

圍棋術語的分辨

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Problem

Q: 圍棋是甚麼？

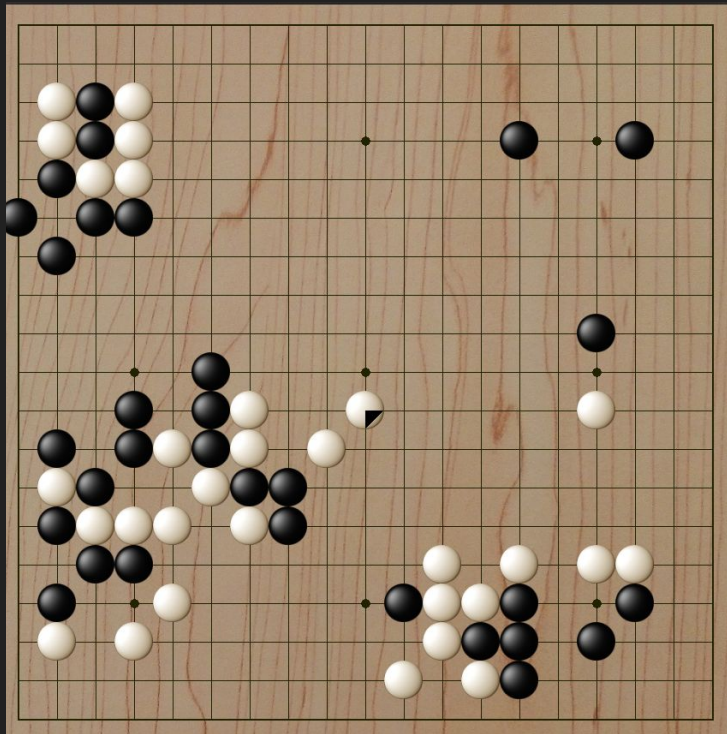
A: 一種雙人遊戲，一方執黑，一方執白，雙方輪流落子，由黑方先行第一手棋。圍地較大的一方獲勝。

Q: 術語是甚麼？

A: 術語是用來形容一手棋的策略目的，通常一種術語會對應到固定的棋型。

problem

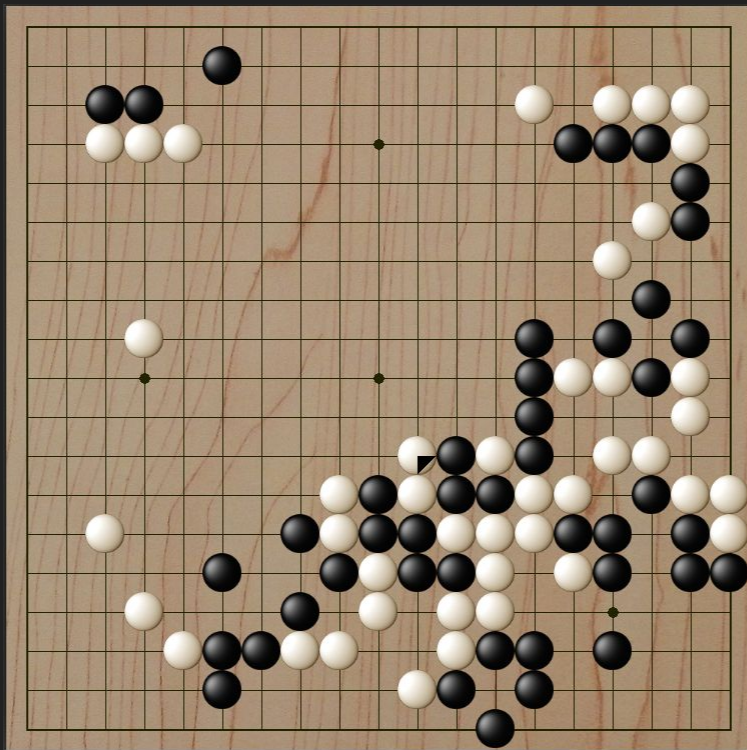
input:



