```
#Importing Libraries

import numpy as np
import pickle as pkl
import tensorflow as tf
from tensorflow.keras.applications.resnet50 import
ResNet50,preprocess_input
from tensorflow.keras.preprocessing import image
from tensorflow.keras.layers import GlobalMaxPool2D

from sklearn.neighbors import NearestNeighbors
import os
from numpy.linalg import norm

#Extract Filenames from Folder

filenames = []
for file in os.listdir('images'):
    filenames.append(os.path.join('images',file))


len(filenames)
```

```
44441
```

```
#Importing ResNet50 Model and Cofiguration

model = ResNet50(weights='imagenet', include_top=False,
input_shape=(224,224,3))
model.trainable = False

model = tf.keras.models.Sequential([model,
                                   GlobalMaxPool2D()
                                   ])
model.summary()
```

```
Model: "sequential_3"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 resnet50 (Functional)       (None, 7, 7, 2048)        23587712

 global_max_pooling2d_2 (Gl  (None, 2048)              0
 obalMaxPooling2D)

=================================================================
Total params: 23587712 (89.98 MB)
Trainable params: 0 (0.00 Byte)
Non-trainable params: 23587712 (89.98 MB)
_________________________________________________________________
```

```
#Extracting Fetaures from Image

img = image.load_img('16871.jpg', target_size=(224,224))
img_array = image.img_to_array(img)
img_expand_dim = np.expand_dims(img_array, axis=0)
img_preprocess = preprocess_input(img_expand_dim)
result = model.predict(img_preprocess).flatten()
norm_result = result/norm(result)
norm_result
```

```
1/1 [==============================] - 2s 2s/step
```

```
array([0.        , 0.00295302, 0.        , ..., 0.00752505,
0.02113523,
       0.00401741], dtype=float32)
```

```
def extract_features_from_images(image_path, model):
    img = image.load_img(image_path, target_size=(224,224))
    img_array = image.img_to_array(img)
    img_expand_dim = np.expand_dims(img_array, axis=0)
    img_preprocess = preprocess_input(img_expand_dim)
    result = model.predict(img_preprocess).flatten()
    norm_result = result/norm(result)
    return norm_result

extract_features_from_images(filenames[0], model)
```

```
1/1 [==============================] - 0s 75ms/step
