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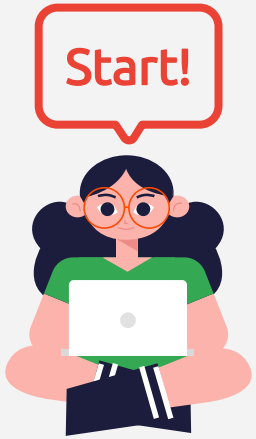
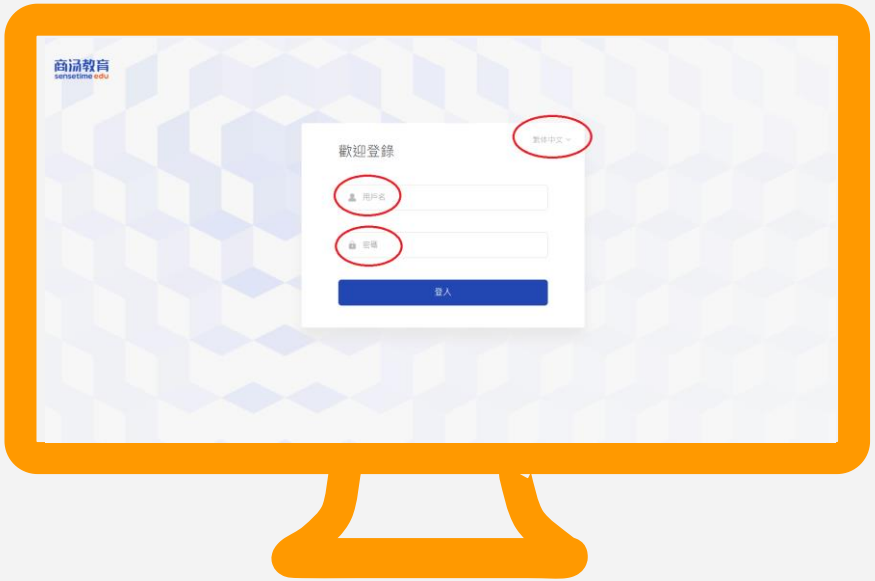
SenseTime AI Education

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

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Lesson Topic

Lecture 1
Introduction of AI

1. Introduction of AI

What is AI?

A science that teaches computers how to behave like humans.

How do we do that?

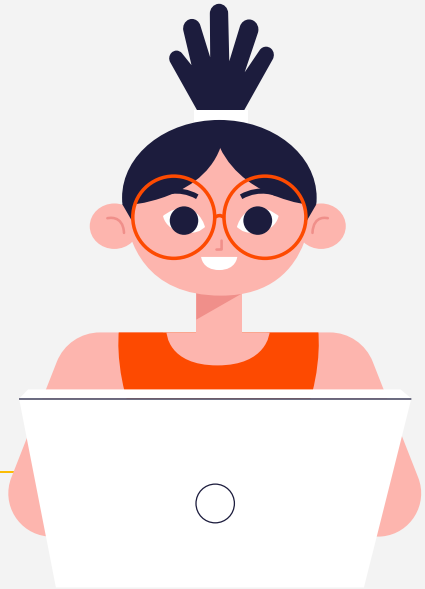
1. Introduction of AI

Supervised Learning

Given a set of input/output pairs, learn to predict the output when given a new input.

= Learn by using model answers!

