```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
from sklearn.metrics import confusion_matrix
import seaborn as sns ; sns.set(font_scale=1.4)
from sklearn.utils import shuffle
import matplotlib.pyplot as plt
import cv2
import tensorflow as tf
import keras
import os
from tqdm import tqdm
```

```
class_name=['mountain','street','glacier','buildings','sea','forest']
class_name_labels={class_name:i for i , class_name in enumerate(class_name)}
nb_classes=len(class_name)
Image_size=(150,150)
class_name_labels
```

```
{'mountain': 0,
 'street': 1,
 'glacier': 2,
 'buildings': 3,
 'sea': 4,
 'forest': 5}
```

```
def load_data():
    data_sets=['/content/drive/MyDrive/Company Project/Akra Tech Pvt ltd/seg_train','/content/drive/MyDrive/Comp
    output=[]

    for dataset in data_sets:
        images=[]
        labels=[]
        print("Loading {}".format(dataset))

        for folder in os.listdir(dataset):
            label=class_name_labels[folder]

            for file in tqdm(os.listdir(os.path.join(dataset,folder))):
                image_path=os.path.join(os.path.join(dataset,folder),file)
                image=cv2.imread(image_path)
                image=cv2.cvtColor(image,cv2.COLOR_BGR2RGB)
                image=cv2.resize(image,Image_size)
                images.append(image)
                labels.append(label)
        images=np.array(images,dtype='float32')
        labels=np.array(labels,dtype='int32')
        output.append((images,labels))

    return output
```

```
(train_images,train_labels),(test_images,test_labels)=load_data()
```

```
Loading /content/drive/MyDrive/Company Project/Akra Tech Pvt ltd/seg_train
100%|██████████| 2191/2191 [01:29<00:00, 24.56it/s]
100%|██████████| 2271/2271 [01:34<00:00, 23.99it/s]
100%|██████████| 2404/2404 [01:34<00:00, 25.51it/s]
100%|██████████| 2512/2512 [01:36<00:00, 25.91it/s]
