

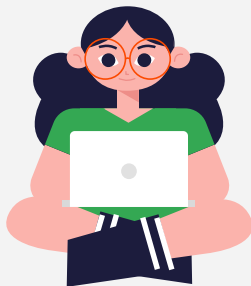


# SenseTime AI Education



Secondary School AI Course Curriculum

Start!



# Preparations



Training Notes Download:

<https://cutt.ly/Un0sQV9>

Login Platform Website:

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

Username: chappie20 ~  
chappie39

Password: SenseStudy123

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## Lesson Topics



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

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# 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](#)

# Q Procedure

Training Data Preparation: Images and labels



Data Pre-Processing: Features extraction



Model Training



Testing Data Preparation: Images and labels



Model Testing

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](#)



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## IOT & IFTTT



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# IOT & IFTTT



3.

## IOT & IFTTT



# IOT

I = Internet

O = of

T = Things

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# 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

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# 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.



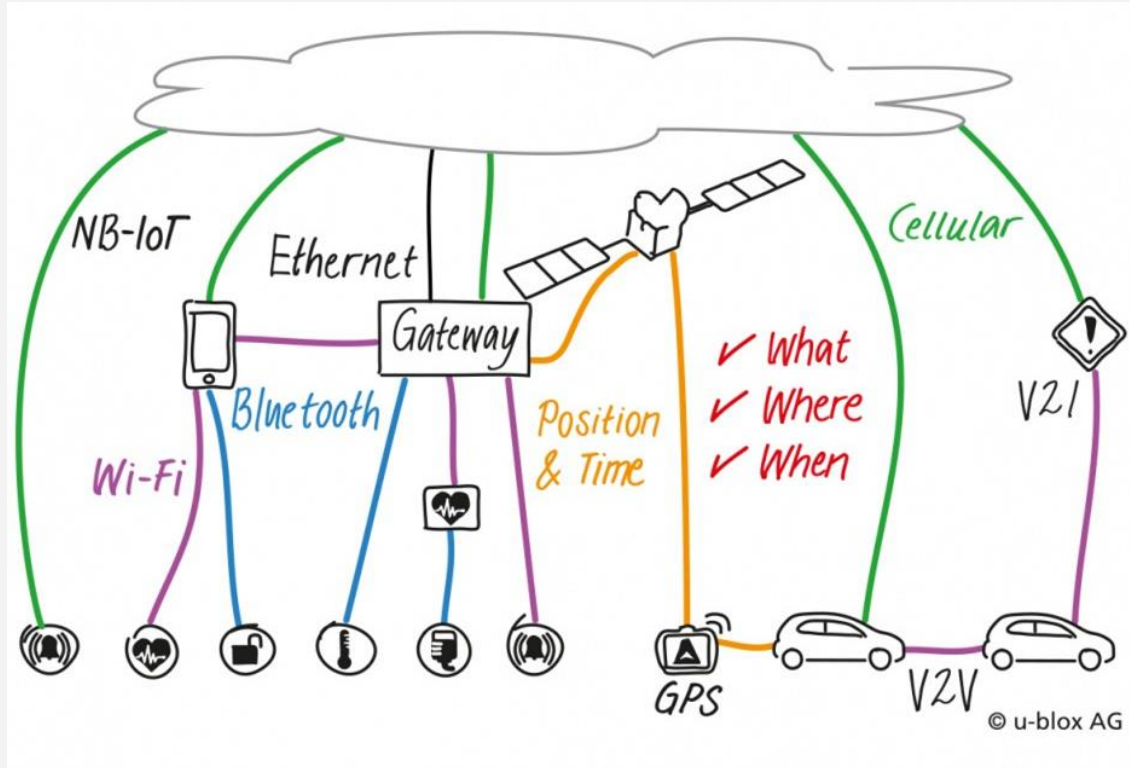
1999: The term “Internet of Things” was proposed, with a definition “connected things / people ratio = 1”. The start of IOT era.



