

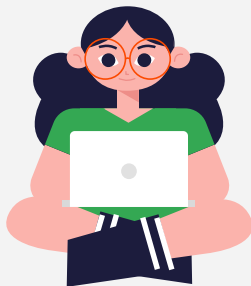


SenseTime AI Education

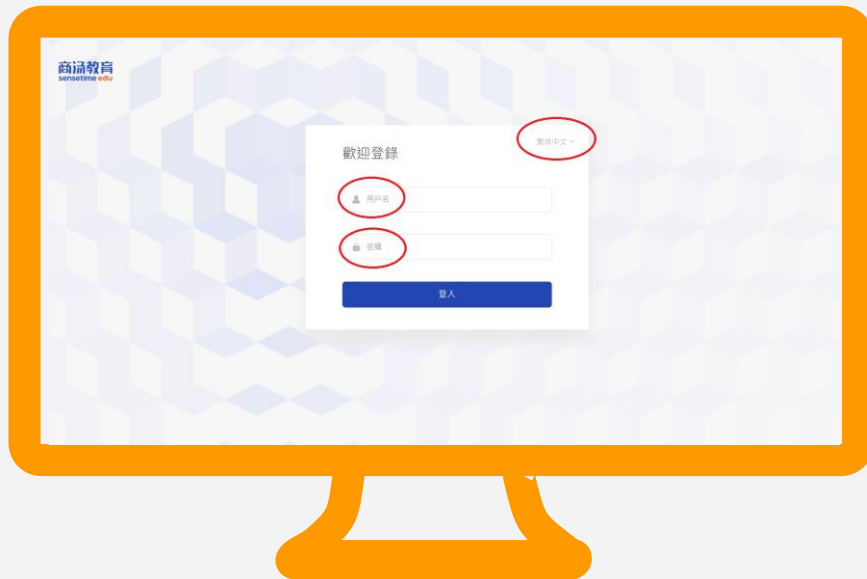


Secondary School AI Course Curriculum

Start!



Preparations



Training Notes Download

Login Platform Website:

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

Username:

chappie20 ~ chappie39

Password:

SenseStudy123

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Lesson Topic



1

Lecture 1

Introduction of AI

2

3

4

1. Introduction of AI



1

What is AI?

A science that teaches computers how to behave like humans.

How do we do that?



2

3

4

1. Introduction of AI



1

Supervised Learning

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

= Learn by using model answers!



2

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4

1. Introduction of AI



1

Unsupervised Learning

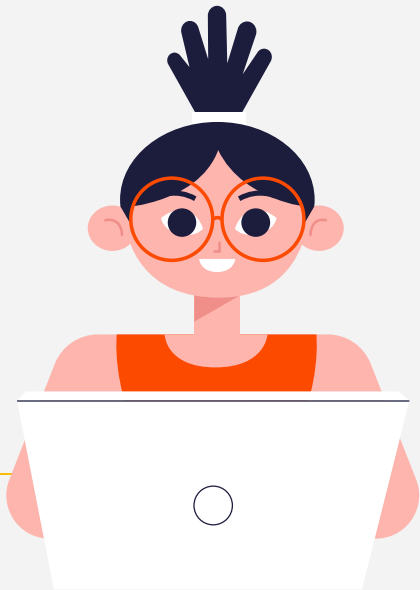
Given data without labels, model learns to group data with similar features together without knowing the true label of each group

