Double-click (or enter) to edit

Python Resources https://www.w3schools.com/python/default.asp

```
#Python pgm
```

```
#a=int(input("enter number1\n"));
#b=int(input("enter number2\n"));
#c=a+b
#print("Sum of 2 numbers are",c)
print("welcome to python pgm")

#How to take help

import qrcode
myimage=qrcode.make("This is my qr and website is nitttrchd.ac.in")
myimage.save("newqrcode.png")
```

```
welcome to python pgm
```

```
!pip install qrcode
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting qrcode
  Downloading qrcode-7.3.1.tar.gz (43 kB)
     |████████████████████████████████| 43 kB 1.4 MB/s
Building wheels for collected packages: qrcode
  Building wheel for qrcode (setup.py) ... done
  Created wheel for qrcode: filename=qrcode-7.3.1-py3-none-any.whl size=40402 sha256=
  Stored in directory: /root/.cache/pip/wheels/93/d7/39/a4111be2cfb8e679938aa671a3788
Successfully built qrcode
Installing collected packages: qrcode
Successfully installed qrcode-7.3.1
```

```
#dir(qrcode)


import sklearn
#dir(sklearn)


import cv2
#dir(cv2)


import keyword
#dir(keyword)


print(len(keyword.kwlist))
```

```
35
```

```
import qrcode,cv2,sklearn
myimage=qrcode.make("This is my qr and website is nitttrchd.ac.in")
myimage.save("newqrcode.png")


print("code of qrcode",qrcode.__file__)
print("code of cv2",cv2.__file__)
```

```
print("code of sklearn",sklearn.__file__)
```

```
code of qrcode /usr/local/lib/python3.7/dist-packages/qrcode/__init__.py
code of cv2 /usr/local/lib/python3.7/dist-packages/cv2/__init__.py
code of sklearn /usr/local/lib/python3.7/dist-packages/sklearn/__init__.py
```

```
cd /usr/local/lib/python3.7/dist-packages/cv2/
```

```
/usr/local/lib/python3.7/dist-packages/cv2
```

```
pwd
```

```
'/usr/local/lib/python3.7/dist-packages/cv2'
```

```
ls
```

```
config-3.py   gapi/                 load_config_py2.py  __pycache__/
config.py     __init__.py           load_config_py3.py  qt/
cv2.abi3.so*  LICENSE-3RD-PARTY.txt mat_wrapper/        utils/
data/         LICENSE.txt           misc/               version.py
```

```
#pip list
```

```
pip list | wc -l
```

```
408
```

```
pwd
```

```
'/usr/local/lib/python3.7/dist-packages/cv2'
```

```
!uname -r
```

```
5.10.133+
```

```
!lsb_release -a
```

```
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 18.04.6 LTS
```

```
Release:        18.04
Codename:       bionic
```

```
!date
```

```
Mon Oct 31 07:12:03 UTC 2022
```

```
!w
```

```
 07:12:12 up 19 min,  0 users,  load average: 0.01, 0.03, 0.05
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
```

```
'''cv2.__builtins__
cv2.__cached__
cv2.__doc__
cv2.__file__
cv2.__loader__
cv2.__name__
cv2.__package__
'''
```

```
cv2.__cached__
```

```
'/usr/local/lib/python3.7/dist-packages/cv2/__pycache__/__init__.cpython-37.pyc'
```

```
cv2.__doc__
```

```
'\nOpenCV Python binary extension loader\n'
```

```
cv2.__file__
```

```
'/usr/local/lib/python3.7/dist-packages/cv2/__init__.py'
```

```
cv2.__loader__
```

```
<_frozen_importlib_external.SourceFileLoader at 0x7f911ddfe790>
```

```
cv2.__name__
```

```
'cv2'
```

```
sklearn.__package__
```

```
'sklearn'
```

```
#sklearn.__builtins__
```

```
#help("modules")

#help()
```

```
from google.colab import files
upload=files.upload()
```

```
from google.colab import drive
drive.mount('/content/drive')
ls '/content/drive/MyDrive/Colab Notebooks/data/OpenCV_Dataset'
```

```
import keyword as kw
print(kw.kwlist,"\n")
```

```
['False', 'None', 'True', 'and', 'as', 'assert', 'async', 'await', 'break', 'class',
```

```
import cv2  # pip install opencv-python
import numpy as np
from google.colab.patches import cv2_imshow

img = cv2.imread("lena.png")
kernel = np.ones((5,5),np.uint8)

imgGray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
imgBlur = cv2.GaussianBlur(imgGray,(7,7),0)
imgCanny = cv2.Canny(img,150,200)
imgDialation = cv2.dilate(imgCanny,kernel,iterations=1)
imgEroded = cv2.erode(imgDialation,kernel,iterations=1)
```

```
    cv2_imshow(imgGray)
    cv2_imshow(imgBlur)
    cv2_imshow(imgCanny)