100%|██████████| 2274/2274 [01:31<00:00, 24.92it/s]
100%|██████████| 2382/2382 [02:12<00:00, 18.04it/s]
Loading /content/drive/MyDrive/Company Project/Akra Tech Pvt ltd/seg_test
100%|██████████| 525/525 [00:19<00:00, 27.02it/s]
100%|██████████| 510/510 [00:17<00:00, 29.02it/s]
100%|██████████| 474/474 [00:13<00:00, 34.54it/s]
100%|██████████| 437/437 [00:11<00:00, 39.54it/s]
100%|██████████| 501/501 [00:14<00:00, 34.44it/s]
100%|██████████| 553/553 [00:15<00:00, 34.57it/s]
```

```
train_images,train_labels=shuffle(train_images,train_labels,random_state=20)
```

```
print(train_labels.shape[0])
print(test_labels.shape[0])
print(Image_size)
```

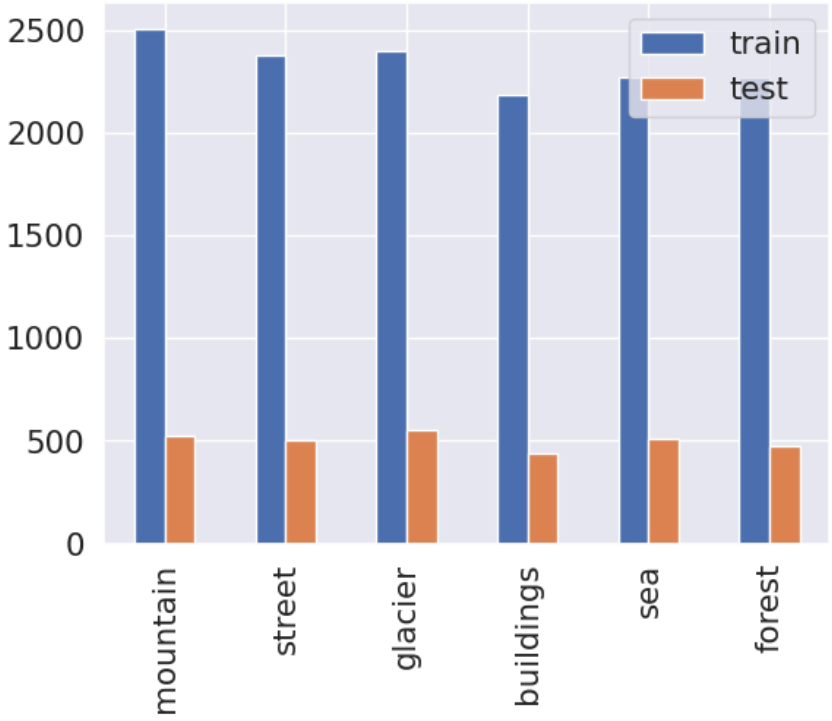
```
14034
3000
(150, 150)
```

```
_,train_counts=np.unique(train_labels,return_counts=True)
_,test_counts=np.unique(test_labels,return_counts=True)
pd.DataFrame({'train':train_counts,'test':test_counts},index=class_name)
```

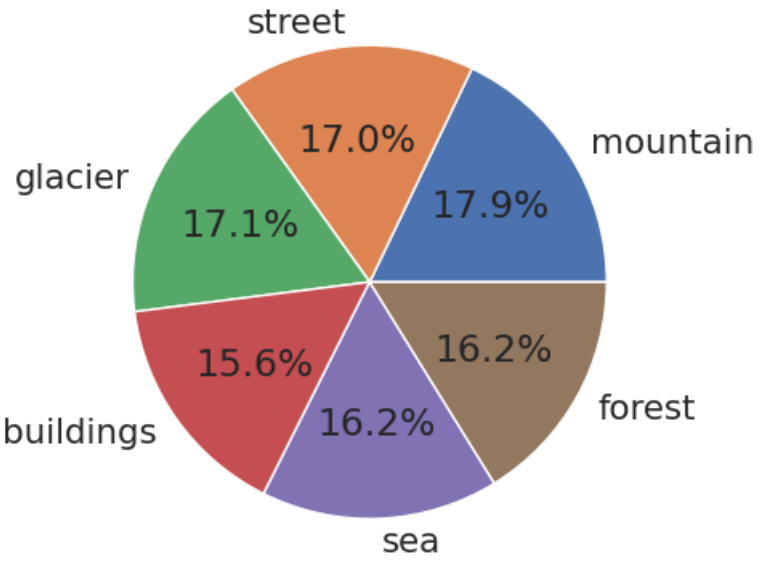
	train	test
mountain	2512	525
street	2382	501
glacier	2404	553
buildings	2191	437
sea	2274	510
forest	2271	474

```
pd.DataFrame({'train':train_counts,'test':test_counts},index=class_name).plot.bar()
```

```
<Axes: >
```




```
plt.pie(train_counts,explode=(0,0,0,0,0,0),labels=class_name,autopct='%1.1f%%')
plt.show()
```




```
train_images=train_images/255.0
test_images=test_images/255.0
```

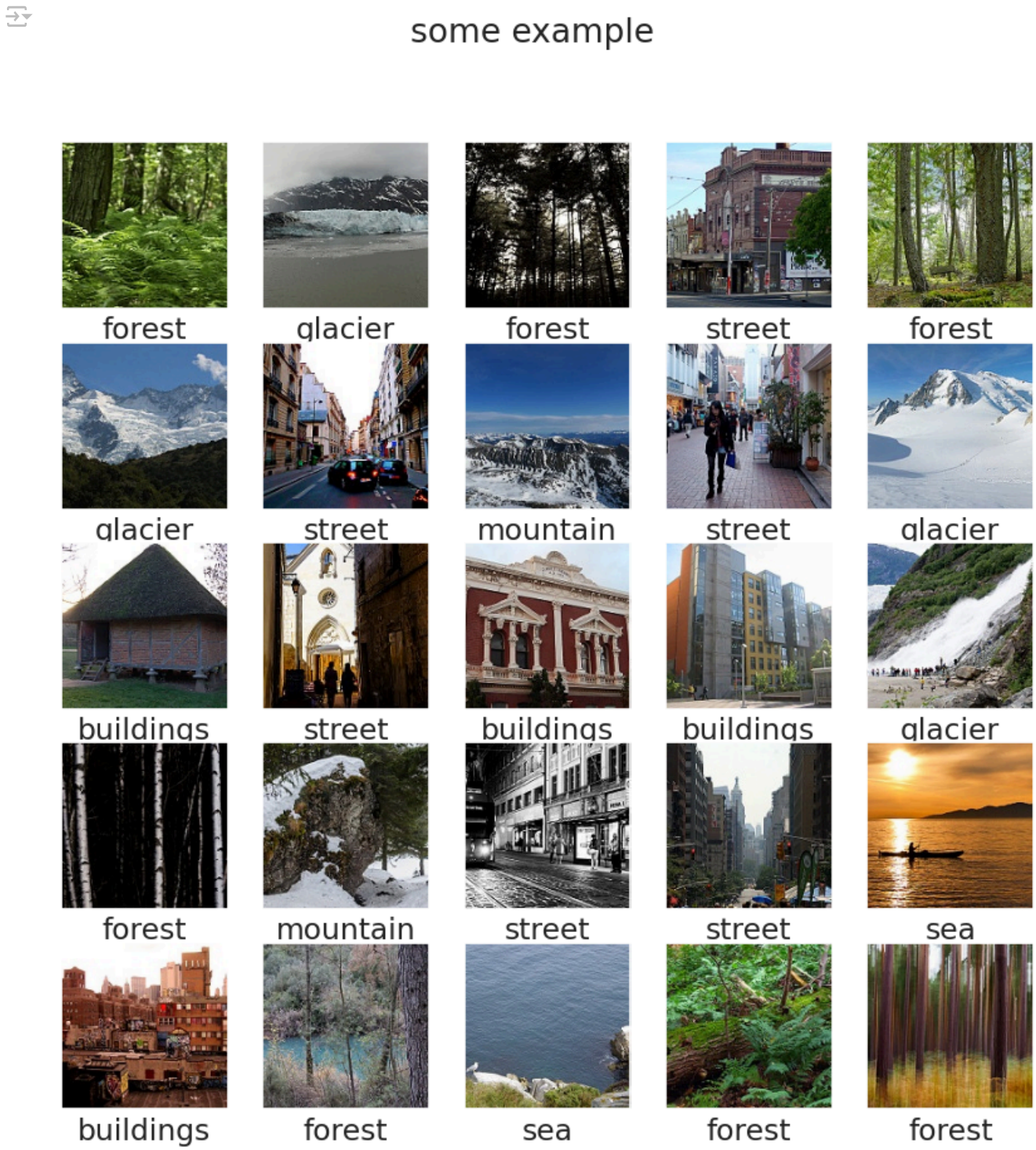
```
def display_random_image(class_names,images,labels):
    index=np.random.randint(images.shape[0])
    plt.figure()
    plt.imshow(images[index])
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.title('image ==> {}: ' .format(index)+class_name[labels[index]])
    plt.show()
```

```
display_random_image(class_name,train_images,train_labels)
```

```
def display_25_images(class_names,images,labels):
    plt.figure(figsize=(10,10))
    plt.suptitle('some example',fontsize=19)