1. Introduction of AI



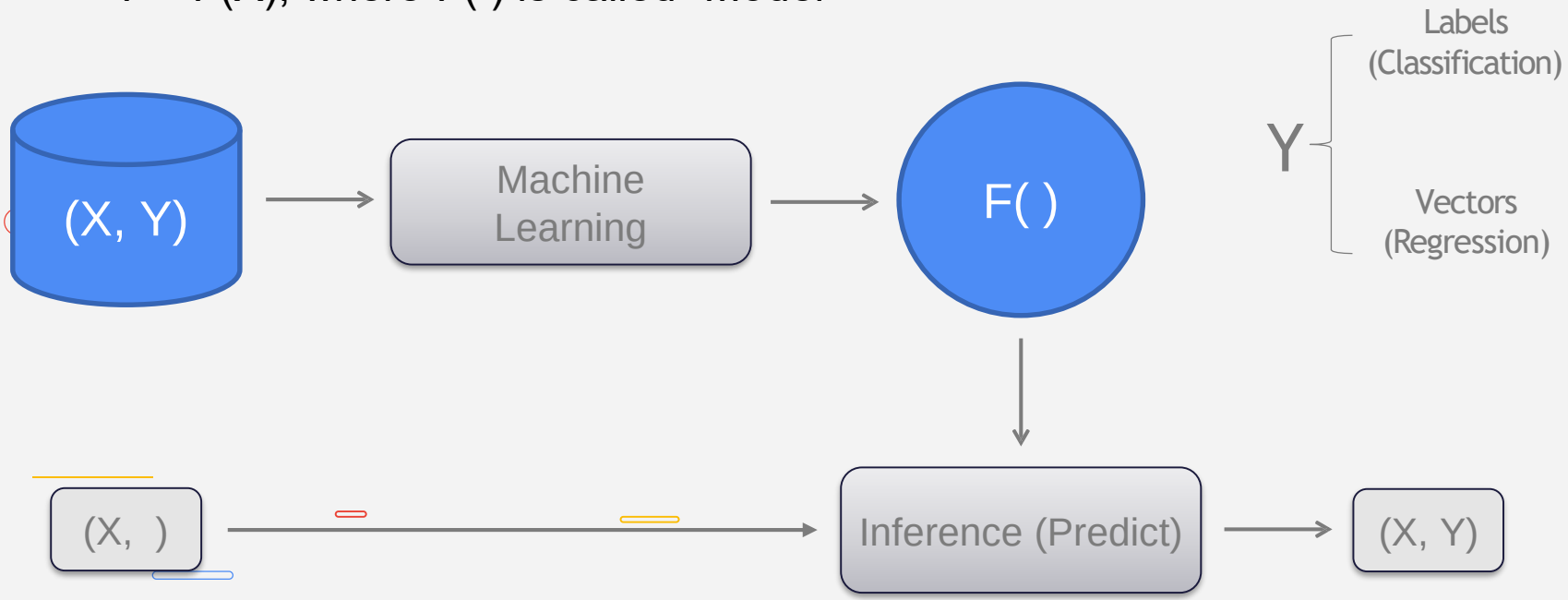
Unsupervised Learning

Given data without labels, model learns to group data with similar features together without knowing the true label of each group

= Learn by grouping similar things together!

AI is Function

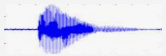
- The world is composed by (observation, recognition) = (X, Y)
- Y = F(X), where F( ) is called “Model”

