كلية الحاسبات والذكاء الإصطناعي
Faculty of Computers & Artificial Intelligence

جامعة حلوان
HELWAN UNIVERSITY

Selected2 cover sheet

Faculty of computer and artificial intelligence.

CS396_Selected CS2 (2021-2022).

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Image Classification Based on the Boost Convolutional Neural Network

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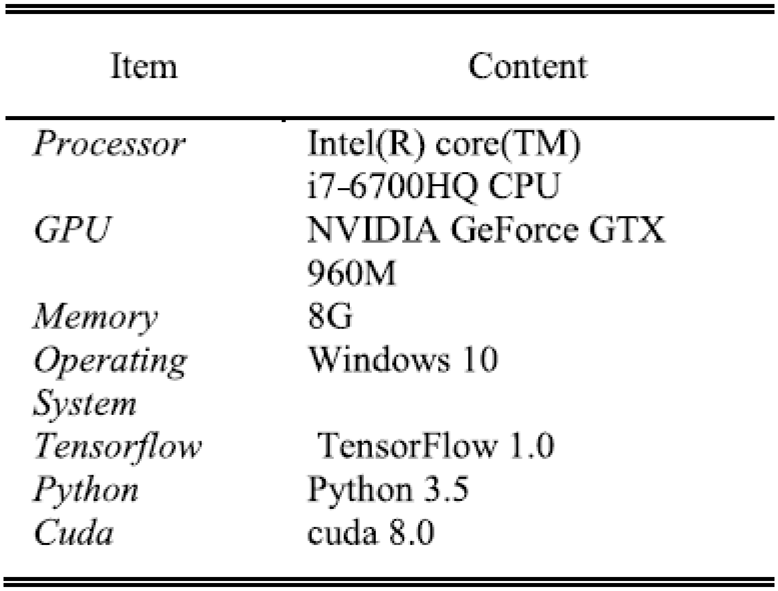
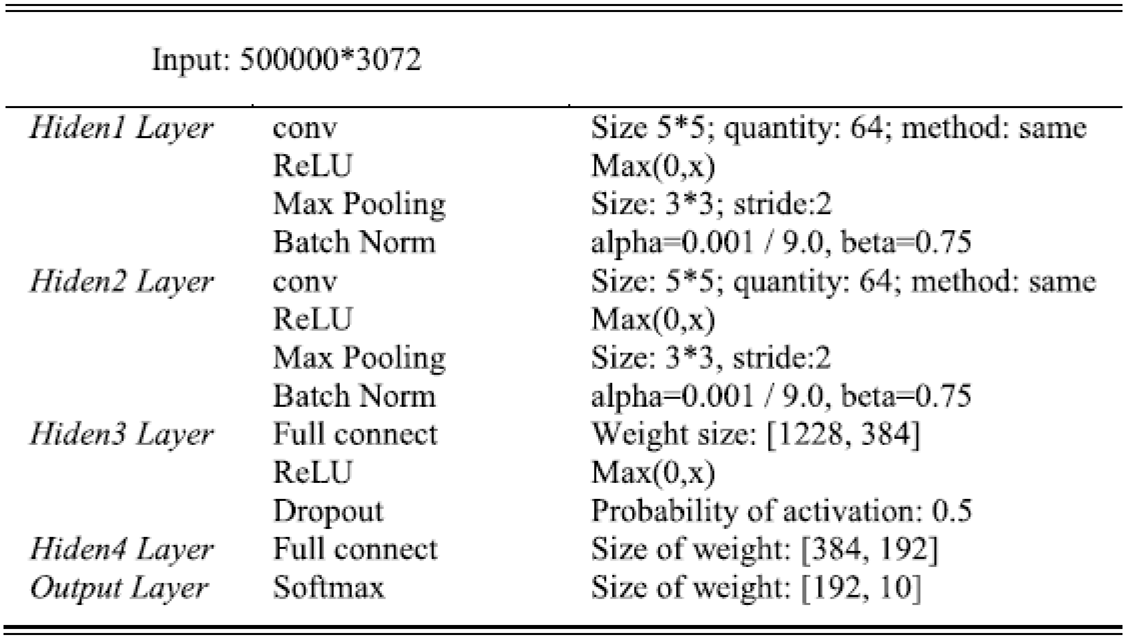
TABLE 1. Hardware and software of computer.



