```
!pip install ipython-autotime
%load_ext autotime
```

```
Collecting ipython-autotime
  Downloading https://files.pythonhosted.org/packages/b4/c9/b413a24f759641bc27ef98c144b5
Requirement already satisfied: ipython in /usr/local/lib/python3.7/dist-packages (from i
Requirement already satisfied: decorator in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: pexpect; sys_platform != "win32" in /usr/local/lib/python
Requirement already satisfied: prompt-toolkit<2.0.0,>=1.0.4 in /usr/local/lib/python3.7/
Requirement already satisfied: simplegeneric>0.8 in /usr/local/lib/python3.7/dist-packag
Requirement already satisfied: pygments in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: pickleshare in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: ipython-genutils in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.7/dist-packages (fro
Requirement already satisfied: wcwidth in /usr/local/lib/python3.7/dist-packages (from p
Installing collected packages: ipython-autotime
Successfully installed ipython-autotime-0.3.1
time: 263 µs (started: 2021-03-30 09:57:53 +00:00)
```

```
# Data: Images
#1.Download manually the images from google
#2.Download dataset from kaggle.com
#3.Build a image web crawler
#4.Use Python libraries to scrape the images(Using)
```

```
!pip install bing-image-downloader
```

```
Collecting bing-image-downloader
  Downloading https://files.pythonhosted.org/packages/0d/bf/537a61030b84ae4cd5022d5c7b01
Installing collected packages: bing-image-downloader
Successfully installed bing-image-downloader-1.0.4
```

```
!mkdir images
```

```
mkdir: cannot create directory ‘images’: File exists
```

```
from bing_image_downloader import downloader
downloader.download("pretty sunflower",limit=30,output_dir='images',adult_filter_off=True)
```

```
[%] Downloading Image #17 from https://i.pinimg.com/736x/f3/90/f6/f390f6bfe013161a98c
[%] File Downloaded !

[%] Downloading Image #18 from https://i.pinimg.com/736x/49/7b/d5/497bd55f180f61f0eb1
[%] File Downloaded !
```

```
[%] Downloading Image #19 from http://www.saphireeventgroup.com/wp-content/uploads/fi
[%] File Downloaded !

[%] Downloading Image #20 from https://www.wallpapers13.com/wp-content/uploads/2016/0
[%] File Downloaded !

[%] Downloading Image #21 from https://i.pinimg.com/736x/e3/93/47/e393474b5aedbbc0ede
[%] File Downloaded !

[%] Downloading Image #22 from https://i.pinimg.com/736x/21/c8/e2/21c8e2c6a8ccbdd74c5
[%] File Downloaded !

[%] Downloading Image #23 from https://www.prettydesigns.com/wp-content/uploads/2014/
[%] File Downloaded !

[%] Downloading Image #24 from https://i.pinimg.com/736x/c5/30/2d/c5302ddde74dbae1289
[%] File Downloaded !



[!!]Indexing page: 3

[%] Indexed 11 Images on Page 3.

===============================================

[%] Downloading Image #25 from https://i.pinimg.com/736x/05/56/97/0556972d1ba881d3699
[%] File Downloaded !

[%] Downloading Image #26 from https://www.tattoosforyou.org/wp-content/uploads/2017/
[%] File Downloaded !

[%] Downloading Image #27 from https://i.pinimg.com/736x/a8/0f/84/a80f847e6275945f8b8
[%] File Downloaded !

[%] Downloading Image #28 from http://www.wallpapers13.com/wp-content/uploads/2015/12
[%] File Downloaded !

[%] Downloading Image #29 from https://i.pinimg.com/736x/5d/8d/38/5d8d3805352583dd613
[%] File Downloaded !

[%] Downloading Image #30 from https://carlsbadcravings.com/wp-content/uploads/2018/0
[%] File Downloaded !



[%] Done. Downloaded 30 images.



===============================================
```

```
downloader.download("rugby ball leather",limit=30,output_dir='images',adult_filter_off=True)
```

```
[!!]Indexing page: 1

[%] Indexed 12 Images on Page 1.

===============================================

[%] Downloading Image #1 from https://img1.etsystatic.com/044/0/7864717/il_fullxfull.