2

3

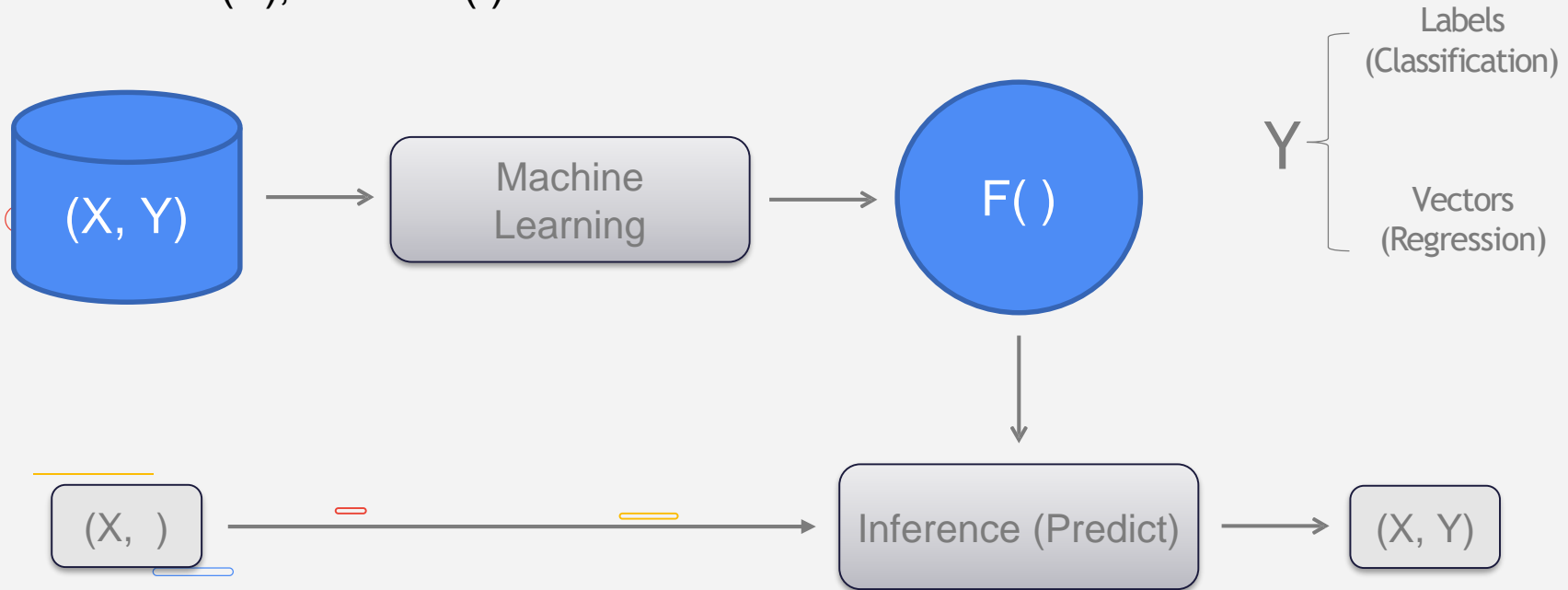
= Learn by grouping similar things together!

4



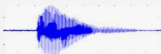
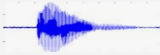





Q AI is Function

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



Q 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



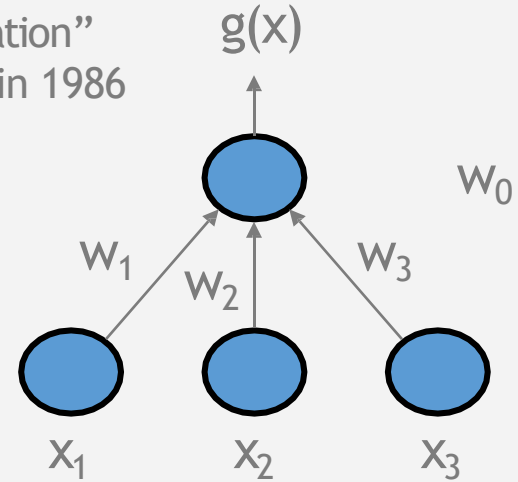
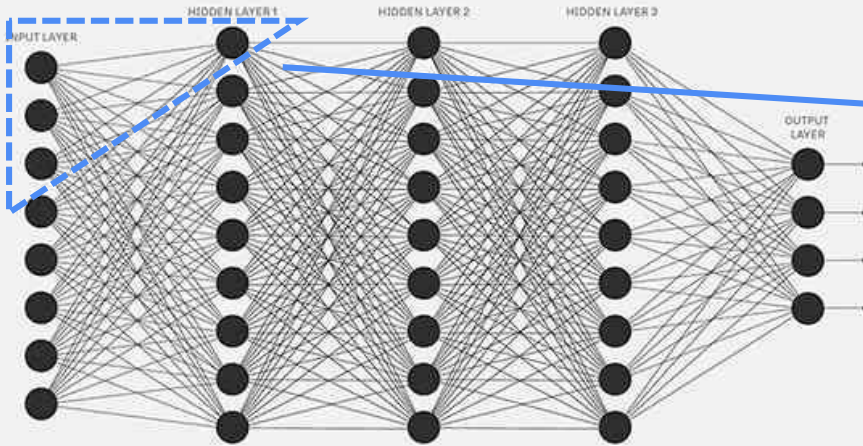
Model Testing