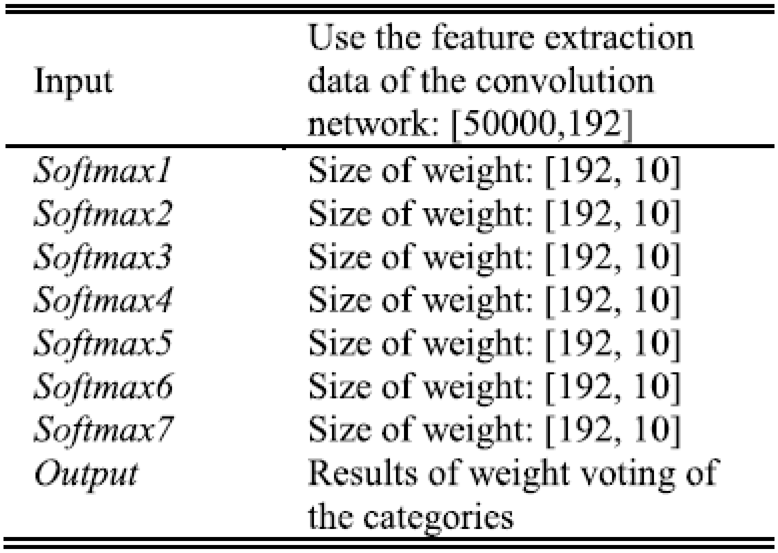
Item	Content
Processor	Intel(R) core(TM) i7-6700HQ CPU
GPU	NVIDIA GeForce GTX 960M
Memory	8G
Operating System	Windows 10
Tensorflow	TensorFlow 1.0
Python	Python 3.5
Cuda	cuda 8.0

TABLE 2. Specification of CNN configuration.



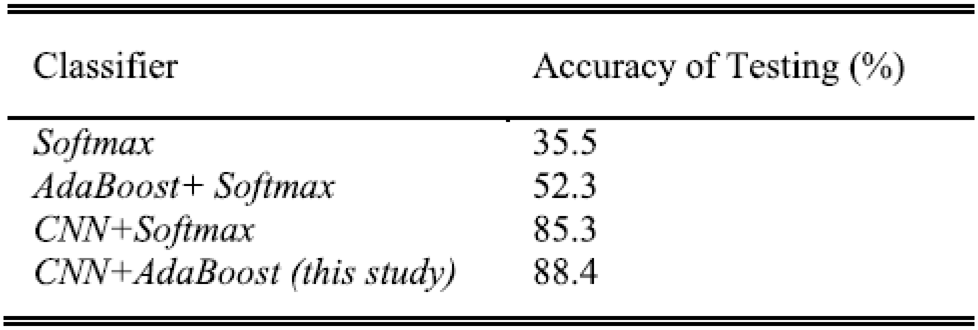
Input: 500000*3072		
Hiden1 Layer	conv	Size 5*5; quantity: 64; method: same
	ReLU	Max(0,x)
	Max Pooling	Size: 3*3; stride:2
	Batch Norm	alpha=0.001 / 9.0, beta=0.75
Hiden2 Layer	conv	Size: 5*5; quantity: 64; method: same
	ReLU	Max(0,x)
	Max Pooling	Size: 3*3, stride:2
	Batch Norm	alpha=0.001 / 9.0, beta=0.75
Hiden3 Layer	Full connect	Weight size: [1228, 384]
	ReLU	Max(0,x)
	Dropout	Probability of activation: 0.5
Hiden4 Layer	Full connect	Size of weight: [384, 192]
Output Layer	Softmax	Size of weight: [192, 10]

TABLE 3. Configuration of adaboost.



Input	Use the feature extraction data of the convolution network: [50000,192]
Softmax1	Size of weight: [192, 10]
Softmax2	Size of weight: [192, 10]
Softmax3	Size of weight: [192, 10]
Softmax4	Size of weight: [192, 10]
Softmax5	Size of weight: [192, 10]
Softmax6	Size of weight: [192, 10]
Softmax7	Size of weight: [192, 10]
Output	Results of weight voting of the categories

TABLE 4. Experimental comparison of CIFAR-10 testing datasets.