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

# 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.

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# Real life applications of NB-IoT



## Smart Metering

Gas Metering  
Water Metering



## Smart Cities

Streetlights  
Parking  
Waste Management

## Consumer

White Goods  
People Tracking



**NB-  
IoT**



## Smart Buildings

Alarm Systems  
HVAC  
Access Control

## Agriculture / Environment

Land / Environment Monitoring  
Pollution Monitoring  
Animal Tracking



What is IFTTT?



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IFTTT

If This, Then That



# What is IFTTT?



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

**I****F****T****T****T**  
**If** **This, Then That**

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# Real life applications of IFTTT


The screenshot displays the IFTTT (If This Then That) website interface. At the top, there is a navigation bar with the IFTTT logo, links for 'Discover', 'Search', 'My Applets', and 'Activity', and a user profile for 'elyse'. Below the navigation bar, six applets are showcased in a grid:

- Sync your Amazon Alexa to-dos with your reminders**: Created by IFTTT, 90k users, works with Alexa and Reminders.
- Add songs from videos you like to a Spotify playlist**: Created by Google, 100k users, works with YouTube and Spotify.
- Get an email when Google Assistant publishes a new trigger or action**: Created by Google, 67k users, works with Google Assistant and Email.
- Google Home Find My Phone**: Created by sss90, 100k users, works with Google Home and Messages.
- Ok Google, call my device**: Created by IFTTT, 50k users, works with Google Assistant and Phone.
- Automatically create a Discover Weekly archive**: Created by Spotify, 71k users, works with Spotify.

# Experiment

## Project: Send your current emotion to email

1. Register and log in: [ifttt.com](https://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}}<br>You are {{Value1}}.**
3. Test it first on the website. And then enjoy your application in SenseStudy with [codes](#).



Your key is: **dof684nStwOEKDTj5ffSAc**  
[Back to service](#)

**To trigger an Event**  
Make a POST or GET web request to:

```
https://maker.ifttt.com/trigger/happy_or_sad/with/key/dof684nStwOEKDTj5ffSAc
```

With an optional JSON body of:

```
{ "values" : { "happy" : "1", "sad" : "0" }, "value1" : "1" }
```

The data is completely optional, and you can also pass `value1`, `value2`, and `value3` as query parameters or form variables. This content will be passed on to the action in your Applet.

You can also try it with `curl` from a command line.

```
curl -X POST -H "Content-Type: application/json" -d '{"values":{"happy":"1","sad":"0"},"value1":"1"}' https://maker.ifttt.com/trigger/happy_or_sad/with/key/dof684nStwOEKDTj5ffSAc
```

Please read [our FAQ](#) on using Webhooks for more info.

[Test it](#)



4.

## AI Real Life Applications



# Computer Vision/ Image Processing

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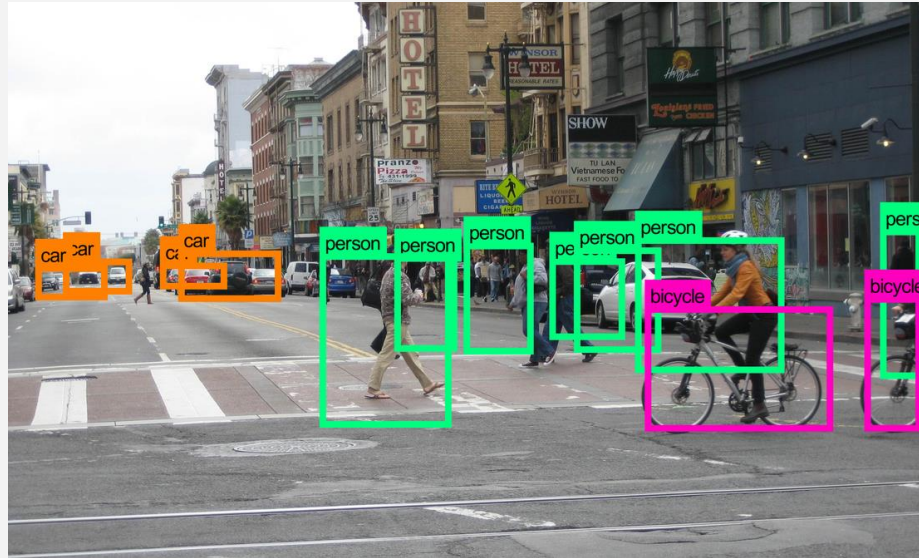
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# What are the differences?