Neural Network

Neural network



Proposed “Back propagation” theory in 1986

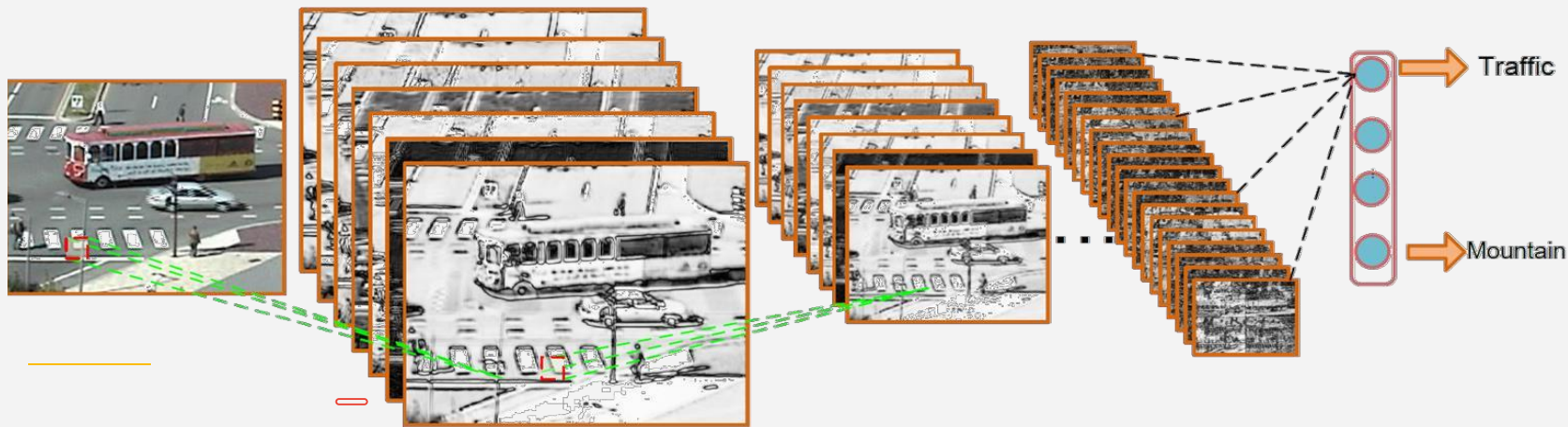


$$g(\mathbf{x}) = f\left(\sum_{i=1}^d x_i w_i + w_0\right) = f(\mathbf{w}^t \mathbf{x})$$

Q Convolutional neural network



Proposed “Convolutional neural network” theory in 1998

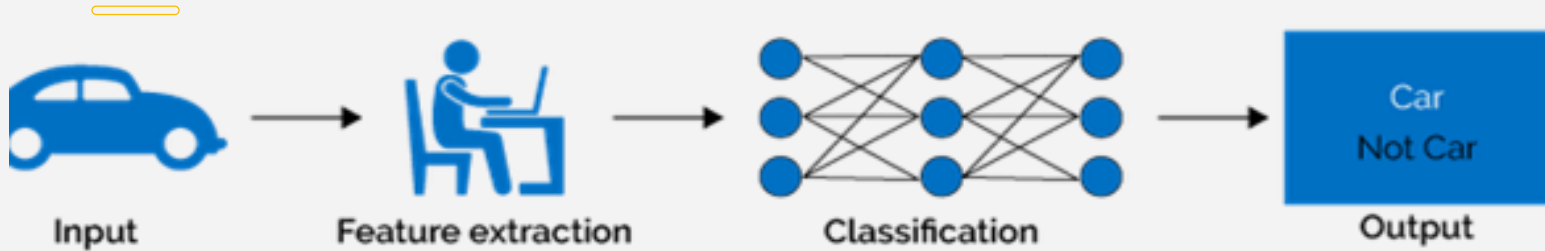


What is Deep Learning?