output: 一種術語

problem

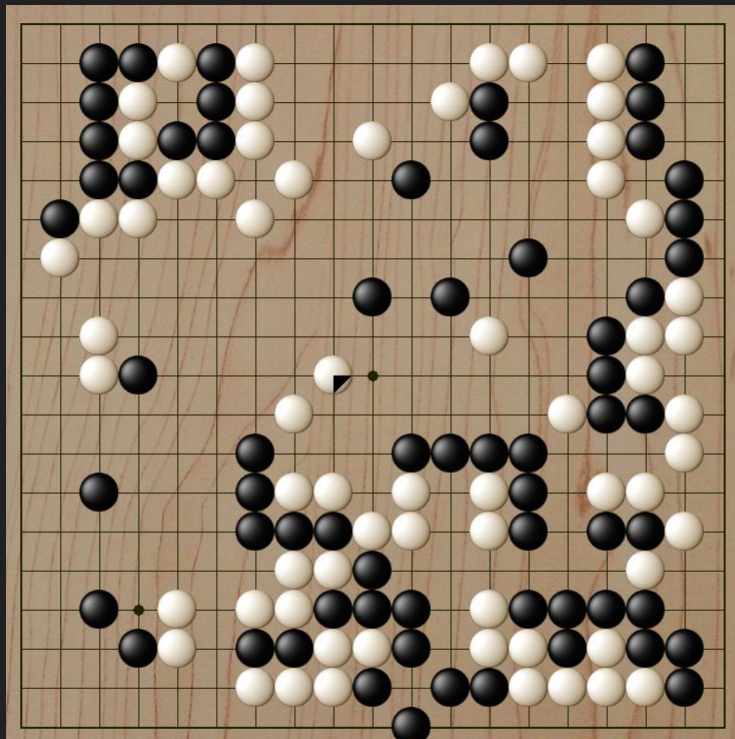
input:



output: “長”

problem

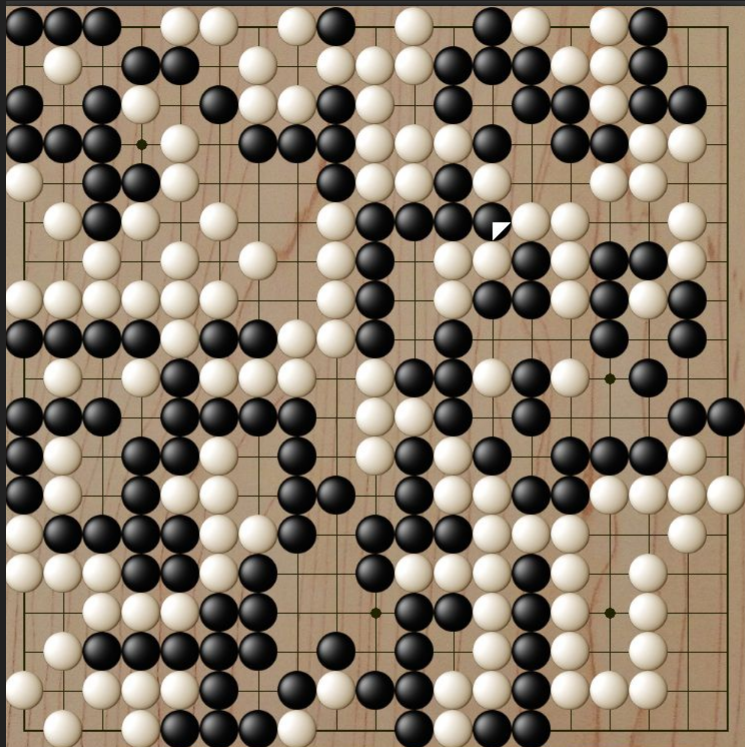
input:



output: "尖"

problem

input:



output: ‘斷’

Data Processing: term

由左至右依序為長、尖、斷 (Label Encoding- 0:長 1:尖 2:斷 3:都不是)

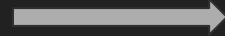
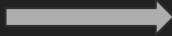


Data Processing: example

$= [0, 0, 0, 0, 0, -1, -1, 1, -1] = [1, 0, 0, 0, 0, 0, 1, 0, 0] = [2, 1, -1, 0, 1, -1, -1, -1, 1]$



