could be turned on/off over the Internet.

1999: The term “Internet of Things” was proposed, with a definition “connected things / people ratio = 1”. The start of IOT era.

2010: Connected things / people ratio = 1.84

Real life applications of IoT



Characteristics of IoT

- Smart Home
- Smart Transport
- Smart Health
- Smart City
- Smart Building

- NFC (<4cm)
- Bluetooth
- RFID
- WIFI
- Ethernet
- 4G LTE
- 5G

- Flexibility
- Complexity
- Power Consumption
- Security

What about NB-IoT?

NB-IoT

NB = Narrowband

I = Internet

O = of

T = Things

M

T

X

T

F

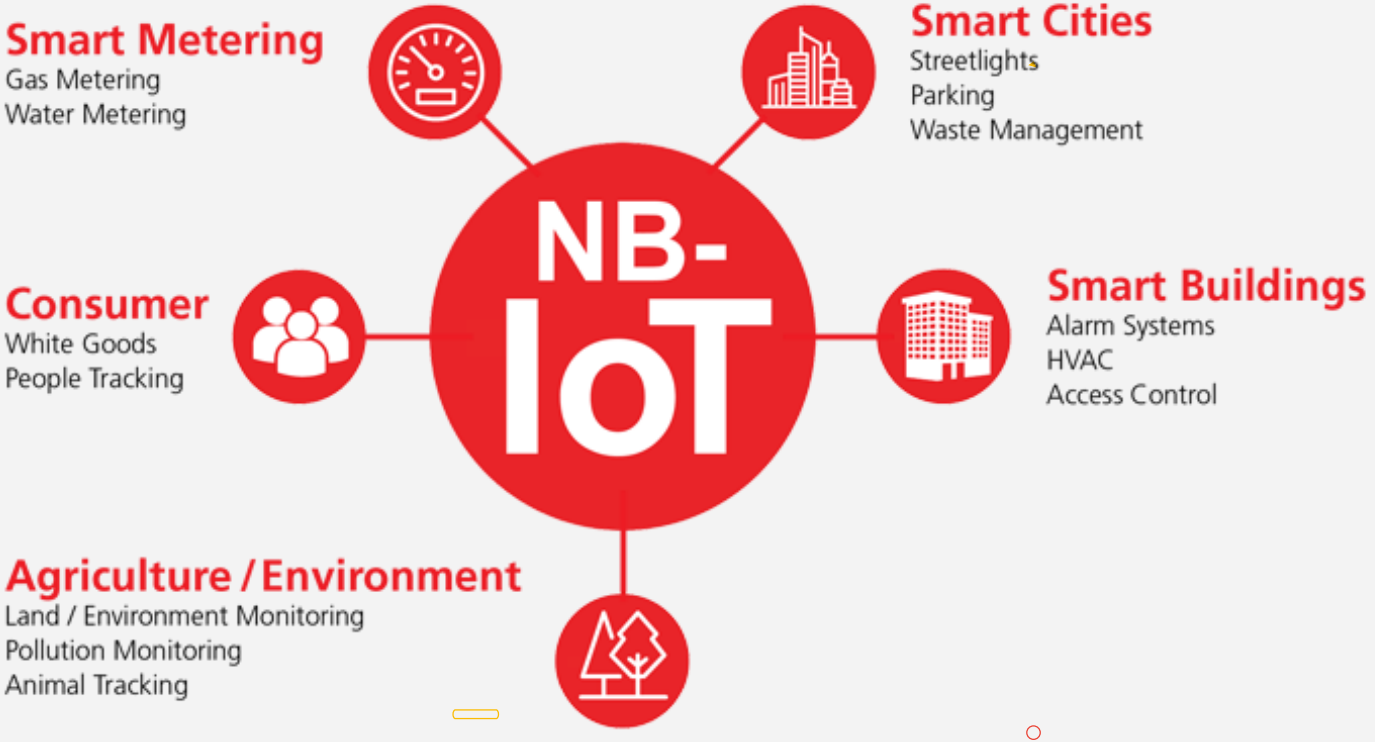
What is NB-IoT?

