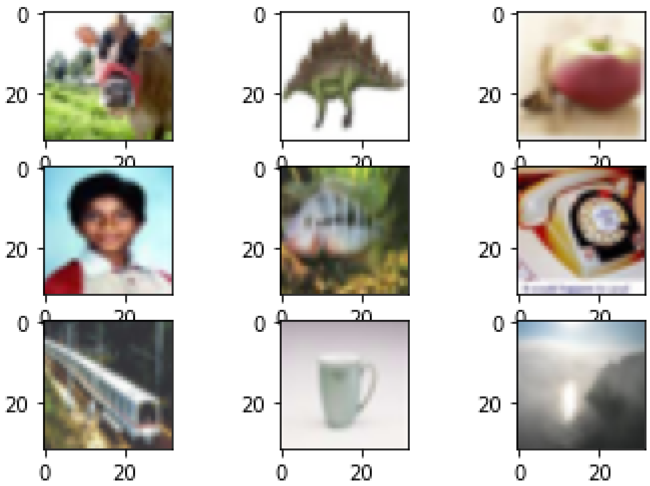
CNN_cifa100

```
import matplotlib.pyplot as plt
from keras.datasets import cifar100
from tensorflow.keras.utils import to_categorical
```

```
(x_train,y_train), (x_test,y_test) = cifar100.load_data()
print(x_train.shape)
print(x_test.shape)
```

```
     Downloading data from https://www.cs.toronto.edu/~kriz/cifar-100-python.tar.gz
     169009152/169001437 [==============================] - 2s 0us/step
     169017344/169001437 [==============================] - 2s 0us/step
     (50000, 32, 32, 3)
     (10000, 32, 32, 3)
```

```
for i in range(9):
  plt.subplot(330+i+1)
  plt.imshow(x_train[i])
plt.show()
```



```
x = x_test
x_train = x_train.astype('float32')
x_test = x_test.astype('float32')
x_train /= 255
x_test /= 255
y_train = to_categorical(y_train,100)
y_test = to_categorical(y_test,100)
```

```
from keras.layers.convolutional import Conv2D
from keras.models import Sequential
from tensorflow.keras.layers import MaxPooling2D, Flatten
model = Sequential()
model.add(Conv2D(32,(3,3), activation='relu', padding='same', input_shape=(32,32,3)))
model.add(Conv2D(32,(3,3), activation='relu', kernel_initializer='he_uniform',padding='same'))
model.add(MaxPooling2D((2,2)))
model.add(Conv2D(64,(3,3), activation='relu', padding='same', input_shape=(32,32,3)))
model.add(Conv2D(64,(3,3), activation='relu', kernel_initializer='he_uniform',padding='same'))
model.add(MaxPooling2D((2,2)))
```

```
model.add(Conv2D(128,(3,3), activation='relu', padding='same', input_shape=(32,32,3)))
model.add(Conv2D(128,(3,3), activation='relu', kernel_initializer='he_uniform',padding='same'))
model.add(MaxPooling2D((2,2)))
```

```
from keras.layers import Dense, Activation, Dropout
model.add(Flatten())
model.add(Dense(128,activation='relu', kernel_initializer='he_uniform'))
model.add(Dense(100,activation='softmax'))
```

```
from tensorflow.keras.optimizers import SGD
opt = SGD(lr=0.01,momentum = 0.9)
model.compile(optimizer=opt, loss='categorical_crossentropy', metrics=['accuracy'])
```

```
    /usr/local/lib/python3.7/dist-packages/keras/optimizer_v2/gradient_descent.py:102: UserWarning
      super(SGD, self).__init__(name, **kwargs)
```

```
history = model.fit(x_train, y_train, epochs=5, batch_size=64, validation_data=(x_test, y_test), ver
```

```
    Epoch 1/5
    782/782 [==============================] - 19s 9ms/step - loss: 4.2256 - accuracy: 0.0576 - va
    Epoch 2/5
    782/782 [==============================] - 7s 8ms/step - loss: 3.4531 - accuracy: 0.1779 - val_
    Epoch 3/5
    782/782 [==============================] - 7s 9ms/step - loss: 2.9852 - accuracy: 0.2642 - val_
    Epoch 4/5
    782/782 [==============================] - 7s 9ms/step - loss: 2.6526 - accuracy: 0.3322 - val_
    Epoch 5/5
    782/782 [==============================] - 7s 9ms/step - loss: 2.3822 - accuracy: 0.3871 - val_
```

```
score = model.evaluate(x_test, y_test,verbose=0)
print('Sai so kiem tra la:', score[0])
print('Do chinh xac kiem tra la:', score[1]*100)
```

```
    Sai so kiem tra la: 2.542343854904175
    Do chinh xac kiem tra la: 36.17999851703644
```