Classifier	Accuracy of Testing (%)
Softmax	35.5
AdaBoost+ Softmax	52.3
CNN+Softmax	85.3
CNN+AdaBoost (this study)	88.4

Project Description Document:

General Information on the selected dataset:

Rock-Paper-Scissors

https://drive.google.com/drive/folders/1ERpc8o3Z1o8srtvMkmrQKGf-5_1ZdiJH?usp=sharing

Total number of samples: 2892 sample.

the dimension of images: (227, 227, 1).

number of classes: (3).

their labels:

1-paper

2-scissors

3-rock

CIFAR-10

https://www.cs.toronto.edu/~kriz/cifar.html

Total number of samples: 60000 sample.

the dimension of images: (32, 32, 3).

number of classes: (10).

their labels:

(1-airplane, 2-automobile ,3-bird, 4-cat ,5-deer ,6-dog, 7-frog ,8-horse, 9-ship, 10-truck)

Implementation details:

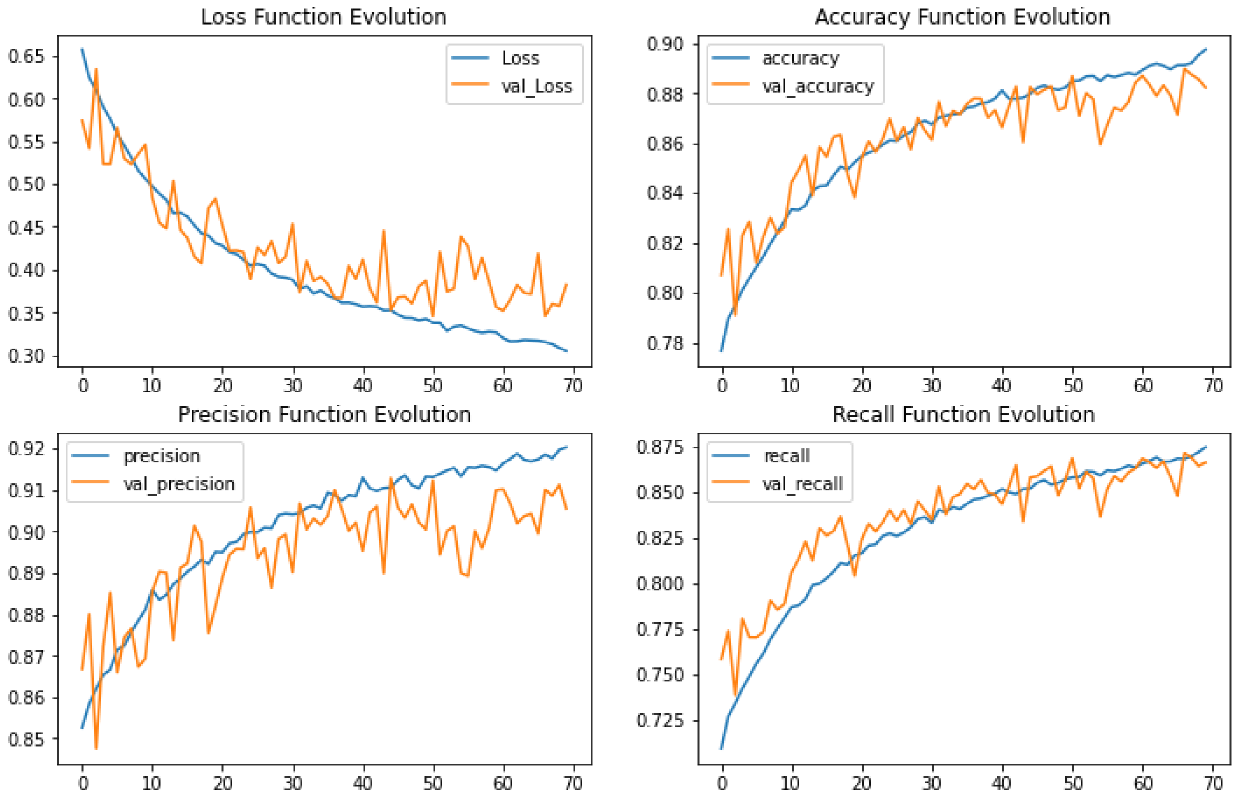
CIFAR-10

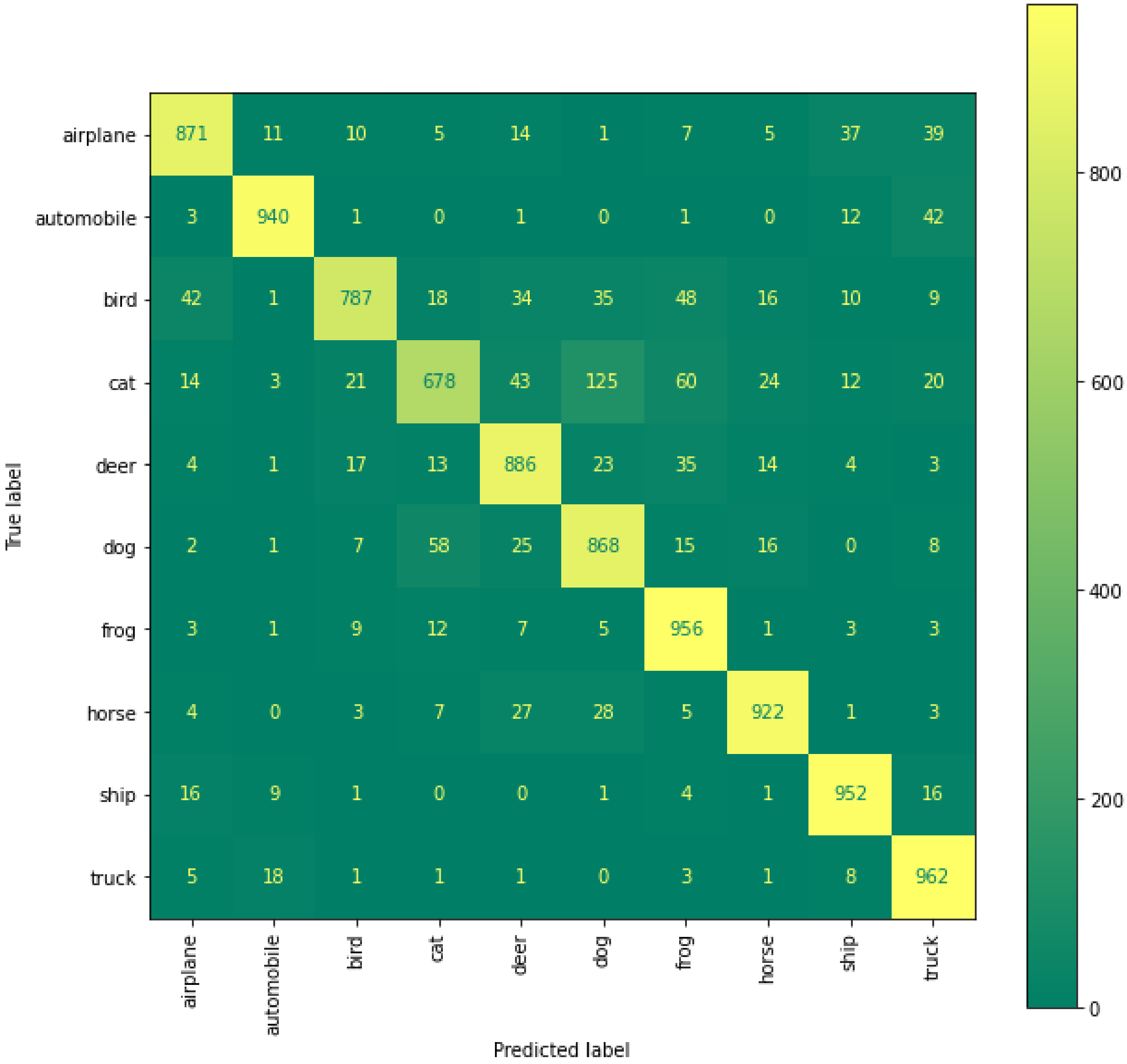
Training (83.3%=50000 image), validation (16.67%=10000) and testing (16.67%=10000).