Gathering Data



dataset

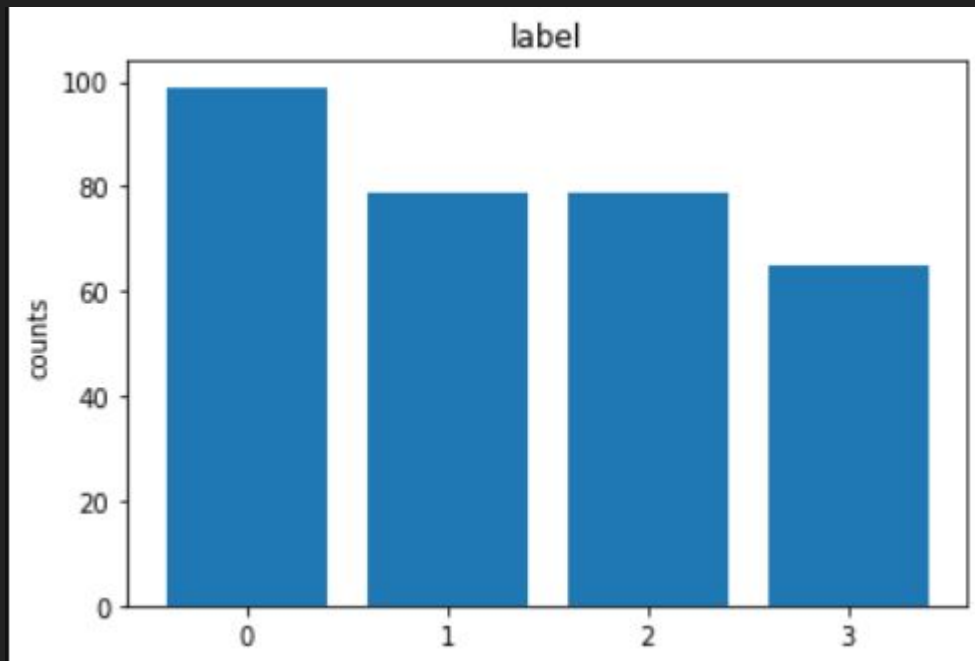
Label Encoding- 0:長 1:間 2:斷 3:都不是

	label	left_up	mid_up	right_up	left_mid	right_mid	left_down	mid_down	right_down
0	0	-1	0	0	0	1	0	-1	0
1	0	0	1	0	0	-1	0	0	1
2	0	-1	1	0	0	0	0	0	0
3	0	0	0	-1	0	1	0	0	0
4	0	0	1	0	-1	0	0	0	0
...
317	3	0	0	0	-1	-1	0	0	1
318	3	0	0	0	-1	0	1	1	0
319	3	0	0	1	0	-1	0	0	0
320	3	-1	1	0	1	1	0	-1	1
321	3	1	0	0	1	0	-1	1	0

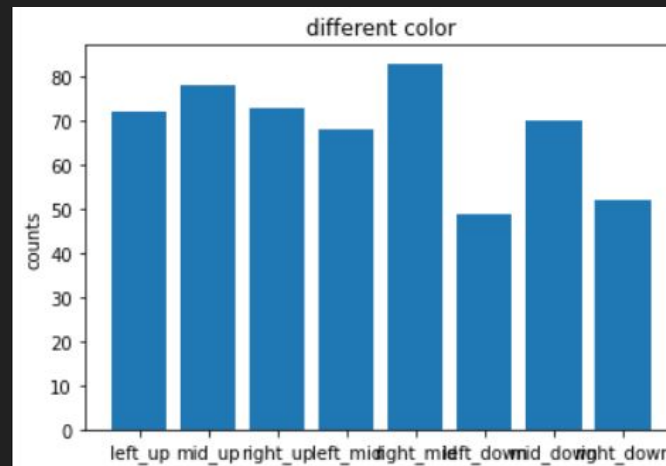
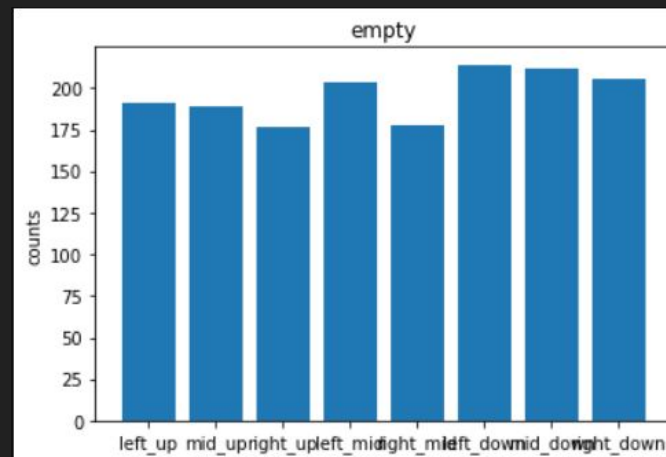
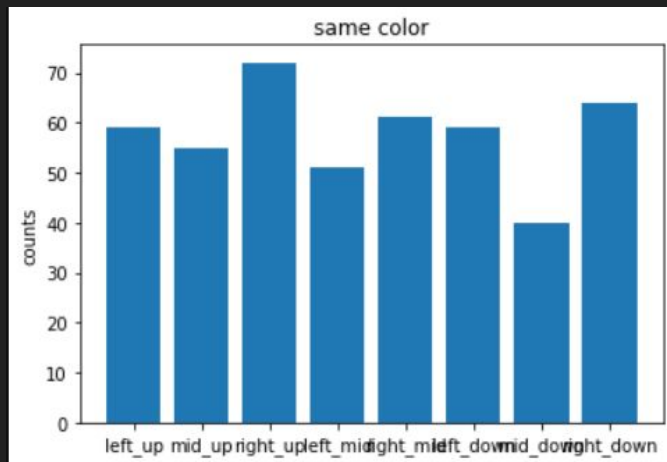
322 rows × 9 columns