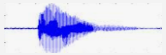


Function is everywhere

F() = “is face” / “Ada” → Facial Detection / Recognition

F() = “Dog” → Object Classification

F() = “Hellow” → Acoustic Speech Recognition

F(“Hellow”) =  → Text-To-Speech,TTS

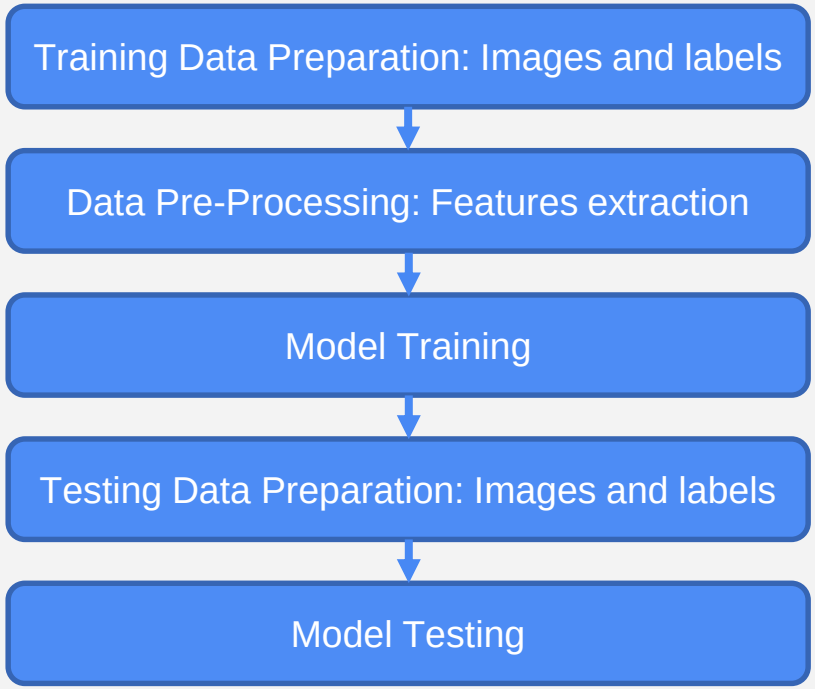
F(Question) = Answer → Chat Robot

F() = (Brake, throttle, direction) → Autonomous Driving

F() = Next position → AlphaGo

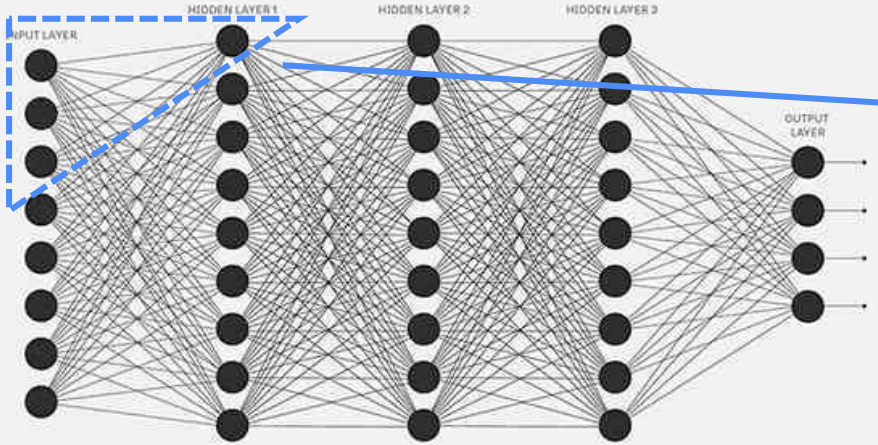
F() = (Liquidity, volatility, trend) → Stock Prediction

Procedure

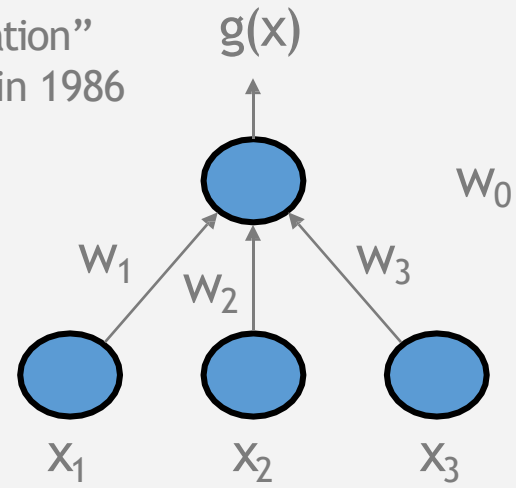

Training Data Preparation: Images and labels
Data Pre-Processing: Features extraction
Model Training
Testing Data Preparation: Images and labels
Model Testing

Neural Network

Neural network



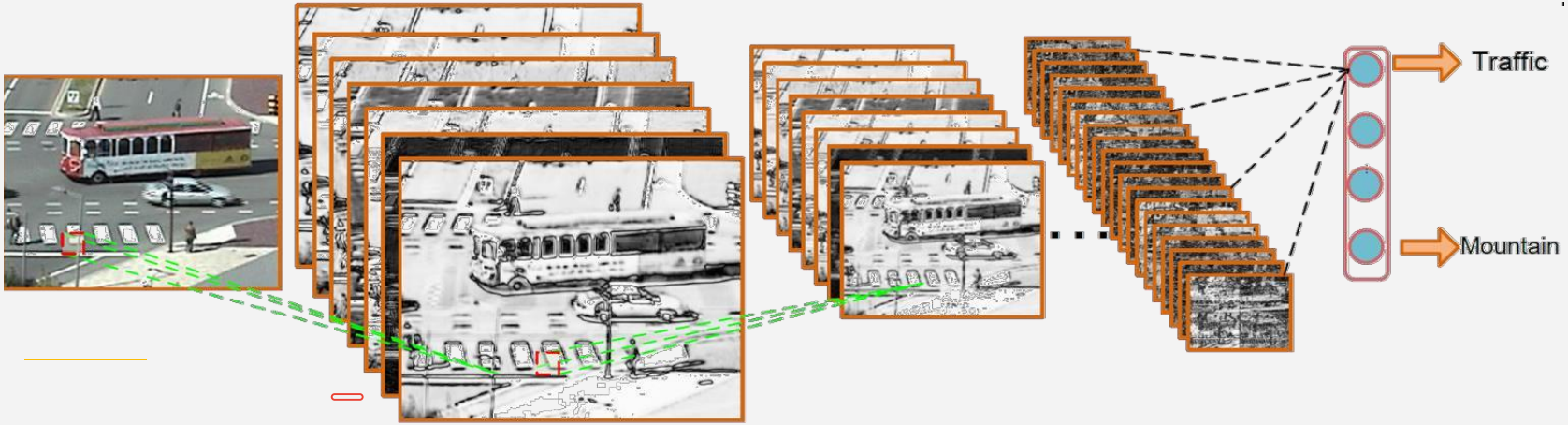
Proposed "Back propagation" theory in 1986



$$g(\mathbf{x}) = f\left(\sum_{i=1}^{d} x_i w_i + w_0\right) = f(\mathbf{w}^t \mathbf{x})$$