[%] File Downloaded !

[%] Downloading Image #2 from https://media.decathlon.sg/1740490-thickbox_default/cri
[!] Issue getting: https://media.decathlon.sg/1740490-thickbox_default/cricket-leathe
[!] Error:: HTTP Error 403: Forbidden
[%] Downloading Image #2 from https://static.vecteezy.com/system/resources/previews/0
[%] File Downloaded !

[%] Downloading Image #3 from https://thumbs.dreamstime.com/z/baseball-basketball-rug
[%] File Downloaded !

[%] Downloading Image #4 from https://www.john-woodbridge.com/1009-large_default/1930
[%] File Downloaded !

[%] Downloading Image #5 from http://www.rugby-gifts.co.uk/ekmps/shops/rugbygifts/ima
[%] File Downloaded !

[%] Downloading Image #6 from https://static.vecteezy.com/system/resources/previews/0
[%] File Downloaded !

[%] Downloading Image #7 from https://www.sportsballshop.co.uk/acatalog/gripcontrol1.
[%] File Downloaded !

[%] Downloading Image #8 from https://medias.go-sport.com/media/resized/1300x/catalog
[Error]Invalid image, not saving https://medias.go-sport.com/media/resized/1300x/cata

[!] Issue getting: https://medias.go-sport.com/media/resized/1300x/catalog/product/80
[!] Error:: No active exception to reraise
[%] Downloading Image #8 from http://www.prodirectrugby.com/productimages/V3_1_Galler
[!] Issue getting: http://www.prodirectrugby.com/productimages/V3_1_Gallery_2/62291.j
[!] Error:: HTTP Error 403: Forbidden
[%] Downloading Image #8 from http://www.sportsballshop.co.uk/acatalog/DukesSelectMat
[%] File Downloaded !

[%] Downloading Image #9 from http://www.sportsballshop.co.uk/acatalog/ClubOrange.jpg
[%] File Downloaded !



[!!]Indexing page: 2

[%] Indexed 12 Images on Page 2.

===============================================

[%] Downloading Image #10 from https://asdiansi.com/afl-7.jpg
[%] File Downloaded !
```

```
downloader.download("ice cream cone",limit=30,output_dir='images',adult_filter_off=True)
```

```
[%] Downloading Image #17 from http://www.businesstoday.lk/cpanel/uploader/3128/Cargi
[%] File Downloaded !

[%] Downloading Image #18 from https://images.firstwefeast.com/complex/image/upload/f
[%] File Downloaded !

[%] Downloading Image #19 from https://belgique.co.uk/shop/517-thickbox_default/dripp
[%] File Downloaded !

[%] Downloading Image #20 from https://premier-cake-creations.com/wp-content/uploads/
[%] File Downloaded !

[%] Downloading Image #21 from http://etc.usf.edu/clipart/5300/5358/cone_1_lg.gif
[%] File Downloaded !

[%] Downloading Image #22 from http://spoonssquared.com/wp-content/uploads/2014/07/4-
[%] File Downloaded !

[%] Downloading Image #23 from https://media1.s-nbcnews.com/j/streams/2014/May/140501
[%] File Downloaded !

[%] Downloading Image #24 from https://thumbs.dreamstime.com/x/flaming-cocktail-93545
[%] File Downloaded !



[!!]Indexing page: 3

[%] Indexed 11 Images on Page 3.

==============================================

[%] Downloading Image #25 from https://www.bravotv.com/sites/bravo/files/field_blog_i
[%] File Downloaded !

[%] Downloading Image #26 from http://www.businesstoday.lk/cpanel/uploader/3128/Cargi
[%] File Downloaded !

[%] Downloading Image #27 from https://zolpwsuwoq-flywheel.netdna-ssl.com/wp-content/
[%] File Downloaded !

[%] Downloading Image #28 from https://belgique.co.uk/shop/517-thickbox_default/dripp
[%] File Downloaded !

[%] Downloading Image #29 from https://premier-cake-creations.com/wp-content/uploads/
[%] File Downloaded !

[%] Downloading Image #30 from https://images.firstwefeast.com/complex/image/upload/f
[%] File Downloaded !