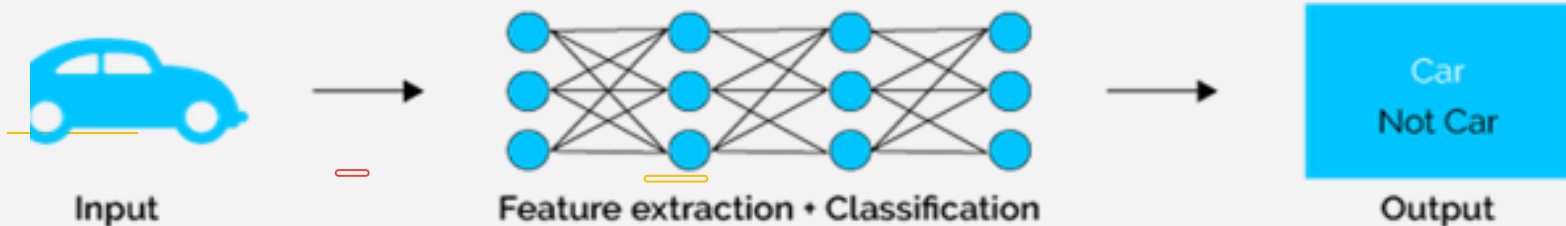
1

Machine Learning



2

Deep Learning



3

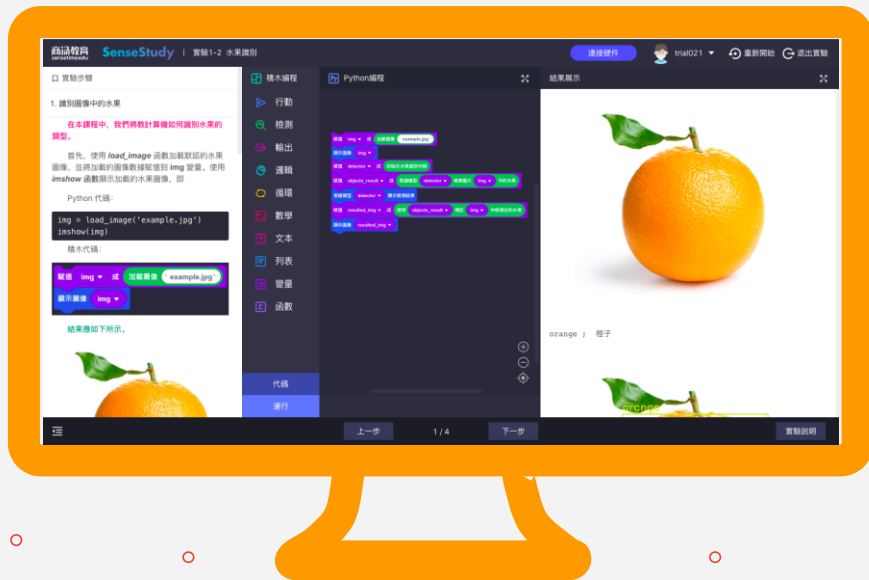
4



SenseStudy Experiments



1



Experiment 1: Fruit Detection

2



Experiment 2: Face Clustering

3



Experiment 3: Image Style Transfer

4

SenseStudy Experiment



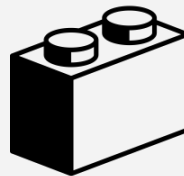
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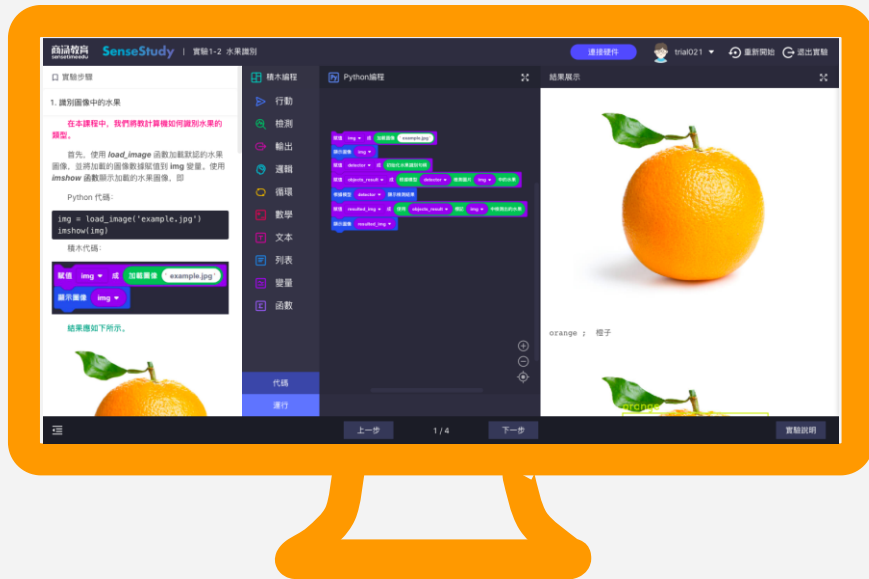