NB-IoT

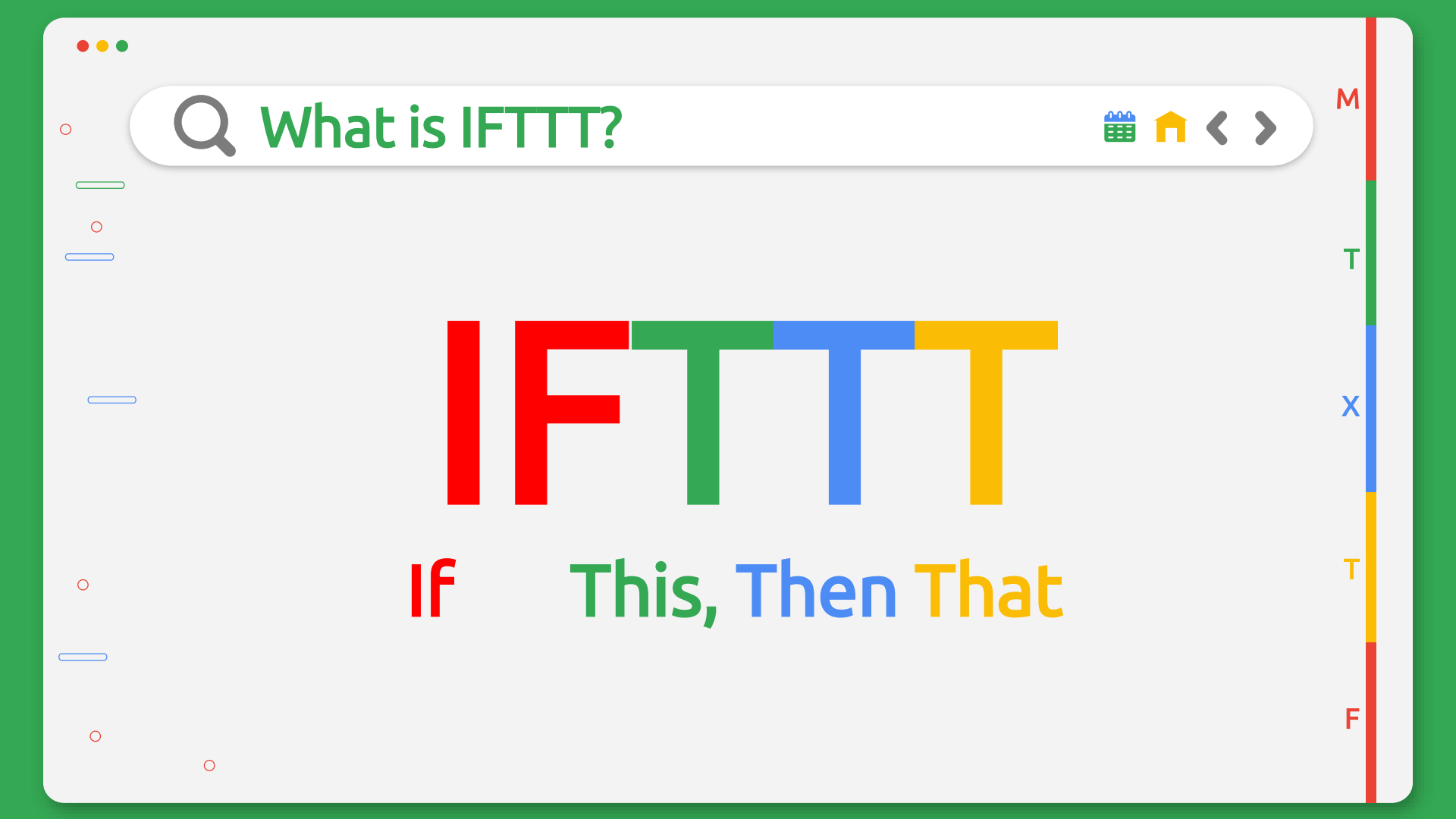
NB = Narrowband
I = Internet
O = of
T = Things

NB-IoT is a radio technology standard **to enable a wide range of cellular devices and services.**

Real life applications of NB-IoT



What is IFTTT?