    for i in range(25):
        plt.subplot(5,5,i+1)
        plt.imshow(images[i],cmap=plt.cm.binary)
        plt.xticks([])
        plt.yticks([])
        plt.grid(False)
        plt.xlabel(class_names[labels[i]])
    plt.show()


display_25_images(class_name,train_images,train_labels)
```



```
CNN_model=tf.keras.models.Sequential([
    keras.layers.Conv2D(32,(3,3),activation='relu',input_shape=(150,150,3)),
    keras.layers.MaxPooling2D((2,2)),
    keras.layers.Conv2D(32,(3,3),activation='relu'),
    keras.layers.MaxPooling2D((2,2)),
    keras.layers.Conv2D(32,(3,3),activation='relu'),
    keras.layers.MaxPooling2D((2,2)),
    keras.layers.Flatten(),
    keras.layers.Dense(128,activation=tf.nn.relu),
    keras.layers.Dense(64,activation=tf.nn.relu),
    keras.layers.Dense(6,activation=tf.nn.softmax)
])
```

```
CNN_model.compile(optimizer='adam',loss='sparse_categorical_crossentropy',metrics=['accuracy'])
```

```
history=CNN_model.fit(train_images,train_labels,batch_size=128,epochs=20,validation_split=0.2)
```

```
Epoch 1/20
88/88 [==============================] - 348s 4s/step - loss: 1.1622 - accuracy: 0.5376 - val_loss: 0.9052 -
Epoch 2/20
88/88 [==============================] - 350s 4s/step - loss: 0.8139 - accuracy: 0.6943 - val_loss: 0.7531 -
Epoch 3/20
88/88 [==============================] - 351s 4s/step - loss: 0.6924 - accuracy: 0.7465 - val_loss: 0.8691 -
Epoch 4/20
88/88 [==============================] - 333s 4s/step - loss: 0.5941 - accuracy: 0.7784 - val_loss: 0.5865 -
Epoch 5/20
88/88 [==============================] - 347s 4s/step - loss: 0.5165 - accuracy: 0.8149 - val_loss: 0.5815 -
Epoch 6/20
88/88 [==============================] - 328s 4s/step - loss: 0.4739 - accuracy: 0.8285 - val_loss: 0.6108 -
Epoch 7/20
88/88 [==============================] - 346s 4s/step - loss: 0.3829 - accuracy: 0.8660 - val_loss: 0.5468 -
Epoch 8/20