Data Visualization - label

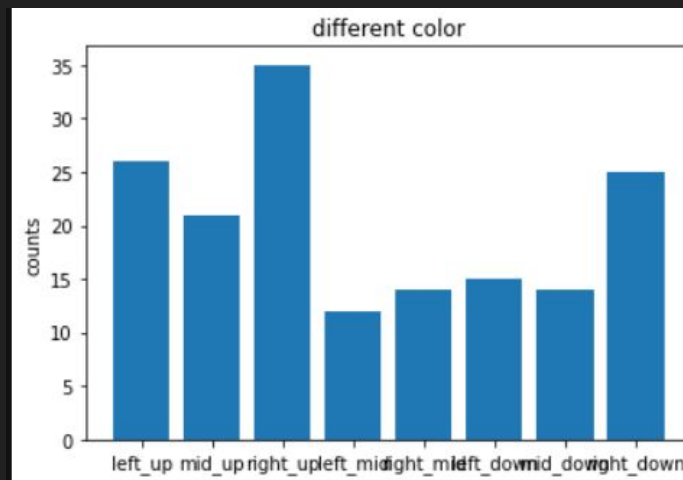
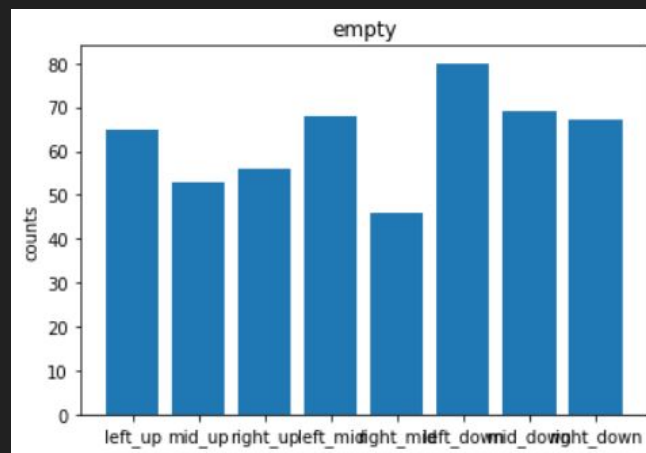
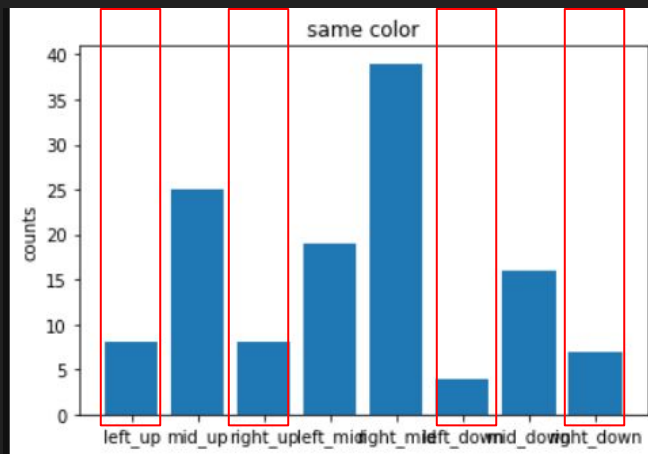
0:長 1:間 2:斷 3:都不是