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Students can code using blocks similar to Scratch and Blockly.





SenseStudy Experiment



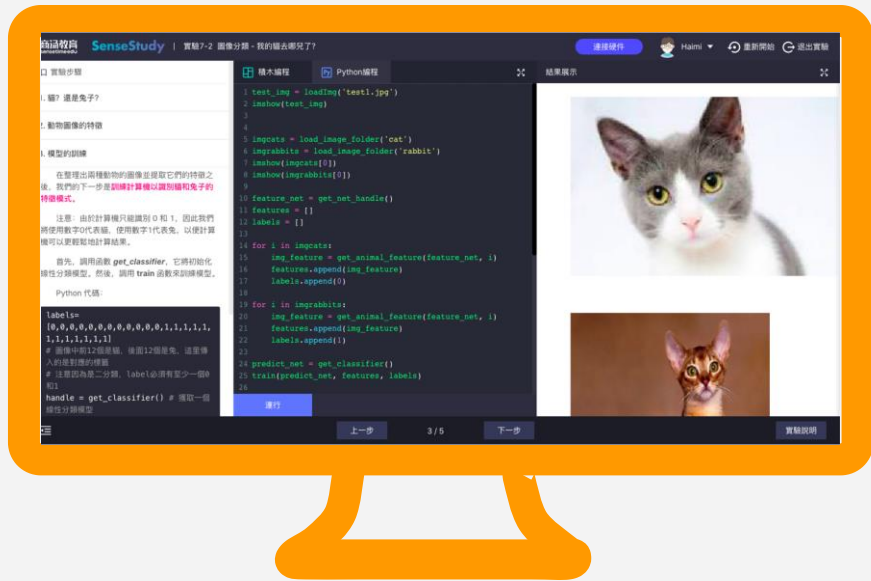
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Students can also code using Python on the SenseStudy platform.

SenseStudy Experiment



Fruit Recognition (Elementary AI, Volume I 1.2)

[Python Codes](#)