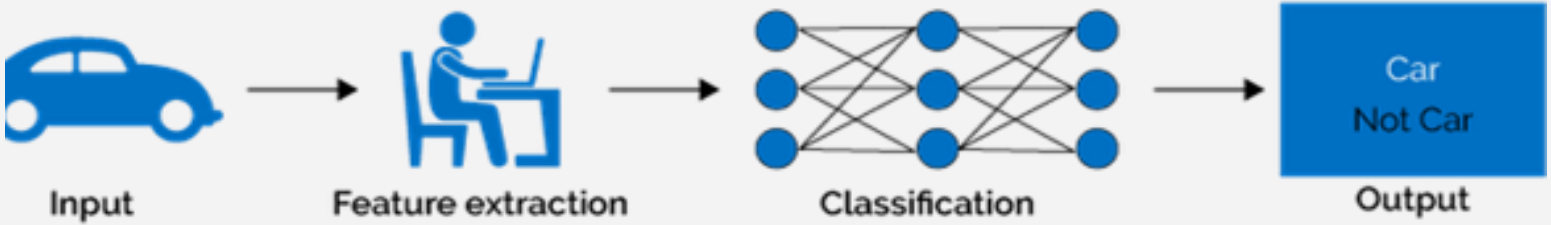
Convolutional neural network

Proposed “Convolutional neural network” theory in 1998

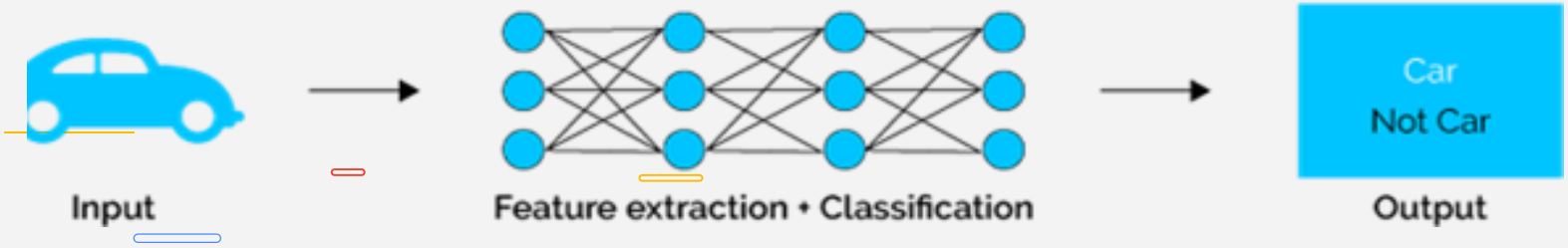


What is Deep Learning?