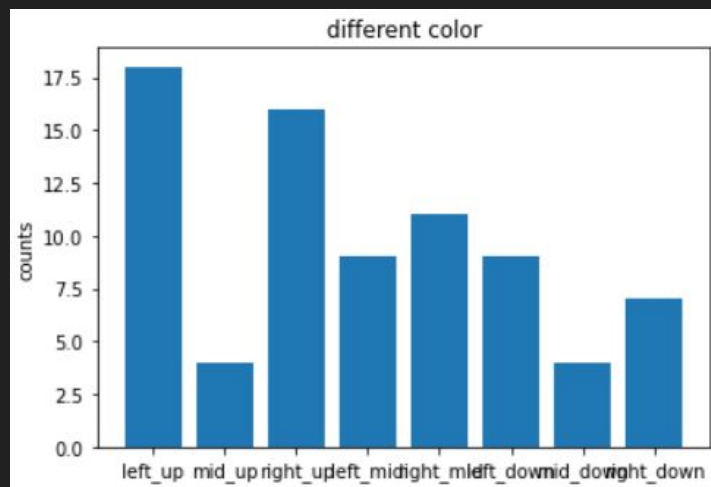
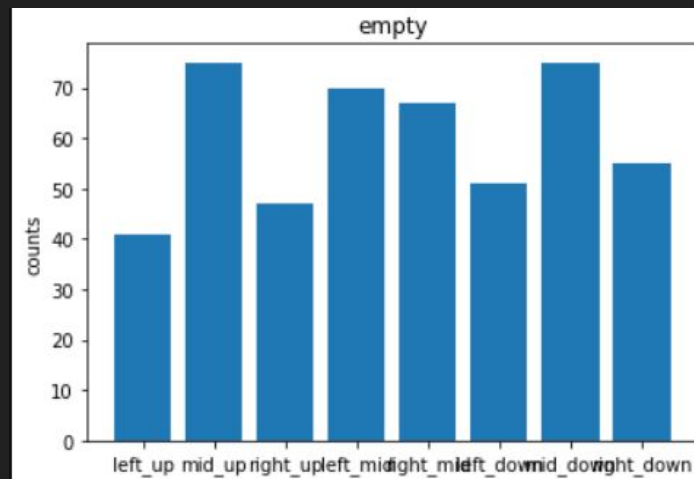
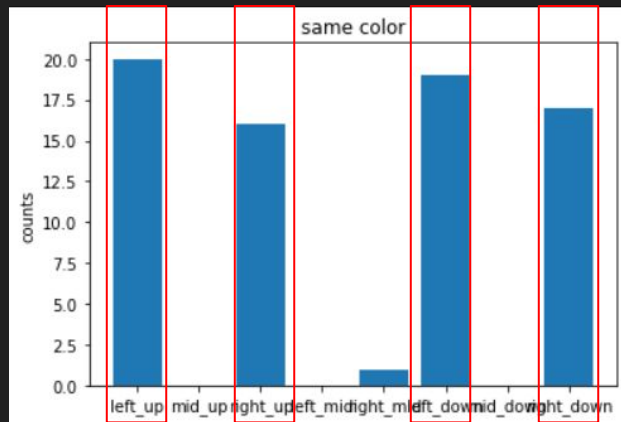
Data Visualization - feature



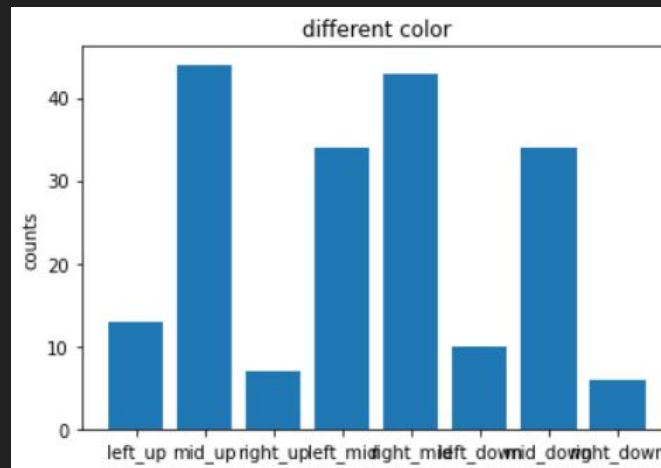
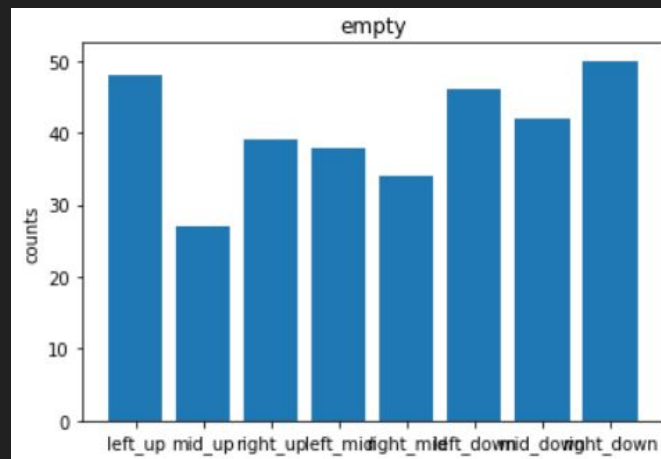
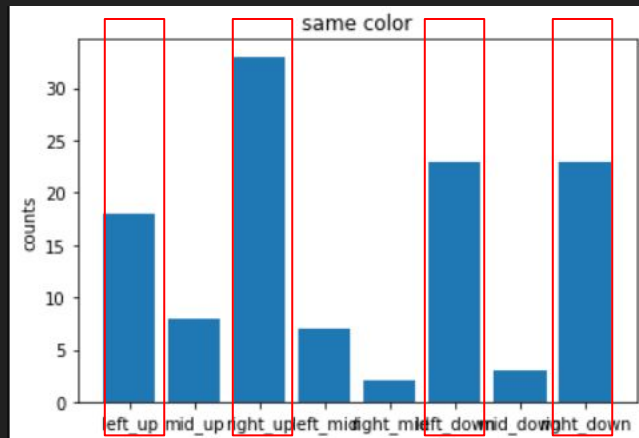
Data Visualization 長