    cv2_imshow(imgDialation)
    cv2_imshow(imgEroded)
    cv2.waitKey(0)
```

```
import cv2
import numpy as np

img = np.zeros((512,512,3),np.uint8)
#print(img)
#img[:]= 255,0,0

cv2.line(img,(0,0),(img.shape[1],img.shape[0]),(0,255,0),3)
cv2.rectangle(img,(0,0),(250,350),(0,0,255),2)
cv2.circle(img,(400,50),30,(255,255,0),5)
cv2.putText(img," OPENCV  ",(300,200),cv2.FONT_HERSHEY_COMPLEX,1,(0,150,0),3)


cv2_imshow(img)

cv2.waitKey(0)
```

```
import cv2
from google.colab.patches import cv2_imshow
import numpy as np
# Create a black image
img = np.zeros((512,512,3), np.uint8)
cv2_imshow(img)
# Draw a diagonal blue line with thickness of 10 px
cv2.line(img,(0,0),(500,500),(0,0,255),10)
cv2_imshow(img)

print(type(img))
```

```
#What kind of OS
!lsb_release -a
```

```
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 18.04.6 LTS
Release:        18.04
Codename:       bionic
```

```
!date
```

```
Tue Oct 18 09:52:39 UTC 2022
```

```
#!free -m



# Generate the QR Code
#steps:   import the essential libraies and start using the inbuilt functions


#sqrt of a number
sqrt(81)
```

```
---------------------------------------------------------------------------
```

```
from math import *
tan(81)
```

```
-0.8109944158318942
```

```
NameError: name 'sqrt' is not defined
```

```
import qrcode
img=qrcode.make("We all are learning Open Source www.nitttrchd.ac.in")
img.save("myqrcode.png")
```

```
!pip install qrcode
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting qrcode
  Downloading qrcode-7.3.1.tar.gz (43 kB)
     |████████████████████████████████| 43 kB 1.5 MB/s
Building wheels for collected packages: qrcode
  Building wheel for qrcode (setup.py) ... done
  Created wheel for qrcode: filename=qrcode-7.3.1-py3-none-any.whl size=40402 sha256=
  Stored in directory: /root/.cache/pip/wheels/93/d7/39/a4111be2cfb8e679938aa671a3788
Successfully built qrcode
Installing collected packages: qrcode
Successfully installed qrcode-7.3.1
```

```
dir(qrcode)
```

```
['ERROR_CORRECT_H',
 'ERROR_CORRECT_L',
 'ERROR_CORRECT_M',
 'ERROR_CORRECT_Q',
 'LUT',
 'QRCode',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 'base',
 'constants',
 'exceptions',
 'image',
 'main',
 'make',
 'run_example',
 'util']
```

```
import keyword as kw
```

```
dir(kw)
```

```
['__all__',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__spec__',
 'iskeyword',
 'kwlist',
 'main']
```

```
print(kw.kwlist)
```

```
['False', 'None', 'True', 'and', 'as', 'assert', 'async', 'await', 'break', 'class',
```

```
dir(math)
```

```
['__doc__',
 '__loader__',
 '__name__',
 '__package__',
 '__spec__',
 'acos',
 'acosh',
 'asin',
 'asinh',
 'atan',
 'atan2',
 'atanh',
 'ceil',
 'copysign',
 'cos',
 'cosh',
 'degrees',
 'e',
 'erf',
 'erfc',
 'exp',
 'expm1',
 'fabs',
 'factorial',
 'floor',
 'fmod',
 'frexp',
 'fsum',
 'gamma',
 'gcd',
 'hypot',
 'inf',
 'isclose',
```

```
 'isfinite',
 'isinf',
 'isnan',
 'ldexp',
 'lgamma',
 'log',
 'log10',
 'log1p',
 'log2',
 'modf',
 'nan',
 'pi',
 'pow',
 'radians',
 'remainder',
 'sin',
 'sinh',
 'sqrt',
 'tan',
 'tanh',
 'tau',
 'trunc']
```

```
import sklearn
```

```
dir(sklearn)
```

```
['__SKLEARN_SETUP__',
 '__all__',
 '__builtins__',
 '__cached__',
 '__check_build',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 '__version__',
 '_config',
 '_distributor_init',
 'base',
 'clone',
 'config_context',
 'exceptions',
 'externals',
 'get_config',
 'logger',
 'logging',
 'os',
 'random',
 'set_config',
 'setup_module',
 'show_versions',
 'sys',
 'utils']
```

```
pypi.org, python.org, https://python.swaroopch.com/

https://amankharwal.medium.com/130-python-projects-with-source-code-61f498591bb

#https://www.deeplearningbook.org/contents/convnets.html

https://sdhanaraj.blogspot.com/2022/02/170-python-projects-with-source-code.html

https://medium.com/coders-camp/130-python-projects-with-source-code-61f498591bb

#Concept of comilation and interpretation


whoami


print(sqrt(81))
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-1-2feabb2a8298> in <module>