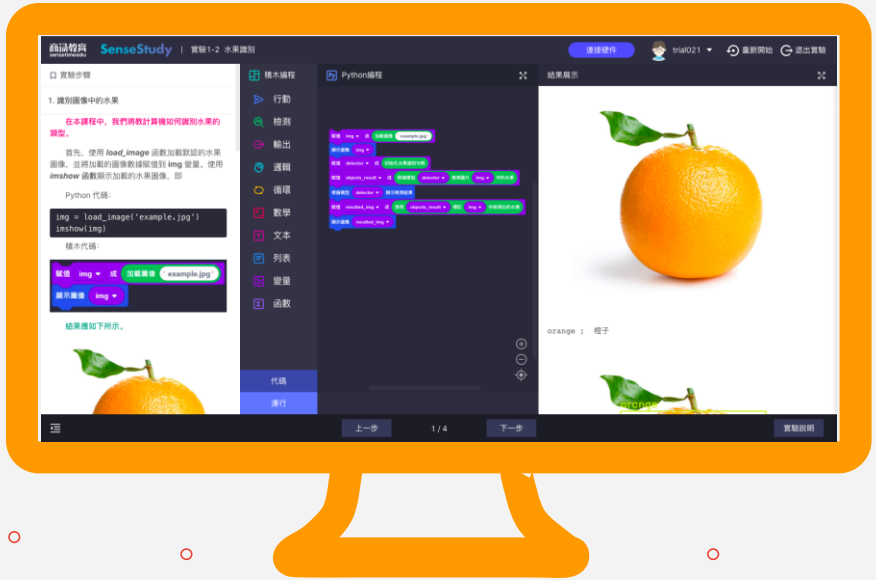
Machine Learning



Deep Learning



SenseStudy Experiments

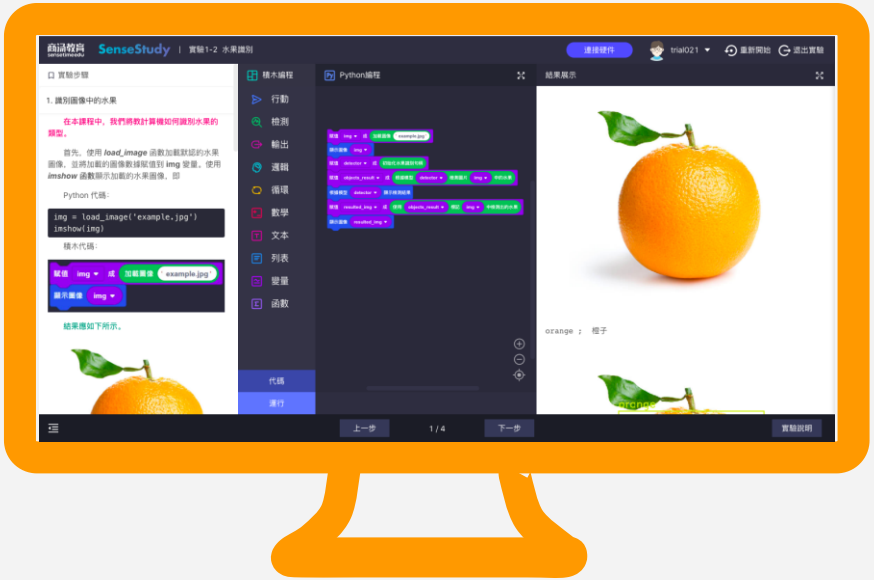


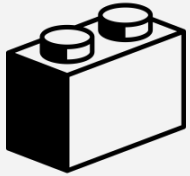
Experiment 1: Fruit Detection

Experiment 2: Face Clustering

Experiment 3: Image Style Transfer

SenseStudy Experiment





Students can code using blocks similar to Scratch and Blockly.

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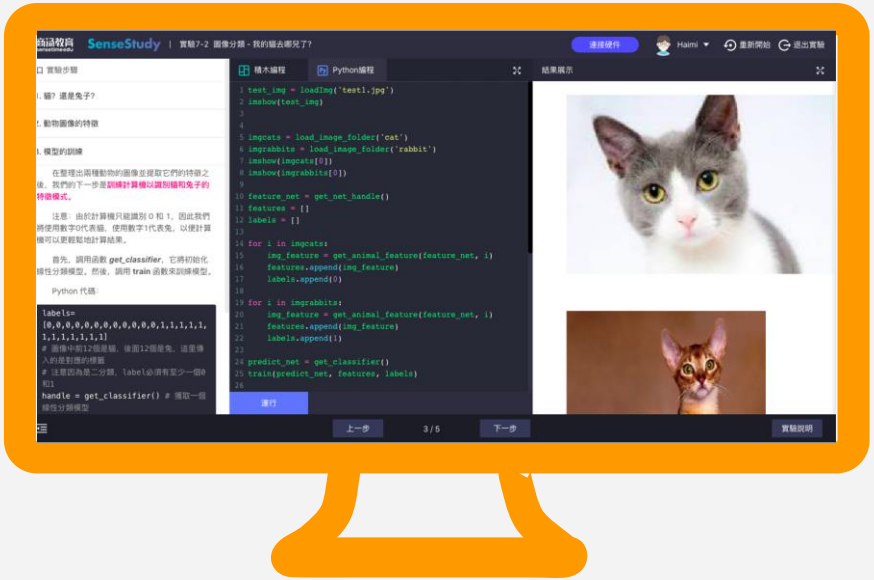
SenseStudy Experiment