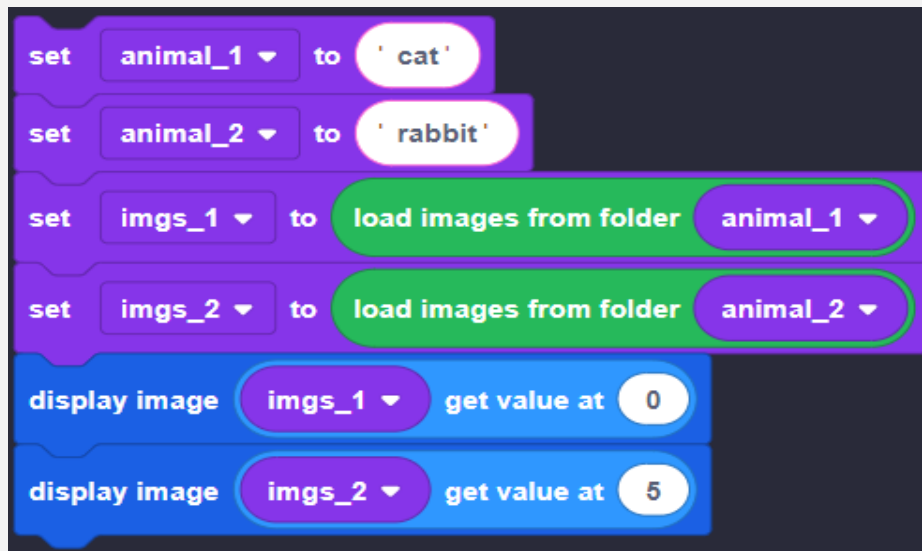
SenseStudy Experiment



1

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

1、Training data preparation



2

3

4

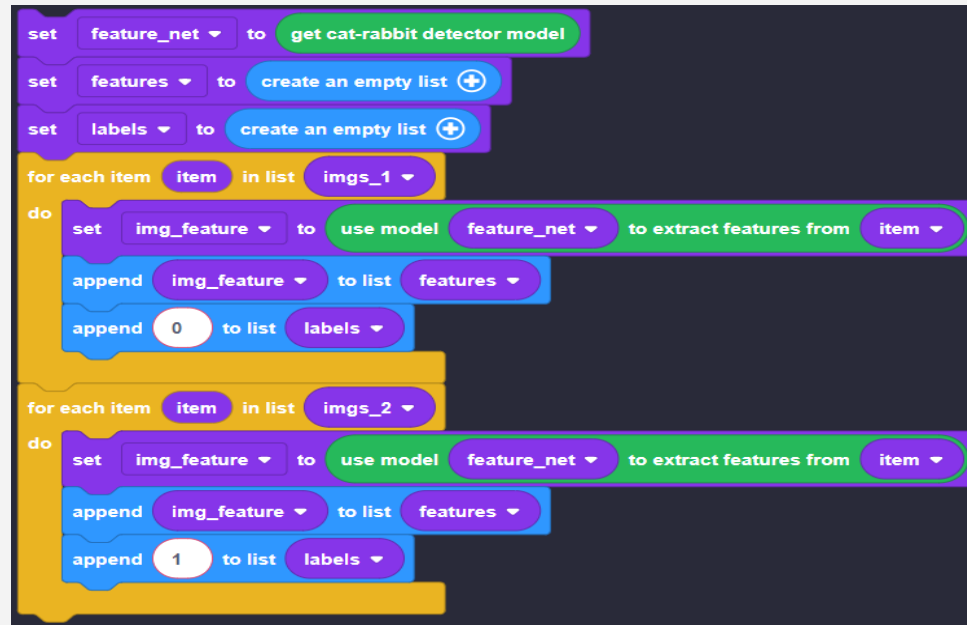


SenseStudy Experiment (Cont'd)



1

2、Data pre-processing for image features and labels



2

3

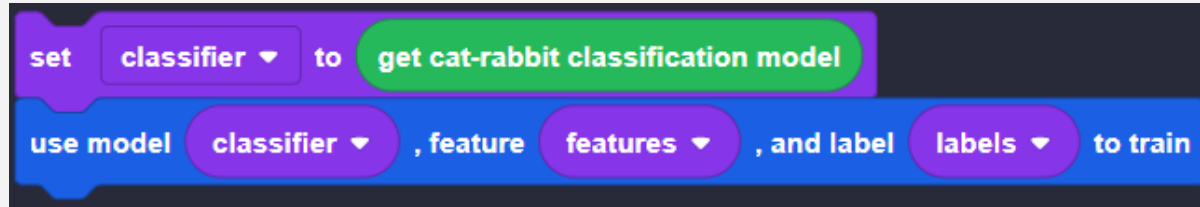
4



SenseStudy Experiment (Cont'd)