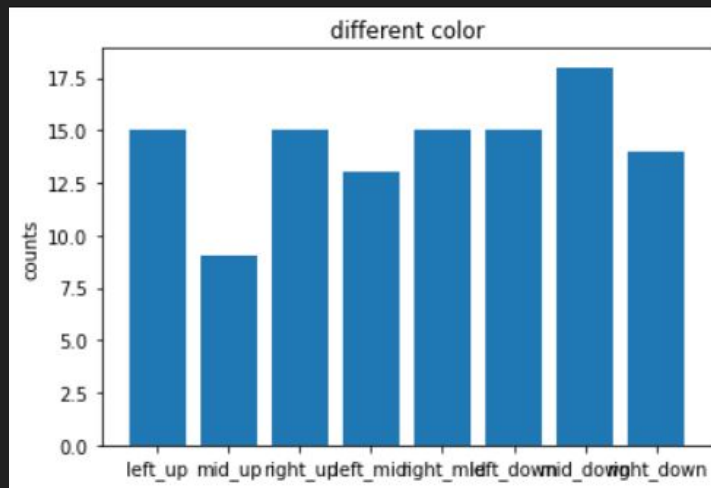
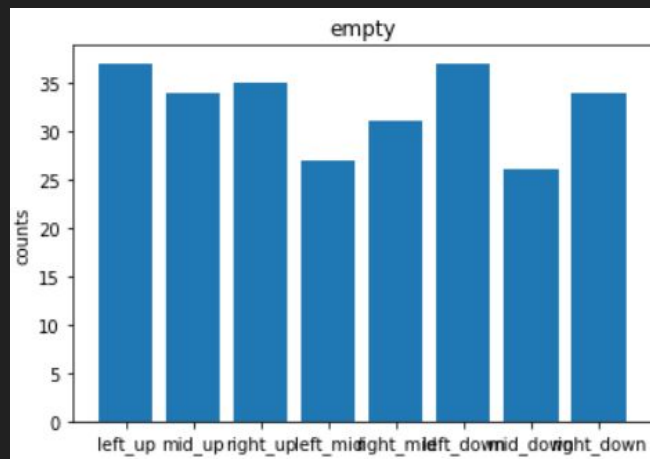
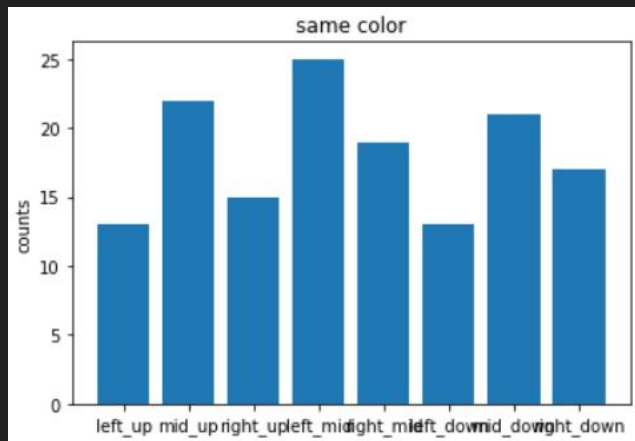
Data Visualization 尖



Data Visualization 断



Data Visualization 都不是



model

1. Decision tree
2. DNN
3. SVM

workflow

1. shuffle data
2. train_test_split in the ratio of 7:3
3. build model and .fit
4. predict

Decision tree

scikit-learn

algorithm-gini

max_depth-not defined

Decision tree

The result:

```
accuracy: 0.865979381443299  
Mean Absolute Error: 0.30927835051546393
```

	label	recall_score	precision_score
0	0	0.852941	0.852941
1	1	0.956522	0.916667
2	2	0.904762	0.904762
3	3	0.736842	0.777778

DNN - workflow

shuffle

train_test_split in the ratio of 7:3

將DNN的label擴張至1*4的array (One-hot Encoding)

在預測或訓練時, DNN會給每個類別一個分數

```
array([[0., 0., 0., 1.],  
       [0., 1., 0., 0.],  
       [1., 0., 0., 0.],  
       ...,  
       [0., 0., 1., 0.],  
       [1., 0., 0., 0.],  
       [1., 0., 0., 0.]], dtype=float32)
```

```
label = to_categorical(label, 4)
```

```
array([3.9770615e-01, 3.5640597e-04, 1.7097640e-05, 1.6808033e-02],  
      dtype=float32)
```

DNN model (Keras+Tensorflow)