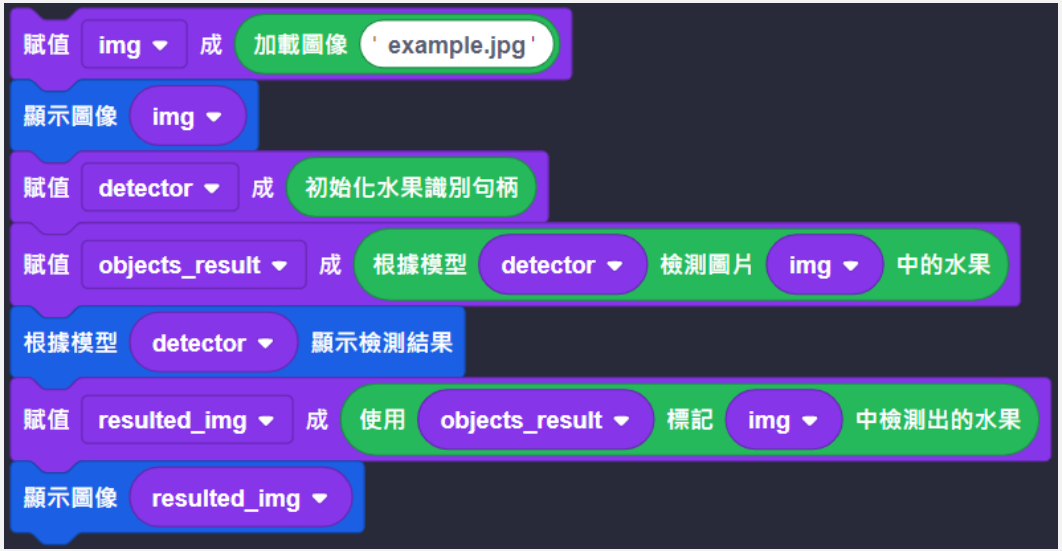


Students can also code using Python on the SenseStudy platform.

SenseStudy Experiment

Fruit Recognition (Elementary AI, Volume I 1.2)

Python Codes

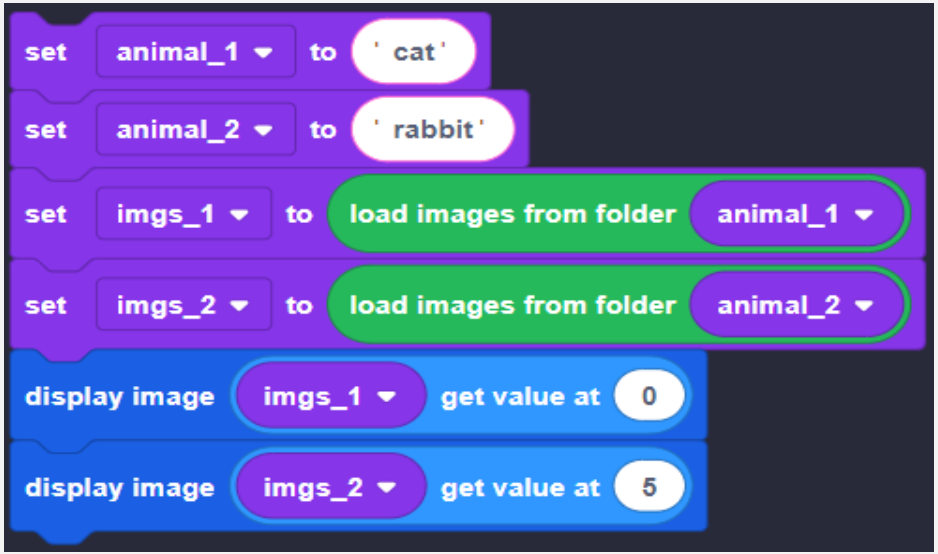


M T X T F

SenseStudy Experiment

Two Animals Classification (Elementary AI, Volume I 2.2) Python Codes

1、Training data preparation

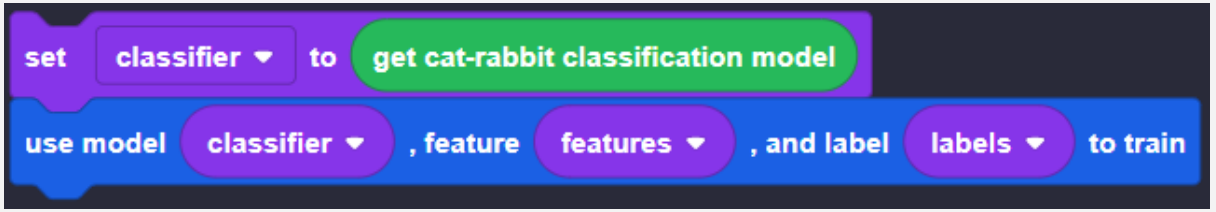


SenseStudy Experiment (Cont'd)