Rock-Paper-Scissors

Training (87.13%=2520 image), validation (0) and testing (12.86%=372).

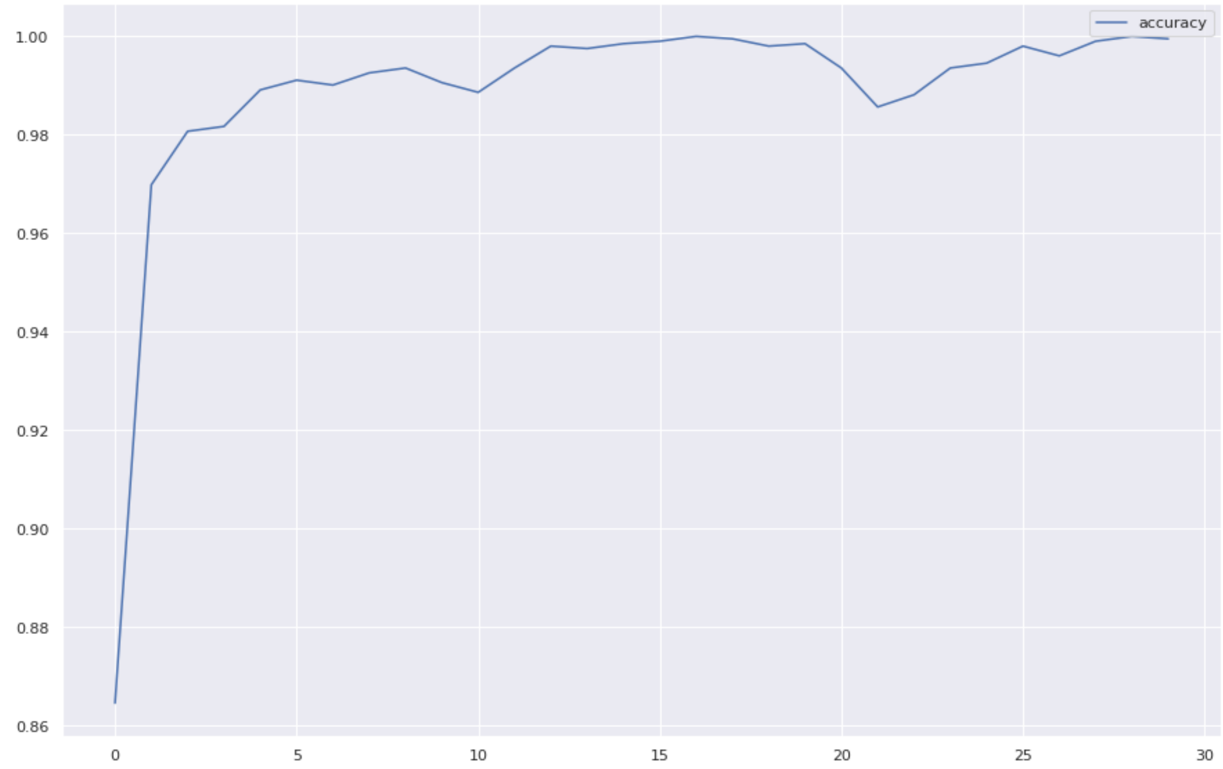
CNN on cifar-10

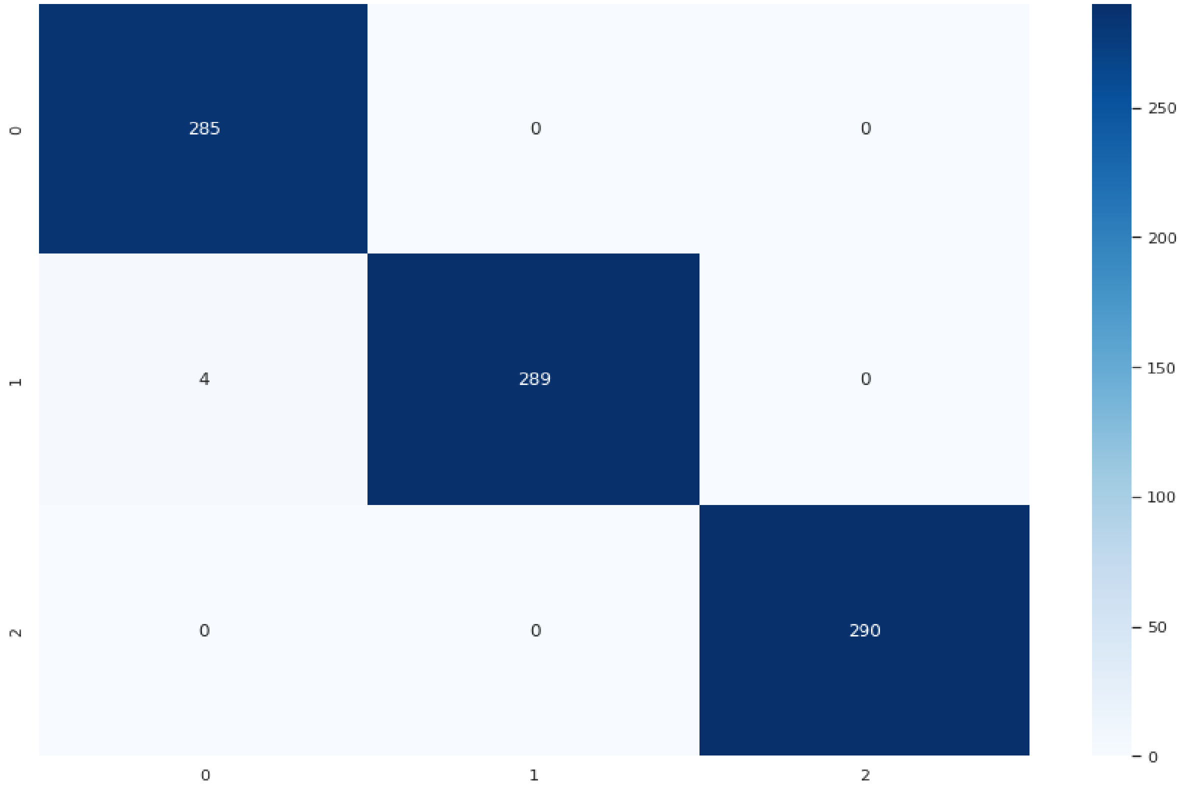




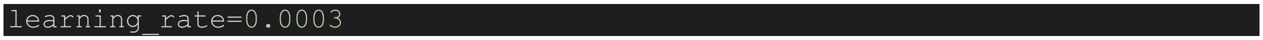
True label \ Predicted label	airplane	automobile	bird	cat	deer	dog	frog	horse	ship	truck
airplane	871	11	10	5	14	1	7	5	37	39
automobile	3	940	1	0	1	0	1	0	12	42
bird	42	1	787	18	34	35	48	16	10	9
cat	14	3	21	678	43	125	60	24	12	20
deer	4	1	17	13	886	23	35	14	4	3
dog	2	1	7	58	25	868	15	16	0	8
frog	3	1	9	12	7	5	956	1	3	3
horse	4	0	3	7	27	28	5	922	1	3
ship	16	9	1	0	0	1	4	1	952	16
truck	5	18	1	1	1	0	3	1	8	962

CNN on Rock-Paper-Scissors





hyperparameters used in your model:

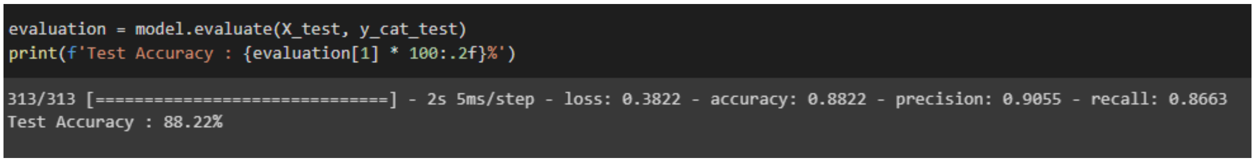


```
learning_rate=0.0003
```

Rock-Paper-Scissors training model

Results details:

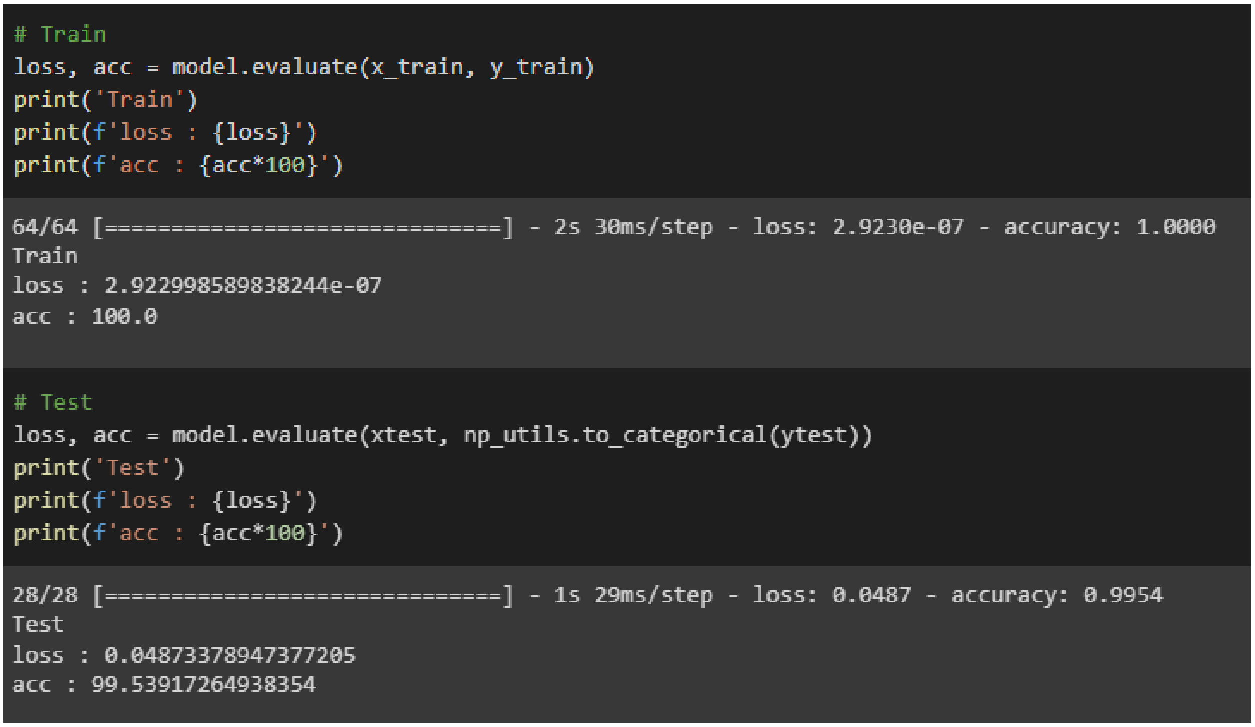
CNN on cifar-10



```
evaluation = model.evaluate(X_test, y_cat_test)
print(f'Test Accuracy : {evaluation[1] * 100:.2f}%')
```

```
313/313 [==============================] - 2s 5ms/step - loss: 0.3822 - accuracy: 0.8822 - precision: 0.9055 - recall: 0.8663
Test Accuracy : 88.22%
```

CNN on Rock-Paper-Scissors



```
# Train
loss, acc = model.evaluate(x_train, y_train)
print('Train')
print(f'loss : {loss}')
print(f'acc : {acc*100}')
```

```
64/64 [==============================] - 2s 30ms/step - loss: 2.9230e-07 - accuracy: 1.0000
Train
loss : 2.922998589838244e-07
acc : 100.0
```

```
# Test
loss, acc = model.evaluate(xtest, np_utils.to_categorical(ytest))
print('Test')
print(f'loss : {loss}')
print(f'acc : {acc*100}')
```

```
28/28 [==============================] - 1s 29ms/step - loss: 0.0487 - accuracy: 0.9954
Test
loss : 0.048733789473772O5
acc : 99.53917264938354
```