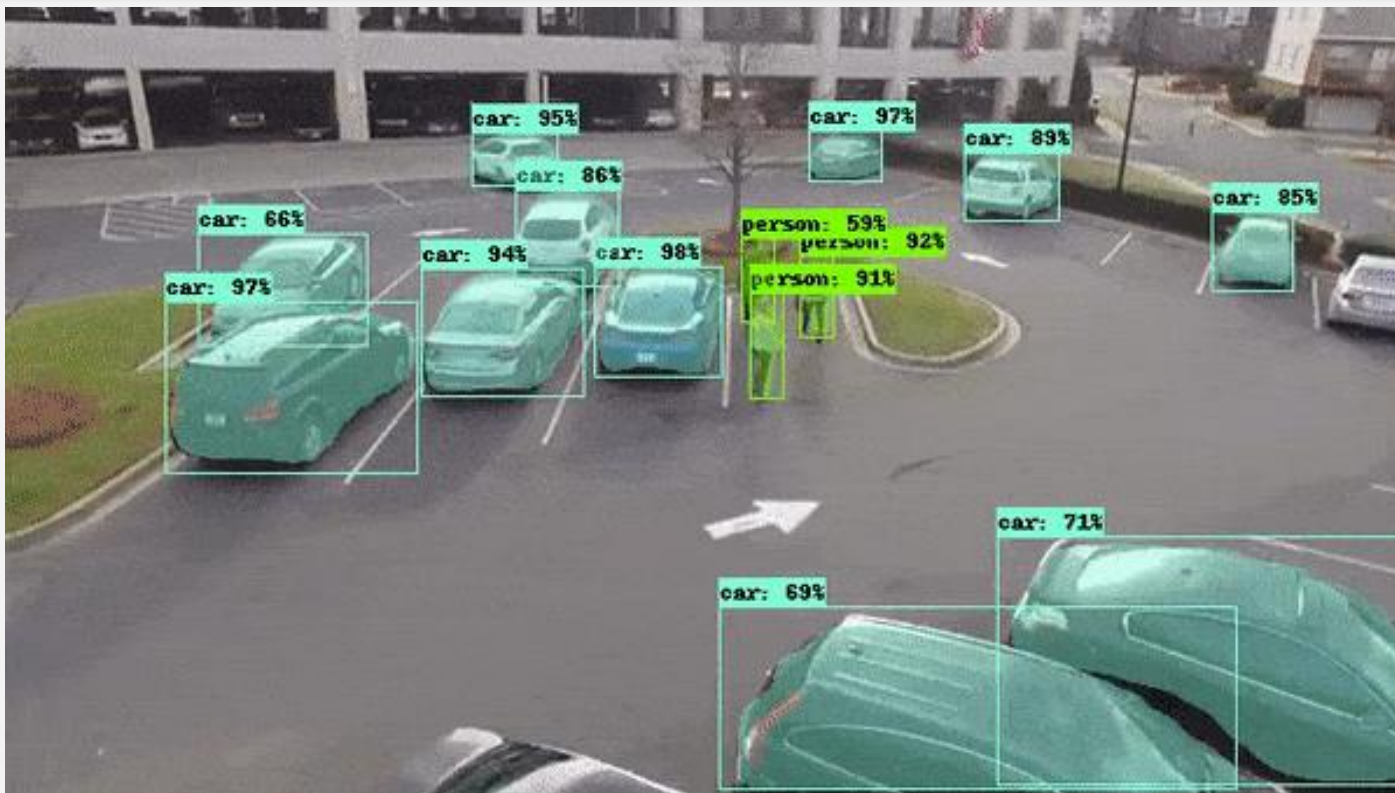


## Computer Vision

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.