----> 1 print(sqrt(81))

NameError: name 'sqrt' is not defined
```

SEARCH STACK OVERFLOW

```
from math import *
print(sqrt(81))
print(cos(81))
```

```
9.0
0.7766859820216312
```

```
import qrcode

img=qrcode.make("Welcome to STC on Deep Learning www.nitttrchd.ac.in")

img.save('qrcode_stc.png')


!pip install qrcode
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
```

```
Requirement already satisfied: qrcode in /usr/local/lib/python3.7/dist-packages (7.3
```

```
#Time taken by the algorithm/method
import numpy
total=0
A=[3,5,7,9,11]
B=[1,2,3,4,5]
for i in range(len(A)):
  total=total+A[i]*B[i]
print("total sum is", total )
#3+10+21+36+55
```

```
total sum is 125
```

```
import time
dir(time)
```

```
['CLOCK_BOOTTIME',
 'CLOCK_MONOTONIC',
 'CLOCK_MONOTONIC_RAW',
 'CLOCK_PROCESS_CPUTIME_ID',
 'CLOCK_REALTIME',
 'CLOCK_THREAD_CPUTIME_ID',
 '_STRUCT_TM_ITEMS',
 '__doc__',
 '__loader__',
 '__name__',
 '__package__',
 '__spec__',
 'altzone',
 'asctime',
 'clock',
 'clock_getres',
 'clock_gettime',
 'clock_gettime_ns',
 'clock_settime',
 'clock_settime_ns',
 'ctime',
 'daylight',
 'get_clock_info',
 'gmtime',
 'localtime',
 'mktime',
 'monotonic',
 'monotonic_ns',
 'perf_counter',
 'perf_counter_ns',
 'process_time',
 'process_time_ns',
 'pthread_getcpuclockid',
 'sleep',
 'strftime',
 'strptime',
 'struct_time',
```

```
 'thread_time',
 'thread_time_ns',
 'time',
 'time_ns',
 'timezone',
 'tzname',
 'tzset']
```

```
import time
import numpy
x=numpy.random.rand(10000000)
y=numpy.random.rand(10000000)
start_time=time.time()  #  Initialize the timer with respect to epoch
total=0
for i in range(len(x)):
  total=total+x[i]*y[i]
end_time=time.time()   #  Initialize the timer with respect to epoch
print("Total time took by the method", end_time-start_time )
print("total sum is", total )
```

```
Total time took by the method 7.432757377624512
total sum is 2499308.6286325743
```

```
#epoch
60*60*24*365*52
```

```
1639872000
```

```
print(time.time())
```

```
1666088658.9796872
```

```
!pip install PyQRCode
!pip install pypng
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting PyQRCode
  Downloading PyQRCode-1.2.1.zip (41 kB)
     |████████████████████████████████| 41 kB 778 kB/s
Building wheels for collected packages: PyQRCode
  Building wheel for PyQRCode (setup.py) ... done
  Created wheel for PyQRCode: filename=PyQRCode-1.2.1-py3-none-any.whl size=36247 sha
  Stored in directory: /root/.cache/pip/wheels/aa/14/ad/f09824edf35fdc5fd8acc01b60ff5
Successfully built PyQRCode
Installing collected packages: PyQRCode
Successfully installed PyQRCode-1.2.1
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pypng
```

```
  Downloading pypng-0.20220715.0-py3-none-any.whl (58 kB)
     |████████████████████████████████| 58 kB 5.4 MB/s
Installing collected packages: pypng
Successfully installed pypng-0.20220715.0
```

```
import pyqrcode
import png
link = "After the course one can download the material from Blog  fosscommunity.wordpress.
qr_code = pyqrcode.create(link)
qr_code.png("ourcourse1.png", scale=7)
```

```
from time import time
start = time()

# Python program to create acronyms
word = "Artificial Intelligence"
text = word.split()
a = " "
for i in text:
    a = a+str(i[0]).upper()
print(a)

end = time()
execution_time = end - start
print("Execution Time : ", execution_time)
```

```
!pip install pyzbar
!pip install pillow

!apt install libzbar0
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pyzbar
  Downloading pyzbar-0.1.9-py2.py3-none-any.whl (32 kB)
Installing collected packages: pyzbar
Successfully installed pyzbar-0.1.9
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Requirement already satisfied: pillow in /usr/local/lib/python3.7/dist-packages (7.1
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libnvidia-common-460
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  libv4l-0 libv4lconvert0
The following NEW packages will be installed:
  libv4l-0 libv4lconvert0 libzbar0
0 upgraded, 3 newly installed, 0 to remove and 22 not upgraded.