3、Model training



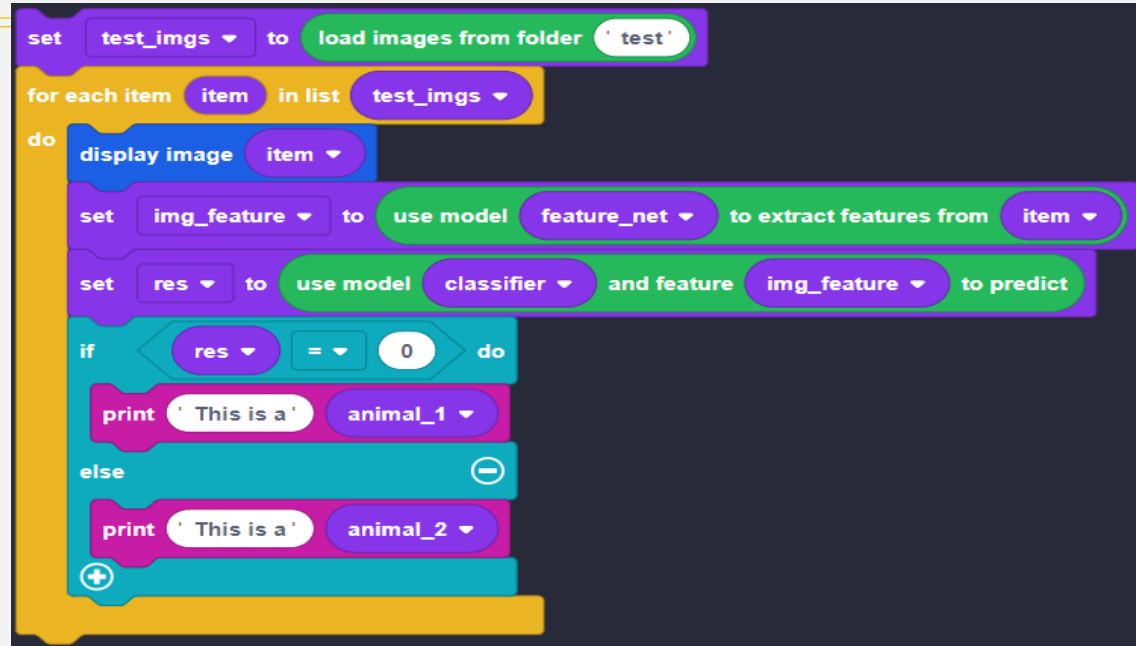


SenseStudy Experiment (Cont'd)



1

4、Model testing



2

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4



SenseStudy Experiment



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Two Animals Classification (Elementary AI, Volume I 2.3)

[Python Codes](#)

Face Cluster (Elementary AI, Volume I 3.3)

[Python Codes](#)