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# Image Processing: Applications



For example:

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



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








# 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



Cloud Computing for Beginners



# 5. Big Data and Cloud Computing

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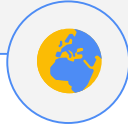
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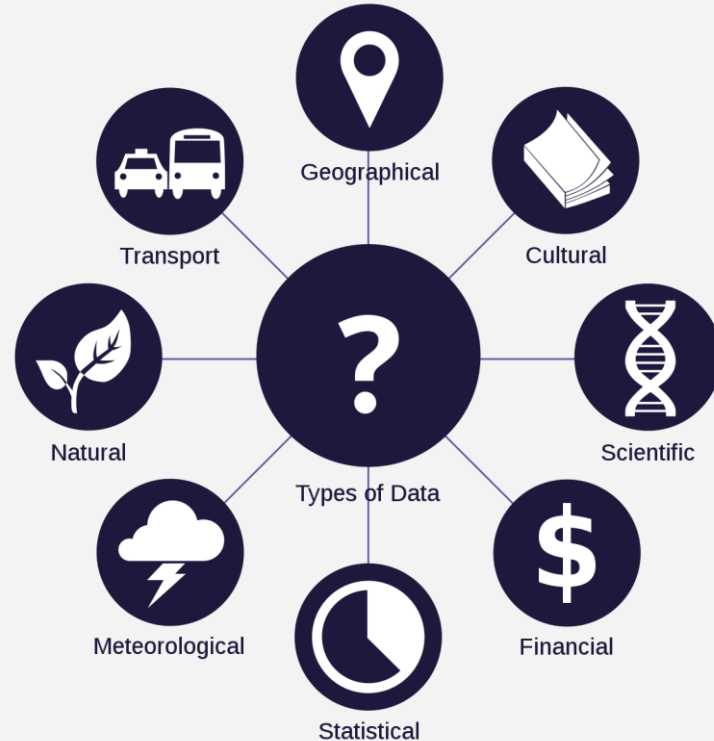
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# Data VS Big Data



## What is Data?

= facts and statistics collected together for reference or analysis.



# Data VS Big Data



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## What is Big Data?

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

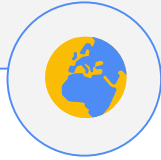


# Characteristics of Big Data





# 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.



Google Cloud

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# Benefits of Cloud Computing