We construct a neural network of three layers with epochs = 50.
batch_size=1

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 16)	144
dense_1 (Dense)	(None, 16)	272
dense_2 (Dense)	(None, 4)	68

Total params: 484

Trainable params: 484

Non-trainable params: 0

DNN

result

```
loss: 0.974406361579895  accuracy: 0.7628865838050842  
Mean Absolute Error: 0.24020116
```

	label	recall_score	precision_score
0	0	0.678571	0.826087
1	1	0.888889	0.857143
2	2	1.000000	0.740741
3	3	0.500000	0.578947

SVM model (scikit learn)

SVC

kernel='rbf' 投影函數轉換

懲罰係數=1

gamma='auto'=1/n-features

SVM

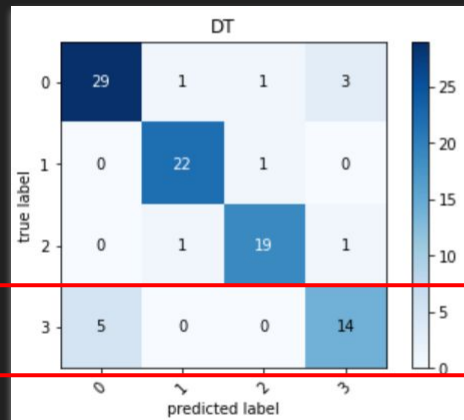
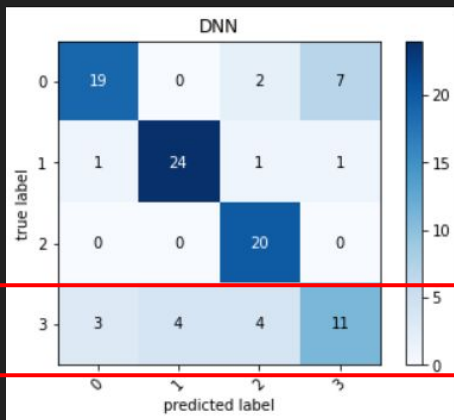
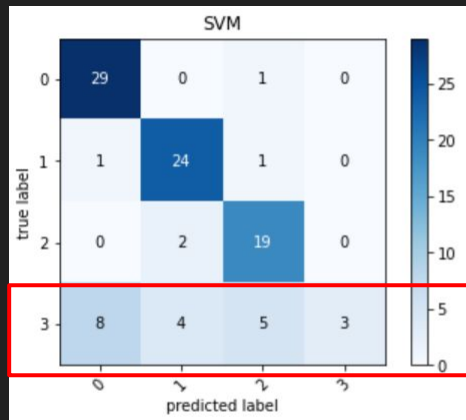
The result:

```
accuaracy: 0.7731958762886598  
Mean Absolute Error: 0.44329896907216493
```

	label	recall_score	precision_score
0	0	0.966667	0.763158
1	1	0.923077	0.800000
2	2	0.904762	0.730769
3	3	0.150000	1.000000