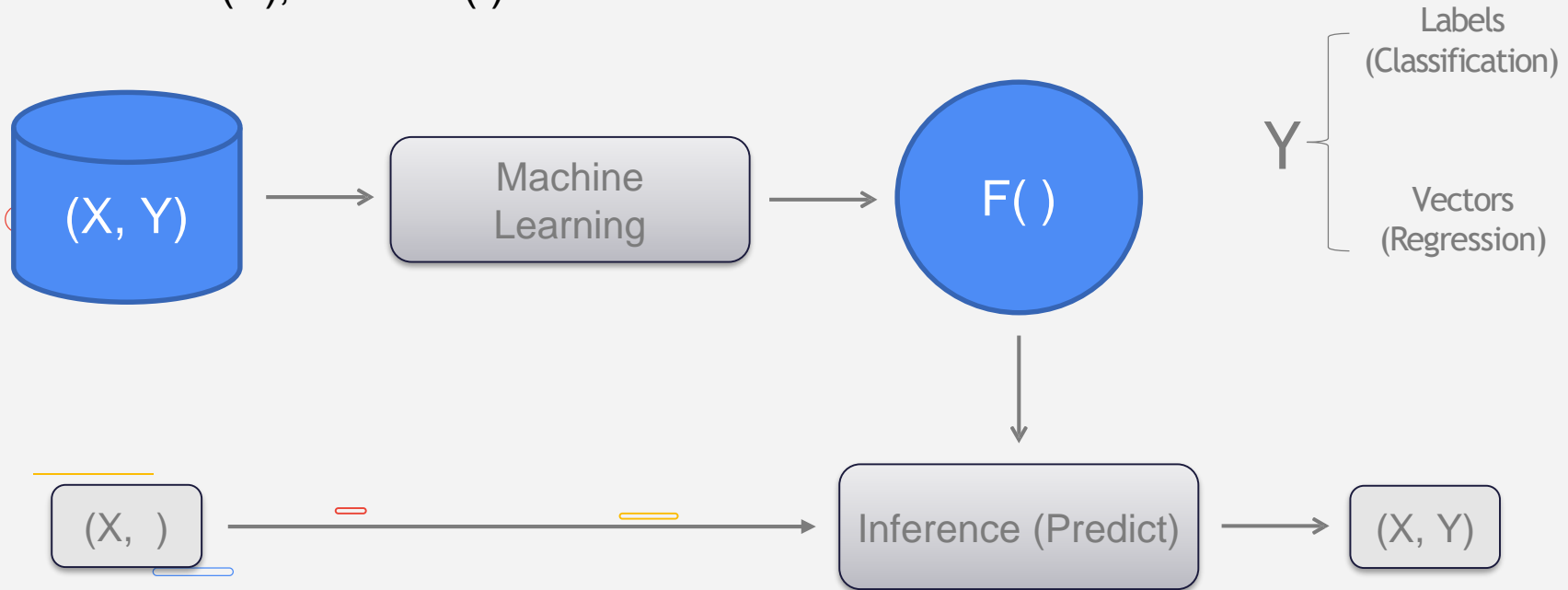


Lecture 2



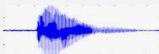
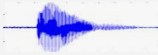



Linear Regression and Classification

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Q Function is everywhere

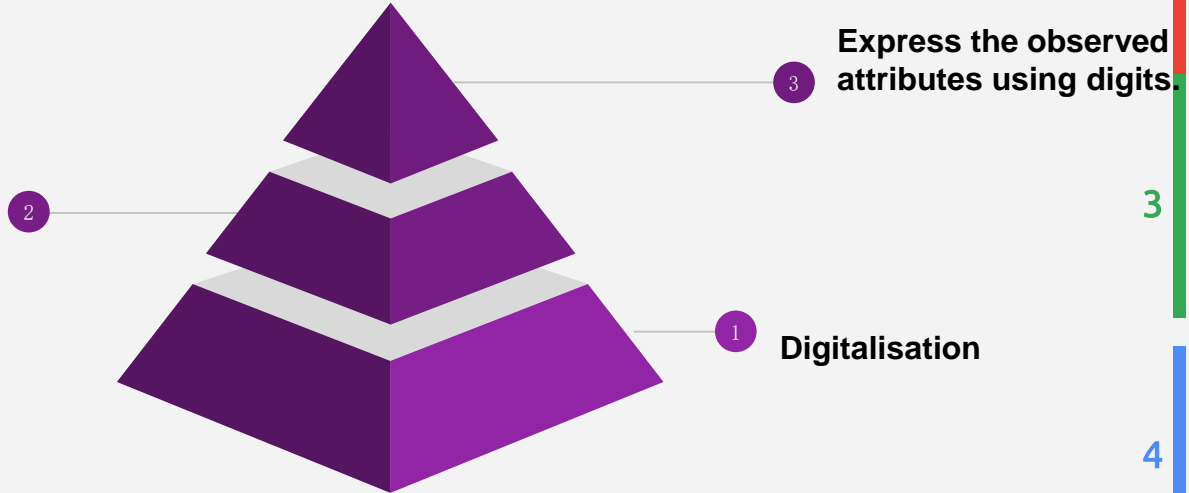
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- F() = Next position → AlphaGo
- F() = (Liquidity, volatility, trend) → Stock Prediction

Q 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.

Establish a
connection
between
real world and
machine world

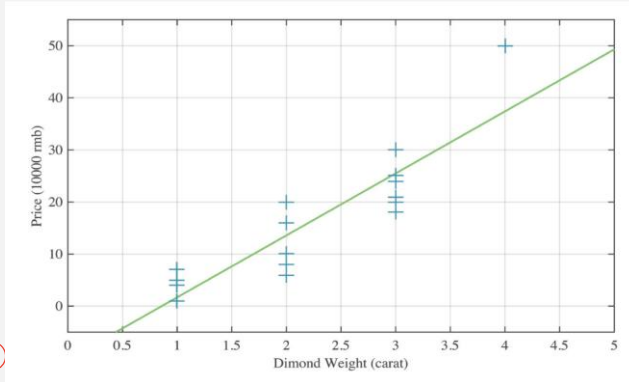


Mathematics is
important!!!

To train machines to make predictions



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](#)



SenseTime AI Education



The End

Thank you for listening!