88/88 [==============================] - 346s 4s/step - loss: 0.3577 - accuracy: 0.8722 - val_loss: 0.5714 -
Epoch 9/20
88/88 [==============================] - 350s 4s/step - loss: 0.2707 - accuracy: 0.9039 - val_loss: 0.5863 -
Epoch 10/20
88/88 [==============================] - 348s 4s/step - loss: 0.2154 - accuracy: 0.9259 - val_loss: 0.6675 -
Epoch 11/20
88/88 [==============================] - 326s 4s/step - loss: 0.1944 - accuracy: 0.9313 - val_loss: 0.6585 -
Epoch 12/20
88/88 [==============================] - 349s 4s/step - loss: 0.1640 - accuracy: 0.9460 - val_loss: 0.7810 -
Epoch 13/20
88/88 [==============================] - 346s 4s/step - loss: 0.1208 - accuracy: 0.9611 - val_loss: 0.7549 -
Epoch 14/20
88/88 [==============================] - 329s 4s/step - loss: 0.0820 - accuracy: 0.9732 - val_loss: 0.8758 -
Epoch 15/20
88/88 [==============================] - 346s 4s/step - loss: 0.0766 - accuracy: 0.9747 - val_loss: 0.9401 -
Epoch 16/20
88/88 [==============================] - 344s 4s/step - loss: 0.0707 - accuracy: 0.9768 - val_loss: 0.8803 -
Epoch 17/20
88/88 [==============================] - 349s 4s/step - loss: 0.0705 - accuracy: 0.9767 - val_loss: 1.0567 -
Epoch 18/20
88/88 [==============================] - 345s 4s/step - loss: 0.0515 - accuracy: 0.9837 - val_loss: 0.9867 -
Epoch 19/20
88/88 [==============================] - 346s 4s/step - loss: 0.0285 - accuracy: 0.9927 - val_loss: 1.0397 -
Epoch 20/20
88/88 [==============================] - 328s 4s/step - loss: 0.0240 - accuracy: 0.9940 - val_loss: 1.1239 -
```

```
# Evaluate the model on the test set
test_loss, test_acc = CNN_model.evaluate(test_images, test_labels)
print(f'Test accuracy: {test_acc}')
```

```
94/94 [==============================] - 20s 205ms/step - loss: 1.0601 - accuracy: 0.7967
Test accuracy: 0.79666668176651
```

```
Start coding or generate with AI.
```