2、Data pre-processing for image features and labels

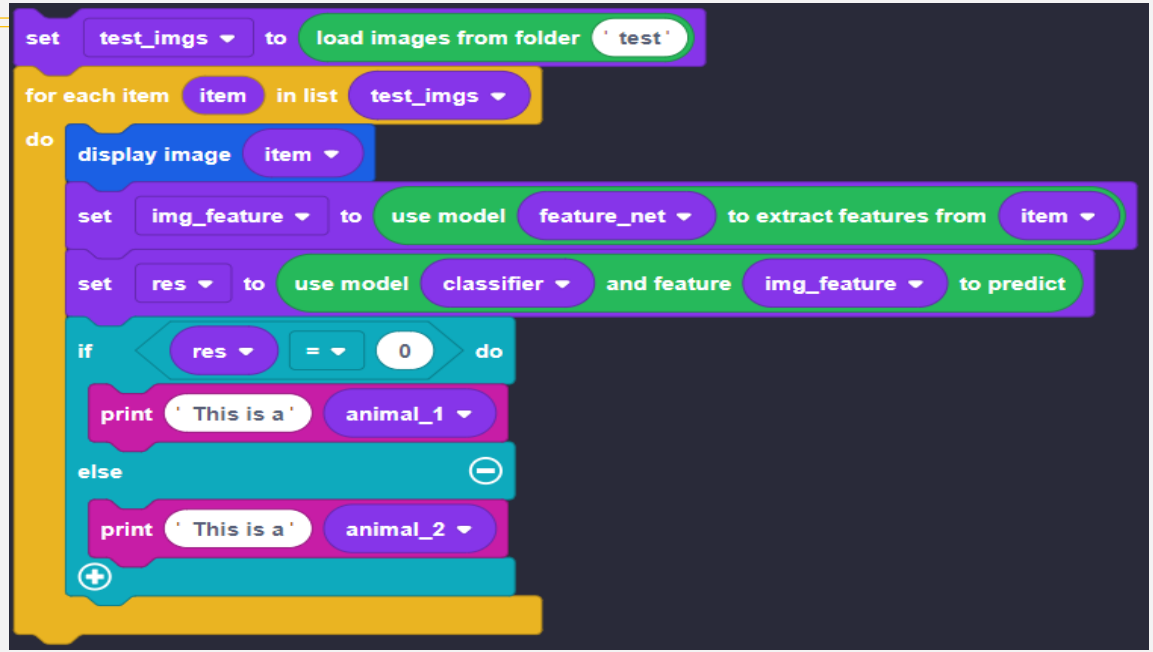
SenseStudy Experiment (Cont'd)

3、Model training



SenseStudy Experiment (Cont'd)