```

```
[%] Done. Downloaded 30 images.

==============================================
```

```
import numpy as np

a=np.array([[1,2,3,4,5],[4,5,6,7,8]])
a.ndim
```

```
2time: 7 ms (started: 2021-03-30 10:07:04 +00:00)
```

```
#how do i convert matrix to vector? - flatten
a.flatten()
```

```
array([1, 2, 3, 4, 5, 4, 5, 6, 7, 8])time: 13.2 ms (started: 2021-03-30 10:07:52 +00:00)
```

```
#preprocessing
#1.Resize
#2.Flatten

import os
import matplotlib.pyplot as plt
import numpy as np
from skimage.io import imread
from skimage.transform import resize

target = []
images = []
flat_data = []

DATADIR ='/content/images'
CATEGORIES = ['pretty sunflower','rugby ball leather','ice cream cone']

for category in CATEGORIES:
  class_num = CATEGORIES.index(category)
  path = os.path.join(DATADIR,category)
  for img in os.listdir(path):
    img_array=imread(os.path.join(path,img))
    #plt.imshow(img_array)
    #print(img_array.shape)
    img_resized=resize(img_array,(150,150,3)) #normalises the value from 0 to 1
    flat_data.append(img_resized.flatten())
    images.append(img_resized)
    target.append(class_num)

flat_data=np.array(flat_data)
```

```
target=np.array(target)
images = np.array(images)


#  /content/images/ice cream cone
```

```
time: 52.1 s (started: 2021-03-30 10:29:28 +00:00)
```

```
flat_data[0]
```

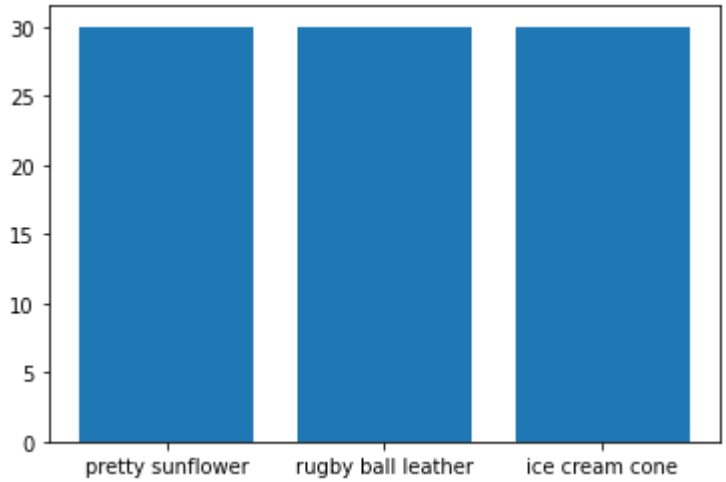
```
array([0.79607843, 0.77647059, 0.75686275, ..., 0.04359041, 0.28888889,
       0.15163399])time: 6.54 ms (started: 2021-03-30 10:31:06 +00:00)
```

```
target
```

```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2])time: 4.46 ms (started: 2021-03-30 10:32:13 +00:00)
```

```
unique,count = np.unique(target,return_counts=True)
plt.bar(CATEGORIES,count)
```

```
<BarContainer object of 3 artists>
```




```
time: 150 ms (started: 2021-03-30 10:34:30 +00:00)
```

```
#split data into traning and testing
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(flat_data,target,test_size=0.3,random_state=10
```

```
time: 26.4 ms (started: 2021-03-30 10:38:32 +00:00)
```

```
from sklearn.model_selection import GridSearchCV
from sklearn import svm
```

```
param_grid = [
              {'C':[1,10,100,1000],'kernel':['linear']},
              {'C':[1,10,100,1000],'gamma':[0.001,0.0001],'kernel':['rbf']}]


svc = svm.SVC(probability=True)
clf = GridSearchCV(svc,param_grid)
clf.fit(x_train,y_train)
```

```
GridSearchCV(cv=None, error_score=nan,
             estimator=SVC(C=1.0, break_ties=False, cache_size=200,
                           class_weight=None, coef0=0.0,
                           decision_function_shape='ovr', degree=3,
                           gamma='scale', kernel='rbf', max_iter=-1,