What is IFTTT?

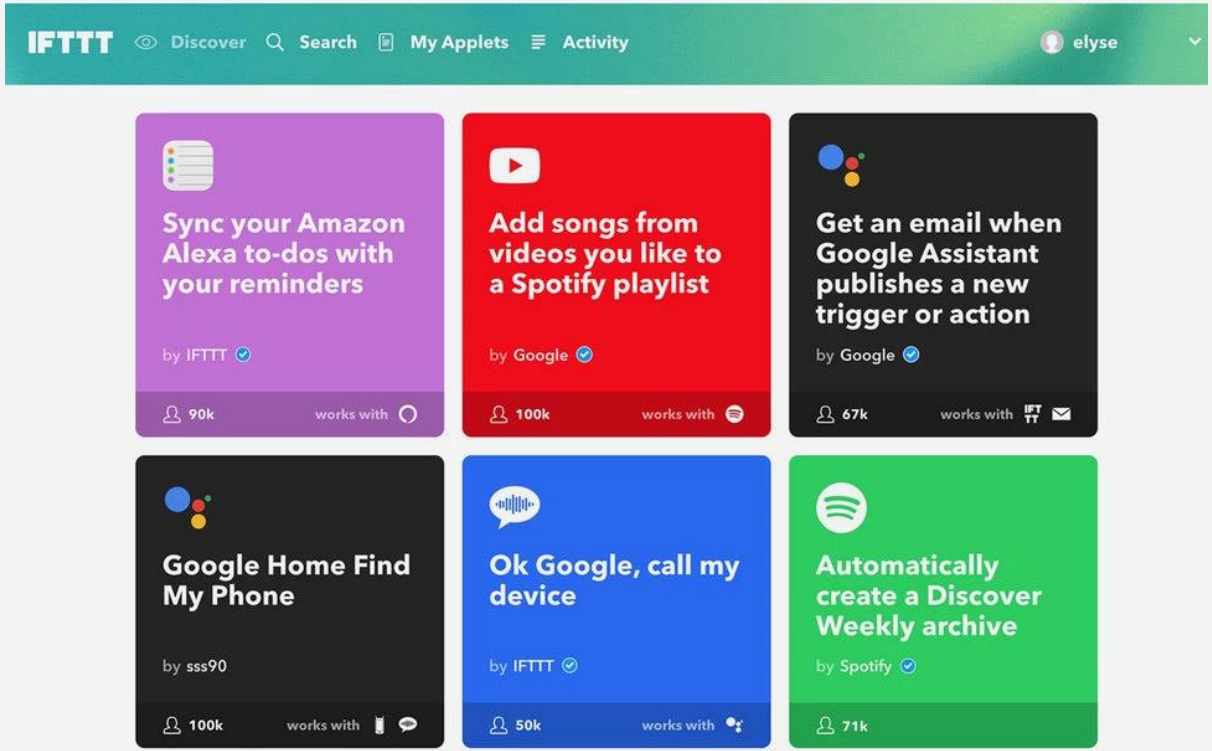
IFTTT is a free web-based service that **creates chains of simple conditional statements (= applets)**

IFTTT

If This, Then That

M T X T F

Real life applications of IFTTT



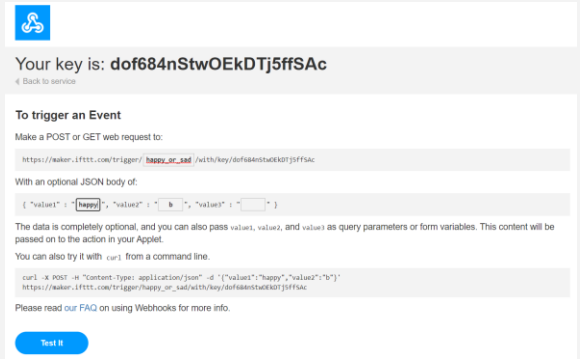
Experiment

Project: Send your current emotion to email

1. Register and log in: ifttt.com

2. Create a new Applet with Webhooks module for “If This” and Email module for “Then That”. In the Email module setup, Subject: Hello from AI Robot
Body: At: {{OccurredAt}}
You are {{Value1}}.