Improved performance

Fewer Maintenance issues

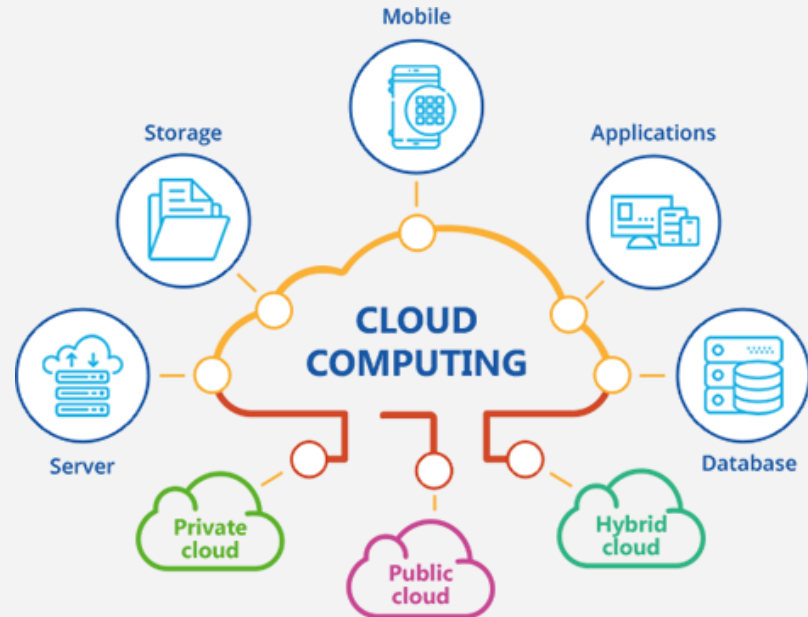
Instant software updates

Improved OS compatibility

Easier backup and recovery

Increased storage capacity

Increased data safety





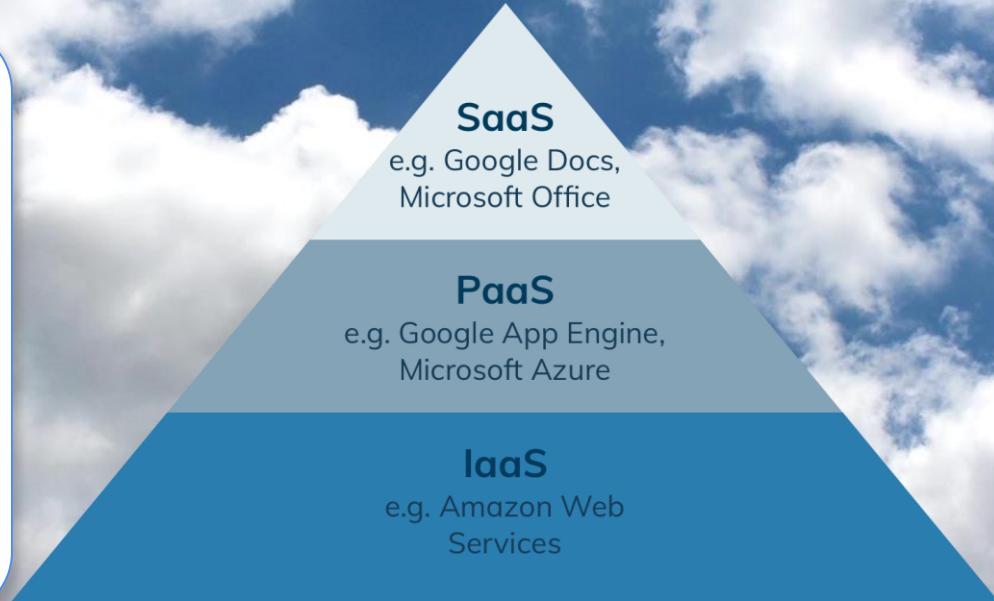
# Cloud Computing Services



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



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# SaaS (Software as a Service)



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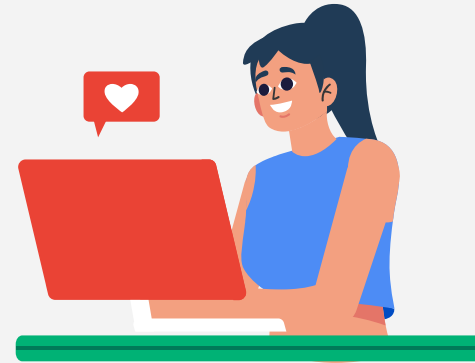
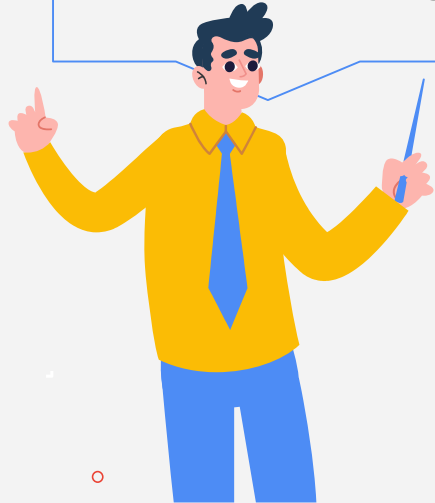
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Traditionally, software application needed to be purchased upfront & then installed it onto your computer.



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

# Q PaaS (Platform as a Service)



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- 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.



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## Q 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.





# SenseTime AI Education



The End

Thank you for listening!