4、Model testing



SenseStudy Experiment

Two Animals Classification (Elementary AI, Volume I 2.3) Python Codes

Face Cluster (Elementary AI, Volume I 3.3) Python Codes

Lesson Topic

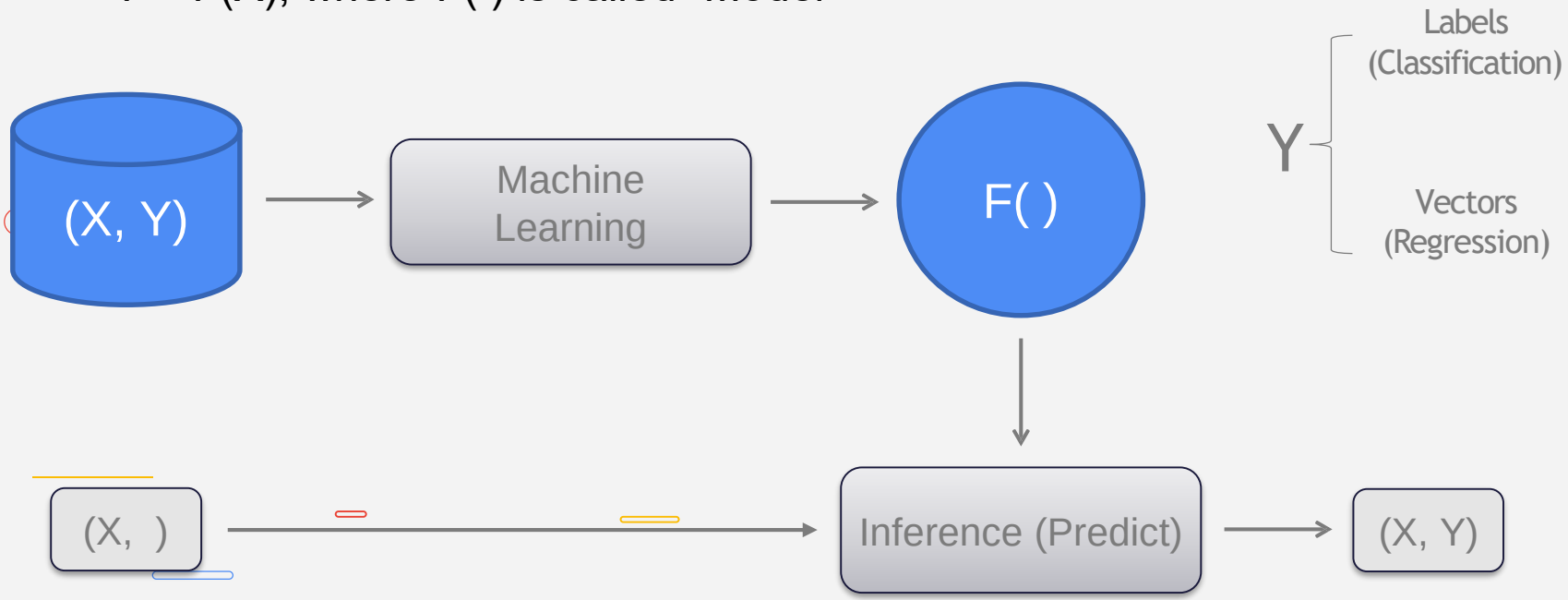
Lecture 2

Linear Regression and Classification

1 2 3 4

AI is Function

- The world is composed by (observation, recognition) = (X, Y)
- Y = F(X), where F( ) is called “Model”



Function is everywhere

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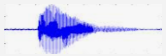
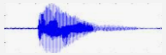
F() = “Hellow” → Acoustic Speech Recognition

F(“Hellow”) =  → Text-To-Speech,TTS

F(Question) = Answer → Chat Robot

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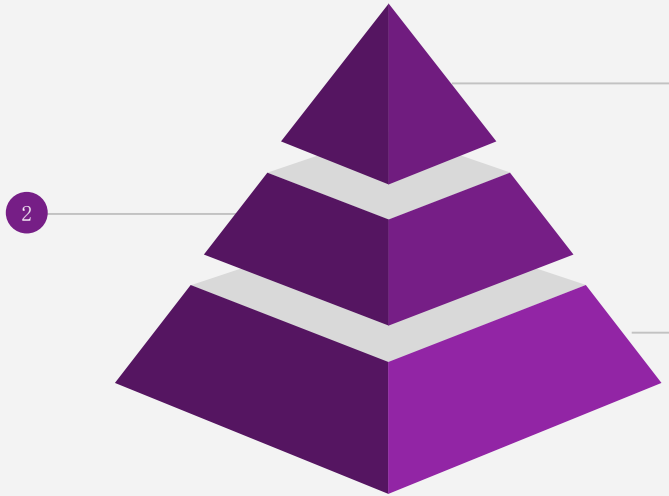
F() = Next position → AlphaGo

F() = (Liquidity, volatility, trend) → Stock Prediction

Digitalisation

People can predict through expressions, taste, sounds and vision. Machine can only recognise digits. After digitalisation, machines are able to interpret a numerical expression for prediction.



3 **Express the observed attributes using digits.**

2 **Establish a connection between real world and machine world**

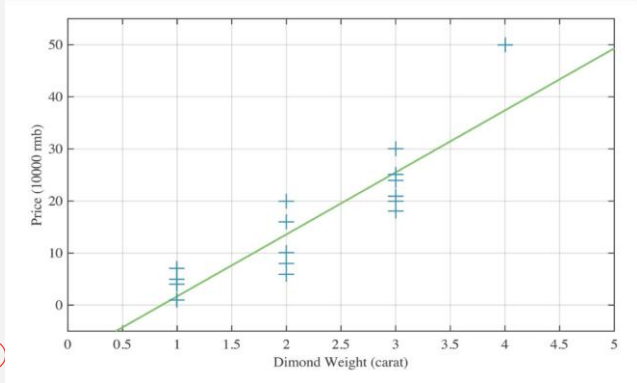
1 **Digitalisation**

Mathematics is important!!!

To train machines to make predictions

1 2 3 4

Example — Weights and Prices of Diamonds



Scatter plot

- x-axis represents diamond weight,
- y-axis represents diamond price,
- Each "+" sign represents a coordinate of diamond, where coordinates = (weight, price)

Green line is the prediction function, used to present the relationship between the weights and price of diamonds.

Q: What are the characteristics of this functions? What functions we learnt resemble this ?

A: From scatterplot, a **linear** relationship is shown between weights and price. Therefore, we can set the prediction function as a **linear function**, which is

$$y = kx + b$$

x and y represent inputs ~~weight~~ and price. This function also consists of two variables. Which is slope **k** and y-intercept **b**. ~~These~~ variables that are necessary in defining prediction functions are called **parameters**.

Linear Function

Suppose you have the following numbers:

Input x	1	2	3	4	5
Output y	4	8	12	16	20

Guess what is y if x = 4.5? Let's try it in SenseStudy !!!

Linear Regression Basics (AI Introduction, Volume I 5.1) Python Codes

Model Training Algorithm (AI Introduction, Volume I 5.3) Python Codes

Training Accuracy Parameters (AI Introduction, Volume I 5.4) Python Codes

Linear Classification Basics (AI Introduction, Volume I 5.7) Python Codes

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The End

Thank you for listening!