```
import numpy as np
import tensorflow as tf
from tensorflow import keras
import time
import os

# Import th data
Data = 'data.npy'
data = np.load(Data, allow_pickle=True)
Name = 'Voice-Over-Self-Driving-Convolutional-Network'
tensorboard = keras.callbacks.TensorBoard(log_dir='logs/{}'.format(Name))

# Declare the required arrays
imgs = []
labels = []

# Class names
class_names = ['W', 'S', 'A', 'D']

# Input to the arrays
for img, keys in data:
    imgs.append(img)
    if keys == [1, 0, 0, 0]:
        label = 0
    elif keys == [0, 1, 0, 0]:
        label = 1
    elif keys == [0, 0, 1, 0]:
        label = 2
    elif keys == [0, 0, 0, 1]:
        label = 3
    else:
        label = 0
    labels.append(label)

##print(len(imgs), len(labels))

# Train and Test data
train_images = imgs[:-8]
train_labels = labels[:-8]

test_images = imgs[-8:]
test_labels = labels[-8:]

train_images = np.asarray(train_images)
test_images = np.asarray(test_images)

train_images = train_images.reshape((-1, 60, 80, 1))
test_images = test_images.reshape((-1, 60, 80, 1))

# Image Processing
train_images = train_images / 255.0
test_images = test_images / 255.0

# Sequential Model
# Sequential Model
# Convolutional Neural Network
model = keras.Sequential([
    keras.layers.Conv2D(32, (2, 2), activation='relu', input_shape=(60, 80, 1)),
    keras.layers.MaxPooling2D((2, 2)),
    keras.layers.Conv2D(64, (3, 3), activation='relu'),
    keras.layers.MaxPooling2D((2, 2)),
    keras.layers.Conv2D(64, (3, 3), activation='relu'),
    keras.layers.MaxPooling2D((2, 2)),
    keras.layers.Dropout(0.25),
    keras.layers.Flatten(),
    keras.layers.Dense(512, activation=tf.nn.relu),
    keras.layers.Dense(128, activation=tf.nn.relu),
    keras.layers.Dense(128, activation=tf.nn.relu),
    keras.layers.Dense(len(class_names), activation=tf.nn.softmax)
])

# Compile the model
model.compile(optimizer=tf.train.AdamOptimizer(),
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])

# Train the Model
history = model.fit(train_images, train_labels, epochs=100, callbacks=[tensorboard])
## tensorboard --logdir=logs/ --host=127.0.0.1

# Save the Model
model.save(Name + '.model')

# Print the Summary
model.summary()

# Accuracy of the Model
test_loss, test_acc = model.evaluate(test_images, test_labels)

# Print Test accuracy
print('Test accuracy:', test_acc*100, '%')

# Make Predictions
predictions = model.predict([test_images])[0]
predicted_label = class_names[np.argmax(predictions)]

# Compare the predictions
print("Predictions : ",predicted_label)
print("Actual : ",class_names[test_labels[0]])

# ##print(history.history.keys())
# # summarize history for accuracy
# plt.plot(history.history['acc'])
# plt.plot(history.history['loss'])
# plt.title('Model')
# plt.ylabel('Result')
# plt.xlabel('Epochs')
# plt.legend(['Accuracy', 'Loss'], loc='upper right')
# plt.show()
```

```
Train on 32 samples
Epoch 1/100
32/32 [==============================] - 0s 9ms/sample - loss: 1.3849 - acc: 0.2812
Epoch 2/100
32/32 [==============================] - 0s 460us/sample - loss: 1.3794 - acc: 0.2812
Epoch 3/100
32/32 [==============================] - 0s 209us/sample - loss: 1.3705 - acc: 0.3125
Epoch 4/100
32/32 [==============================] - 0s 208us/sample - loss: 1.3669 - acc: 0.2500
Epoch 5/100
32/32 [==============================] - 0s 215us/sample - loss: 1.3544 - acc: 0.3438
Epoch 6/100
32/32 [==============================] - 0s 273us/sample - loss: 1.3475 - acc: 0.4375
Epoch 7/100
32/32 [==============================] - 0s 258us/sample - loss: 1.3549 - acc: 0.4375
Epoch 8/100
32/32 [==============================] - 0s 213us/sample - loss: 1.3338 - acc: 0.3438
Epoch 9/100
32/32 [==============================] - 0s 248us/sample - loss: 1.3361 - acc: 0.5000
Epoch 10/100
32/32 [==============================] - 0s 210us/sample - loss: 1.3201 - acc: 0.3438
Epoch 11/100
32/32 [==============================] - 0s 226us/sample - loss: 1.2854 - acc: 0.4375
Epoch 12/100
32/32 [==============================] - 0s 217us/sample - loss: 1.2940 - acc: 0.4688
Epoch 13/100
32/32 [==============================] - 0s 205us/sample - loss: 1.2698 - acc: 0.4062
Epoch 14/100
32/32 [==============================] - 0s 227us/sample - loss: 1.2202 - acc: 0.4062
Epoch 15/100
32/32 [==============================] - 0s 225us/sample - loss: 1.2148 - acc: 0.5000
Epoch 16/100
32/32 [==============================] - 0s 227us/sample - loss: 1.2253 - acc: 0.5000
Epoch 17/100