conclusion

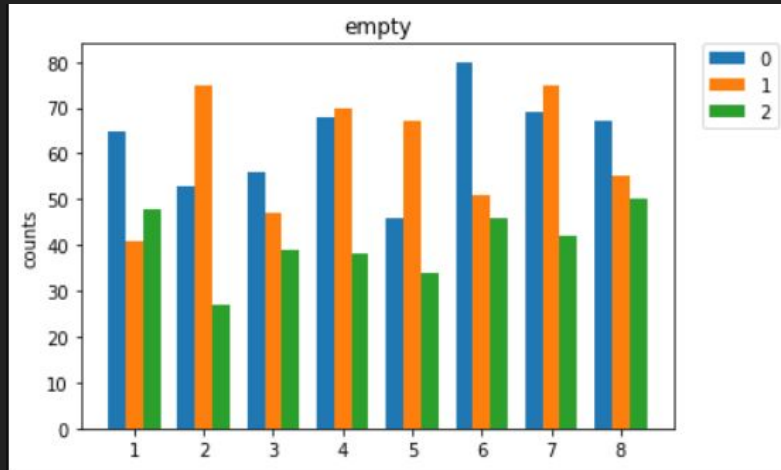
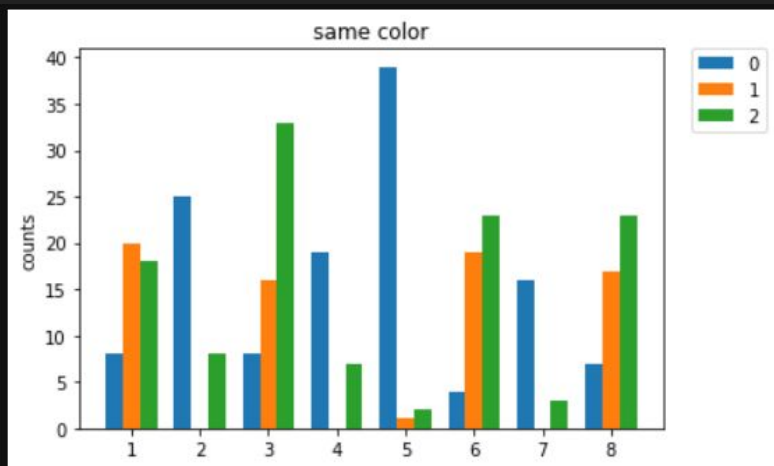
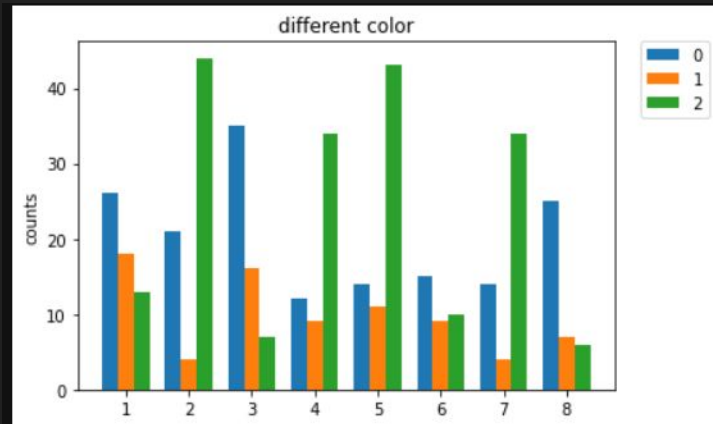
根據結果，可以看出模型在預測這三種以外的術語結果不好，原因可能是因為3*3太小，能判斷出的術語很有限。



Label: 0:長 1:間 2:斷 3:都不
是

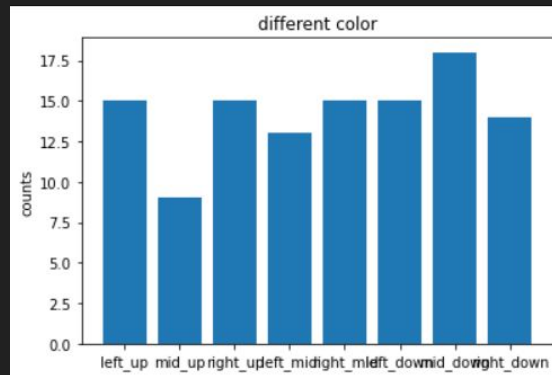
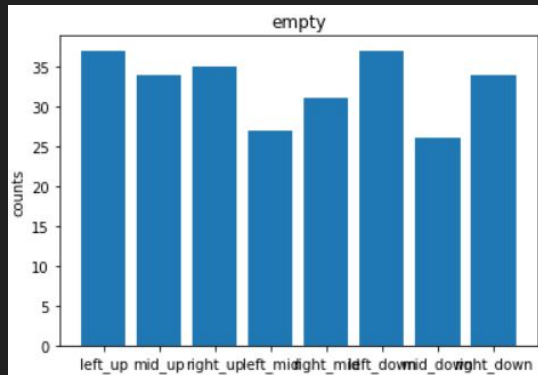
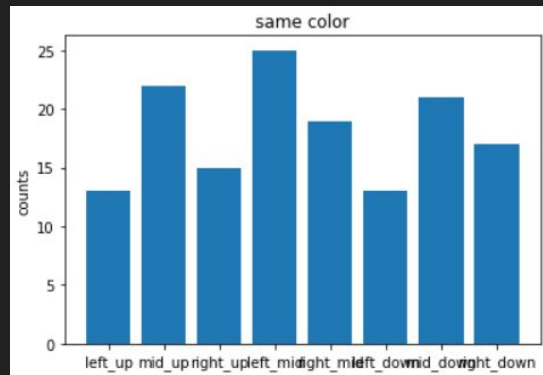
conclusion-Data Visualization

在三者的分類上，各類有比較明確的特徵。
因此能在三者做出不錯的分類。



conclusion-Data Visualization (label=3 都不是)

在三種以外的feature中，沒有很明確的特徵
對於"都不是"的資料傾向亂猜



application

在三者的預測結果不錯，能對現況棋盤做簡單的預測

在三者(長、尖、斷)以外的分辨需要其他更具明顯的特徵

有些術語需要更大的範圍才能判斷(飛、跳)，我們可以用5*5, 7*7的尺寸判斷更多數語。

有些術語則需直接判斷座標位置才能判斷(五之五、天元)。

工作比例分配

0712534 陳永承 40%

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