                           probability=True, random_state=None, shrinking=True,
                           tol=0.001, verbose=False),
             iid='deprecated', n_jobs=None,
             param_grid=[{'C': [1, 10, 100, 1000], 'kernel': ['linear']},
                         {'C': [1, 10, 100, 1000], 'gamma': [0.001, 0.0001],
                          'kernel': ['rbf']}],
             pre_dispatch='2*n_jobs', refit=True, return_train_score=False,
             scoring=None, verbose=0)time: 1min 49s (started: 2021-03-30 11:19:36 +00:00
```

```
y_pred = clf.predict(x_test)
y_pred
```

```
array([0, 0, 1, 2, 2, 1, 1, 1, 1, 0, 1, 0, 1, 2, 2, 0, 2, 1, 0, 1, 2, 2,
       2, 0, 0, 1, 1])time: 169 ms (started: 2021-03-30 11:22:57 +00:00)
```

```
y_test
```

```
array([1, 0, 1, 2, 2, 1, 0, 1, 1, 0, 1, 0, 1, 2, 2, 1, 2, 1, 0, 1, 2, 2,
       2, 0, 0, 0, 1])time: 9.75 ms (started: 2021-03-30 11:23:15 +00:00)
```

```
from sklearn.metrics import accuracy_score,confusion_matrix
```

```
time: 902 µs (started: 2021-03-30 11:23:32 +00:00)
```

```
accuracy_score(y_pred,y_test)
```

```
0.8518518518518519time: 14.4 ms (started: 2021-03-30 11:23:49 +00:00)
```

```
confusion_matrix(y_pred,y_test)
```

```
array([[6, 2, 0],
       [2, 9, 0],
       [0, 0, 8]])time: 13 ms (started: 2021-03-30 11:24:17 +00:00)
```

```
from sklearn.metrics import classification_report
classification_report(y_pred,y_test)
```

```
'              precision    recall  f1-score   support\n\n           0       0.75
0.75      0.75         8\n           1       0.82      0.82      0.82        11\n
2       1.00      1.00      1.00         8\n\n    accuracy                           0.
85        27\n   macro avg       0.86      0.86      0.86        27\nweighted avg
```

```
# save the model using pickle library
import pickle
pickle.dump(clf,open('img_model.p','wb'))
```

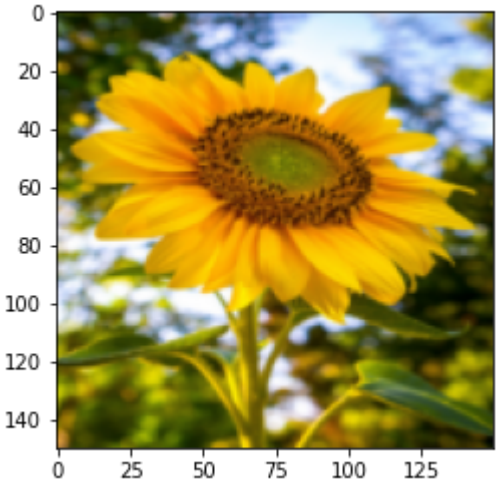
```
time: 36.2 ms (started: 2021-03-30 11:24:57 +00:00)
```

```
model = pickle.load(open('img_model.p','rb'))
```

```
time: 24.2 ms (started: 2021-03-30 11:25:12 +00:00)
```

```
# testing a brand new image
flat_data = []
url = input('Enter Your URL')
img = imread(url)
img_resized = resize(img,(150,150,3))
flat_data.append(img_resized.flatten())
flat_data = np.array(flat_data)
print(img.shape)
plt.imshow(img_resized)
y_out = model.predict(flat_data)
y_out = CATEGORIES[y_out[0]]
print(f' PREDICTED OUTPUT: {y_out}')
```

```
Enter Your URLhttps://i.pinimg.com/originals/0b/ed/24/0bed24b65ae57cd703dc7a9190d6d29f.j
(4838, 3456, 3)
 PREDICTED OUTPUT: pretty sunflower
```




```
time: 23.8 s (started: 2021-03-30 12:10:30 +00:00)
```

✓ 24s completed at 5:40 PM