```

```
array([0.        , 0.01761619, 0.00171596, ..., 0.01247231,
0.02726381,
       0.06899218], dtype=float32)
```

```
image_features = []
for file in filenames[0:5]:
    image_features.append(extract_features_from_images(file, model))
image_features
```

```
1/1 [==============================] - 0s 79ms/step
1/1 [==============================] - 0s 57ms/step
1/1 [==============================] - 0s 60ms/step
1/1 [==============================] - 0s 55ms/step
1/1 [==============================] - 0s 57ms/step
```

```
[array([0.        , 0.01761619, 0.00171596, ..., 0.01247231,
0.02726381,
        0.06899218], dtype=float32),
 array([0.        , 0.03648942, 0.        , ..., 0.00997929,
0.02375531,
        0.04649909], dtype=float32),
 array([0.        , 0.03642137, 0.00710439, ..., 0.00140775, 0.
,
        0.05435045], dtype=float32),
 array([0.00232164, 0.05030543, 0.00747742, ..., 0.00346696,
0.03391022,
        0.04565722], dtype=float32),
 array([0.00306835, 0.06240455, 0.        , ..., 0.00170629,
0.02032896,
        0.05833264], dtype=float32)]
```

```
Image_features = pkl.dump(image_features,
open('Images_features.pkl','wb'))

filenames = pkl.dump(filenames, open('filenames.pkl','wb'))

#Loading Pickle Files

Image_features = pkl.load(open('Images_features.pkl','rb'))

filenames = pkl.load(open('filenames.pkl','rb'))

np.array(Image_features).shape
```

```
(44441, 2048)
```

```
#Finidng Simialar Images

neighbors = NearestNeighbors(n_neighbors=6, algorithm='brute',
metric='euclidean')

neighbors.fit(Image_features)
```

```
NearestNeighbors(algorithm='brute', metric='euclidean', n_neighbors=6)
```

```
input_image = extract_features_from_images('16871.jpg',model)
```

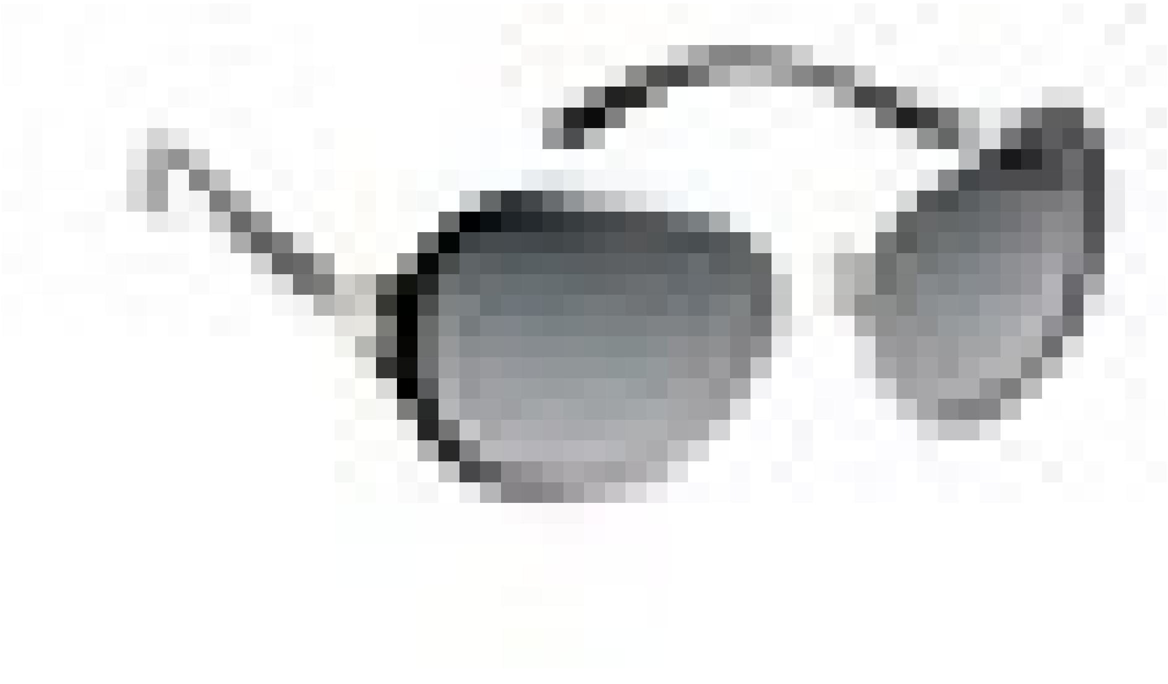
```
1/1 [==============================] - 0s 72ms/step
```

```
distance,indices = neighbors.kneighbors([input_image])

indices[0]
```

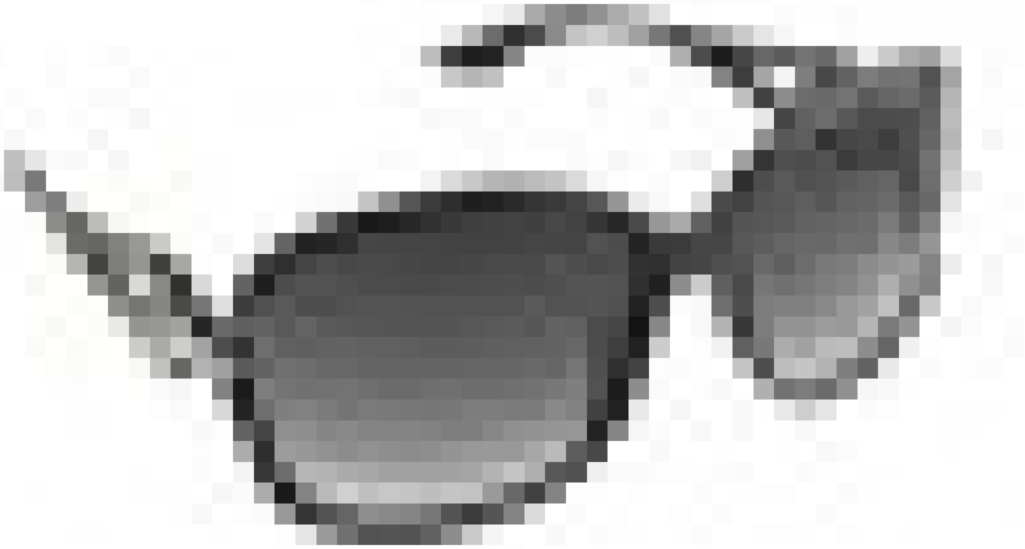
```
array([ 5828,  5799, 34267, 16489,  6257,  5814], dtype=int64)
```

```
from IPython.display import Image

Image('16871.jpg')
```

```
Image(filenames[indices[0][1]])
```



```
Image(filenames[indices[0][2]])
```



```
Image(filenames[indices[0][3]])
```

```
Image(filenames[indices[0][4]])
```

```
Image(filenames[indices[0][5]])
```