

```
In [1]: import os
import re
import numpy as np
from PIL import Image
from keras.layers import Dense
import matplotlib.pyplot as plt
from keras.models import Sequential
from keras.preprocessing import image
from keras.utils import to_categorical
from sklearn.model_selection import train_test_split
```

```
/home/forbidden_devil/anaconda3/lib/python3.6/site-packages/h5py/__init__.py:34: FutureWarning: Conversion of the second argument of issubdtype from `float` to `np.floating` is deprecated. In future, it will be treated as `np.float64 == np.dtype(float).type`.
    from ._conv import register_converters as _register_converters
Using TensorFlow backend.
```

```
In [2]: REGEX = r'(obj)([0-9]+)(\_)(.*)'

def get_data_and_label(path):
    label = int(re.search(REGEX, path).group(2))
    f = Image.open(path)
    f.thumbnail((28, 28), Image.ANTIALIAS)
    arr = np.array(f).flatten()
    f.close()
    return arr, label

data_dir = os.path.join(os.getcwd(), './coil-20-proc/')
```

```
In [3]: images, labels = [], []
for file in os.listdir(data_dir):
    path = os.path.join(data_dir, file)
    arr, label = get_data_and_label(path)
    images.append(arr)
    labels.append(label)

images = np.array(images) / 255.0
labels = np.array(labels)
labels = labels - 1
images.shape, labels.shape
```

```
Out[3]: ((1440, 784), (1440,))
```

```
In [4]: labels = to_categorical(labels)
images.shape, labels.shape
```

```
Out[4]: ((1440, 784), (1440, 20))
```

```
In [5]: # Splitting data in train and test dataset
X_train, X_test, y_train, y_test = train_test_split(images, labels, test_size=0.8, random_state=42)
```

```
In [6]: model = Sequential()
model.add(Dense(100, activation='relu', input_shape=(784,)))
model.add(Dense(20, activation='sigmoid'))
model.compile(optimizer='rmsprop', loss='mse', metrics=['acc'])
```

```
In [9]: hist = model.fit(X_train, y_train, epochs = 10, batch_size = 10 , validation_data = (X_test,y_test))
```

Train on 288 samples, validate on 1152 samples

Epoch 1/10

288/288 [=====] - 1s 3ms/step - loss: 0.0032 - acc: 0.9375 - val\_loss: 0.0107 - val\_acc: 0.8385

Epoch 2/10

288/288 [=====] - 1s 3ms/step - loss: 0.0032 - acc: 0.9410 - val\_loss: 0.0107 - val\_acc: 0.8368

Epoch 3/10

288/288 [=====] - 1s 3ms/step - loss: 0.0031 - acc: 0.9410 - val\_loss: 0.0151 - val\_acc: 0.8359

Epoch 4/10

288/288 [=====] - 1s 3ms/step - loss: 0.0034 - acc: 0.9410 - val\_loss: 0.0104 - val\_acc: 0.8411

Epoch 5/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0105 - val\_acc: 0.8377

Epoch 6/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0107 - val\_acc: 0.8394

Epoch 7/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0107 - val\_acc: 0.8385

Epoch 8/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0102 - val\_acc: 0.8403

Epoch 9/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0102 - val\_acc: 0.8403

Epoch 10/10

288/288 [=====] - 1s 3ms/step - loss: 0.0030 - acc: 0.9410 - val\_loss: 0.0106 - val\_acc: 0.8394