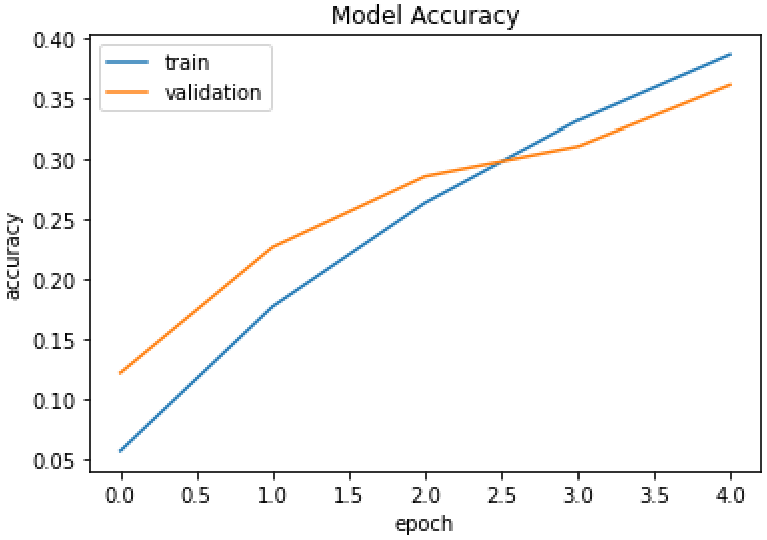
```
model.save('Cifar100.h5')
```

```
from keras.models import load_model
model1 = load_model('Cifar100.h5')
```

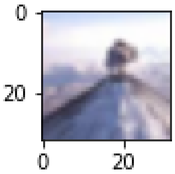
```
plt.plot(history.history['accuracy'])
plt.plot(history.history['val_accuracy'])
plt.title('Model Accuracy')
plt.ylabel('accuracy')
plt.xlabel('epoch')
plt.legend(['train','validation'], loc='upper-left')

     /usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:6: MatplotlibDeprecationWarning:
             best
             upper right
             upper left
             lower left
             lower right
             right
             center left
             center right
             lower center
             upper center
             center
     This will raise an exception in 3.3.

     <matplotlib.legend.Legend at 0x7f97ae34bf90>
```



```
import numpy as np
y_pred = model.predict(x_test)
for i in range (9):
  plt.subplot(330+i+1)    # 330 mean: 3 hang 3 cot
  plt.imshow(x[i])
  plt.show()
  print(np.round(y_pred[i]))
```



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 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
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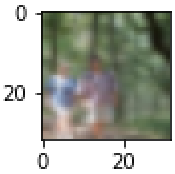

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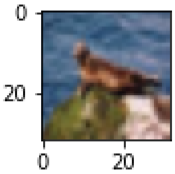

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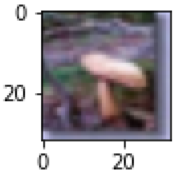

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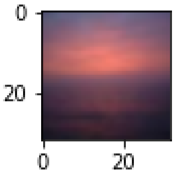

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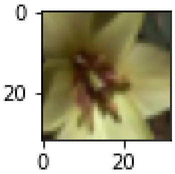

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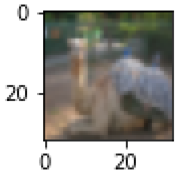

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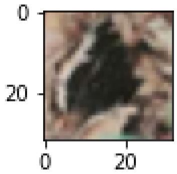

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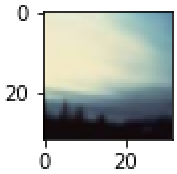

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