3. Test it first on the website. And then enjoy your application in SenseStudy with codes.



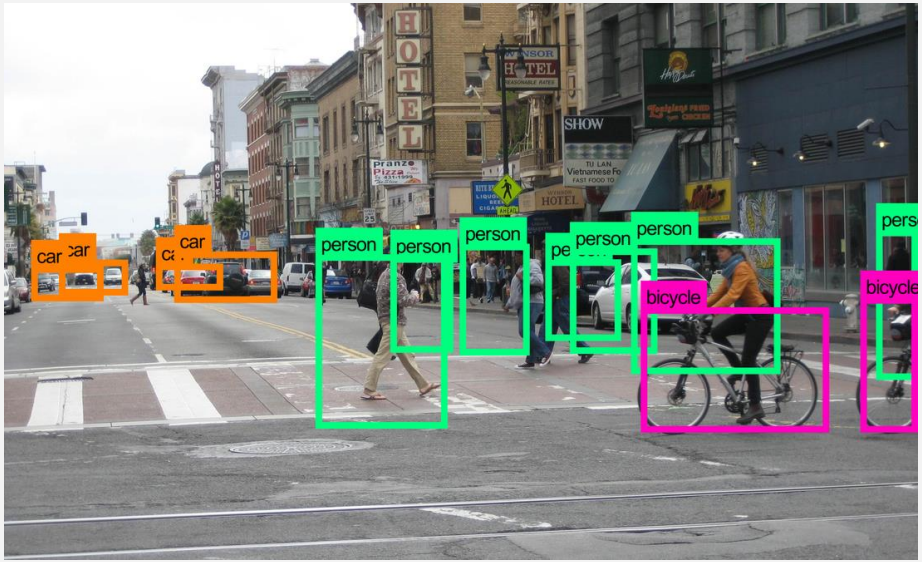
4. AI Real Life Applications

Computer Vision/ Image Processing

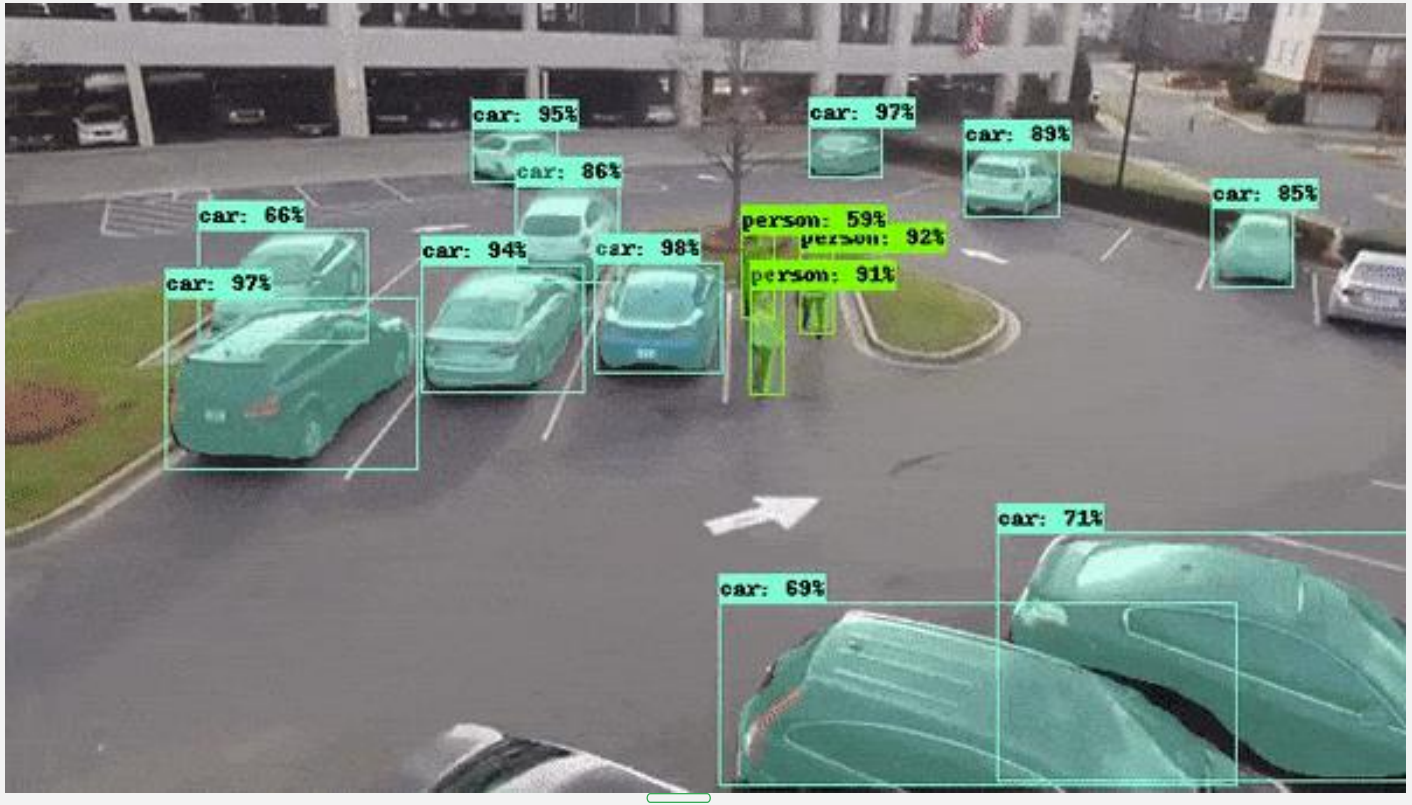
What are the differences?

Computer Vision

When a 2D image is given, the computer **recognizes its traits** in order to provide a description of the image as accurate as possible.



Computer Vision: Applications



What are the differences?

Image Processing

Usually, the goal is to **improve the quality/ change the "look" of images** or to prepare them as an input for a specific task.

Image Processing: Applications

For example:

- Noise reduction
- Contrast adjustment
- Photo rotation
- Brightness adjustment
- Colour filters etc...

Experiment

Project: Wearing a Hat on Your Head

1. Open a blank experiment on your Sensestudy platform.

2. Copy & Paste the following codes onto the edit environment of SenseStudy.

3. Try and have fun!

Experiment (Cont'd)

Imported libraries in the codes:

cv2: OpenCV library, proposed by Intel. For computer vision processing.

dlib: It consists of popular machine learning algorithms, such as classification, regression, clustering and data processings.

imutils: basic image processing functions, such as rotation, resizing

matplotlib: create interactive visualizations

5. Big Data and Cloud Computing

Data VS Big Data

What is Data?

= **facts and statistics** collected together for reference or analysis.

Data VS Big Data

What is Big Data?

a collection of data with **extremely large size** that **none** of the traditional data management tools can process it efficiently.