32/32 [==============================] - 0s 223us/sample - loss: 1.2345 - acc: 0.4375
Epoch 18/100
32/32 [==============================] - 0s 228us/sample - loss: 1.1799 - acc: 0.5000
Epoch 19/100
32/32 [==============================] - 0s 211us/sample - loss: 1.2766 - acc: 0.3125
Epoch 20/100
32/32 [==============================] - 0s 220us/sample - loss: 1.1268 - acc: 0.5312
Epoch 21/100
32/32 [==============================] - 0s 228us/sample - loss: 1.3237 - acc: 0.5625
Epoch 22/100
32/32 [==============================] - 0s 255us/sample - loss: 1.0524 - acc: 0.5000
Epoch 23/100
32/32 [==============================] - 0s 412us/sample - loss: 1.1948 - acc: 0.4688
Epoch 24/100
32/32 [==============================] - 0s 282us/sample - loss: 1.0798 - acc: 0.5625
Epoch 25/100
32/32 [==============================] - 0s 322us/sample - loss: 1.0388 - acc: 0.5625
Epoch 26/100
32/32 [==============================] - 0s 308us/sample - loss: 1.0072 - acc: 0.6562
Epoch 27/100
32/32 [==============================] - 0s 215us/sample - loss: 1.0355 - acc: 0.5938
Epoch 28/100
32/32 [==============================] - 0s 210us/sample - loss: 0.9270 - acc: 0.6875
Epoch 29/100
32/32 [==============================] - 0s 232us/sample - loss: 0.8886 - acc: 0.7812
Epoch 30/100
32/32 [==============================] - 0s 278us/sample - loss: 0.9560 - acc: 0.5000
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Epoch 31/100
32/32 [==============================] - 0s 280us/sample - loss: 0.7796 - acc: 0.8438
Epoch 32/100
32/32 [==============================] - 0s 260us/sample - loss: 0.7869 - acc: 0.7812
Epoch 33/100
32/32 [==============================] - 0s 264us/sample - loss: 0.7845 - acc: 0.6875
Epoch 34/100
32/32 [==============================] - 0s 233us/sample - loss: 0.8025 - acc: 0.6875
Epoch 35/100
32/32 [==============================] - 0s 287us/sample - loss: 0.8048 - acc: 0.7500
Epoch 36/100
32/32 [==============================] - 0s 348us/sample - loss: 0.6300 - acc: 0.8438
Epoch 37/100
32/32 [==============================] - 0s 275us/sample - loss: 0.5877 - acc: 0.8125
Epoch 38/100
32/32 [==============================] - 0s 222us/sample - loss: 0.6342 - acc: 0.6875
Epoch 39/100
32/32 [==============================] - 0s 336us/sample - loss: 1.1610 - acc: 0.5000
Epoch 40/100
32/32 [==============================] - 0s 244us/sample - loss: 0.5821 - acc: 0.6875
Epoch 41/100
32/32 [==============================] - 0s 289us/sample - loss: 1.2678 - acc: 0.5625
Epoch 42/100
32/32 [==============================] - 0s 292us/sample - loss: 0.5765 - acc: 0.7188
Epoch 43/100
32/32 [==============================] - 0s 279us/sample - loss: 0.9722 - acc: 0.6875
Epoch 44/100
32/32 [==============================] - 0s 227us/sample - loss: 0.6137 - acc: 0.8125
Epoch 45/100
32/32 [==============================] - 0s 211us/sample - loss: 0.5629 - acc: 0.7500
Epoch 46/100
32/32 [==============================] - 0s 201us/sample - loss: 0.6800 - acc: 0.7188
Epoch 47/100
32/32 [==============================] - 0s 281us/sample - loss: 0.6886 - acc: 0.7500
Epoch 48/100
32/32 [==============================] - 0s 228us/sample - loss: 0.5035 - acc: 0.9375
Epoch 49/100
32/32 [==============================] - 0s 201us/sample - loss: 0.5080 - acc: 0.8750
Epoch 50/100
32/32 [==============================] - 0s 211us/sample - loss: 0.5883 - acc: 0.8750
Epoch 51/100
32/32 [==============================] - 0s 365us/sample - loss: 0.5250 - acc: 0.9062
Epoch 52/100
32/32 [==============================] - 0s 286us/sample - loss: 0.4307 - acc: 0.8750
Epoch 53/100
32/32 [==============================] - 0s 213us/sample - loss: 0.4344 - acc: 0.8750
Epoch 54/100
32/32 [==============================] - 0s 328us/sample - loss: 0.3882 - acc: 0.9375
Epoch 55/100
32/32 [==============================] - 0s 239us/sample - loss: 0.3656 - acc: 0.8750
Epoch 56/100
32/32 [==============================] - 0s 253us/sample - loss: 0.3151 - acc: 0.9375
Epoch 57/100
32/32 [==============================] - 0s 262us/sample - loss: 0.2919 - acc: 0.9062
Epoch 58/100
32/32 [==============================] - 0s 312us/sample - loss: 0.3889 - acc: 0.8750
Epoch 59/100
32/32 [==============================] - 0s 239us/sample - loss: 0.1750 - acc: 0.9688
Epoch 60/100
32/32 [==============================] - 0s 262us/sample - loss: 0.3838 - acc: 0.7812
Epoch 61/100
32/32 [==============================] - 0s 285us/sample - loss: 0.3352 - acc: 0.8750
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