Characteristics of Big Data

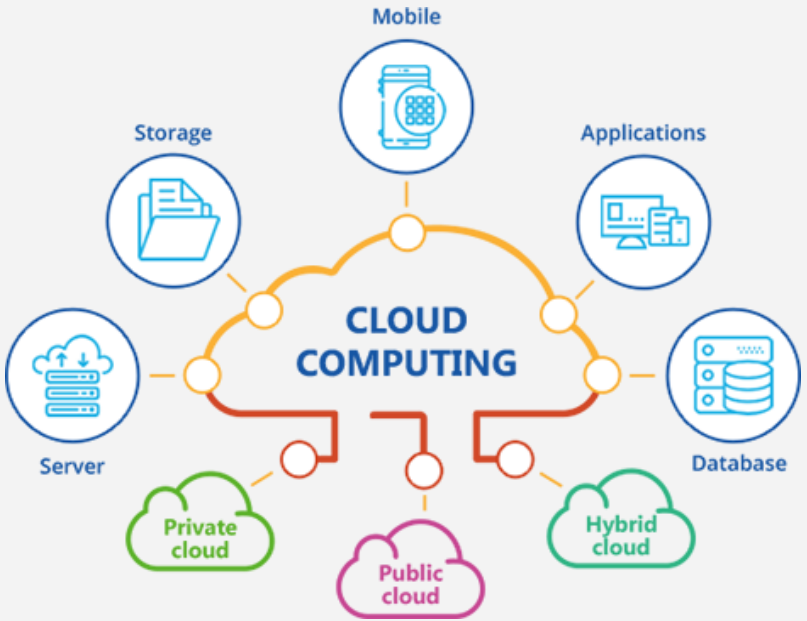
What is Cloud Computing?

What is Cloud Computing?

= **storing and accessing of data** over the internet to give access to data centers to many users. Users can also access data from a remote server.

Benefits of Cloud Computing

- Improved performance
- Fewer Maintenance issues
- Instant software updates
- Improved OS compatibility
- Easier backup and recovery
- Increased storage capacity
- Increased data safety



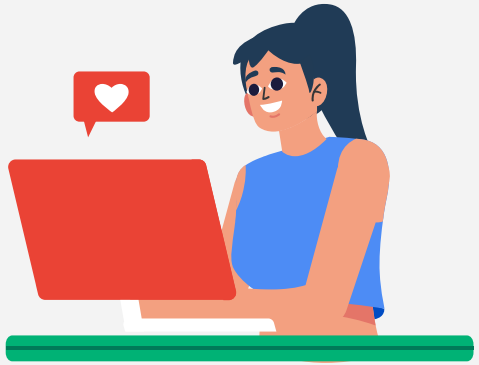
Cloud Computing Services

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

1 2 3 4

SaaS (Software as a Service)

Traditionally, software application needed to be purchased upfront &then installed it onto your computer.



SaaS users on the other hand, instead of purchasing the software subscribes to it, usually on monthly basis via internet.

PaaS (Platform as a Service)

- PaaS provides a platform for developers to build applications and services. This service is hosted in the cloud and accessed by the users via internet.

IaaS (Infrastructure as a service)

- Lastly, IaaS offers the complete package for computing.
- For small businesses who are looking for save cost on IT infrastructure, IaaS is the solution.

Experiment I

Project: Train your own model on Teachable Machine from Google. And implement it on SenseStorm.

We will explore the fun features of Google's teachable machine, and then further combine it with our SenseStorm.

Navigate to Teachable machine's page and explore the three categories:

- Image classification
- Audio classification
- Pose estimation

Experiment I (Cont'd)

There will be several hyperparameters during your training process.

Epochs
Epochs stands for how many times your sample data have been gone through by your model.
The larger the epochs, the longer the training time may it consumes.

Batch Size
Your data will be split into several batches to feed your model. Batch size stands for how large would each batch be.

Learning Rate
The learning rate may be the most important hyperparameter when configuring your neural network. Therefore it is vital to know how to investigate the effects of the learning rate on model performance and to build an intuition about the dynamics of the learning rate on model behavior.

Experiment I (Cont'd)

Export your models onto SenseStorm

1. After playing around with Teachable Machine, we need to implement the models on SenseStorm.

2. Copy the two trained model files from your laptop to SenseStorm via a USB key. And download a python file TM2_tflite.py to run the AI application with the model.

3. Run *python TM2_tflite.py* on your SenseStorm.

Experiment II

Project: MNIST experiment on Cloud Computing Platform: Google Colab Notebook

We will explore an experiment on a popular cloud computing platform: Google Colab Notebook

Please copy & paste the following codes into your Colab environment.

Then use your cloud GPU machine to execute the codes.

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The End

Thank you for listening!