```

```
Need to get 193 kB of archives.
After this operation, 760 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4lconvert0 amd64 1.14.2-
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l-0 amd64 1.14.2-1 [41
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libzbar0 amd64 0.10+doc-
Fetched 193 kB in 1s (363 kB/s)
Selecting previously unselected package libv4lconvert0:amd64.
(Reading database ... 123941 files and directories currently installed.)
Preparing to unpack .../libv4lconvert0_1.14.2-1_amd64.deb ...
Unpacking libv4lconvert0:amd64 (1.14.2-1) ...
Selecting previously unselected package libv4l-0:amd64.
Preparing to unpack .../libv4l-0_1.14.2-1_amd64.deb ...
Unpacking libv4l-0:amd64 (1.14.2-1) ...
Selecting previously unselected package libzbar0:amd64.
Preparing to unpack .../libzbar0_0.10+doc-10.1build2_amd64.deb ...
Unpacking libzbar0:amd64 (0.10+doc-10.1build2) ...
Setting up libv4lconvert0:amd64 (1.14.2-1) ...
Setting up libv4l-0:amd64 (1.14.2-1) ...
Setting up libzbar0:amd64 (0.10+doc-10.1build2) ...
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...
```

```
#Decode a QR Code using Python



from pyzbar.pyzbar import decode

from pyzbar.pyzbar import decode
from PIL import Image
decocdeQR = decode(Image.open('ourcourse1.png'))
print(decocdeQR[0].data.decode('ascii'))
```

```
After the course one can download the material from Blog  fosscommunity.wordpress.com
```

```
!free -m
```

```
              total        used        free      shared  buff/cache   available
Mem:          12985        1266       10260           1        1458       11545
Swap:             0           0           0
```

```
#!pip list |wc -l


#!pip list


#!pip freeze


a=666
b=777.89878
c='t'
d='jkjlkj'
```

```
print(type(a))
print(type(b))
print(type(c))
print(type(d))
```

```
<class 'int'>
<class 'float'>
<class 'str'>
<class 'str'>
```

```
!free -m
!date

!cal 2022
!lsb_release -a

import sys
print('Python:{}'.format(sys.version))
!pip list |wc -l

!pip freeze


import sys
print('Python:{}'.format(sys.version))

import scipy
print('Scipy:{}'.format(scipy.__version__))


import numpy
print('Numpy:{}'.format(numpy.__version__))

import matplotlib
print('Matplotlib:{}'.format(matplotlib.__version__))


import pandas
print('Pandas:{}'.format(pandas.__version__))

import sklearn
print('Scikit Learn :{}'.format(sklearn.__version__))

import dask
print('DASK:{}'.format(dask.__version__))


import pyspark
print('Pyspark:{}'.format(pyspark.__version__))
```

```
!pip install pyspark
dir(sklearn)

#concept of dynamic typing
a=666
b=777.89878
c='t'
d='jkjlkj'

print(type(a))
print(type(b))
print(type(c))
print(type(d))

#Dynamic Type in nature  & Typecasting
a=int(input("Enter the first number\n"))
b=int(input("Enter the second number"))
c=a+b

print(a,"+",b, "--->",c)

Loops

i=1
while i<=11:
 print(i)
 i=i+2



 for counter in range(0,-10,-1):
  print(counter)

  #Find the sum of all numbers from 1 to 10000

print("Sum is --->",sum(range(1,10001)))

import math
dir(math)

#Generation of OTP

#Exception Handling

for i in range(-5,6):
  try:
   print("100/",i,"--->",100/i)
  except:
    print("error")

#Keywords
import keyword as kw
dir(kw)
```

```
print(kw.kwlist)
```

```
                total        used        free      shared  buff/cache   available
     Mem:          12985         835       10334           1        1815       11950
     Swap:             0           0           0
```

```
for i in range(-5,6):
  #try:    -5 -4 ...-1, 0 , 1
   try:
    print("100/",i,"--->",100/i)
   except:
    print("error")
```

```
     100/ -5 ---> -20.0
     100/ -4 ---> -25.0
     100/ -3 ---> -33.333333333333336
     100/ -2 ---> -50.0
     100/ -1 ---> -100.0
     error
     100/ 1 ---> 100.0
     100/ 2 ---> 50.0
     100/ 3 ---> 33.333333333333336
     100/ 4 ---> 25.0
     100/ 5 ---> 20.0
```

```
import cv2
dir(cv2)
```

```
     ['ACCESS_FAST',
      'ACCESS_MASK',
      'ACCESS_READ',
      'ACCESS_RW',
      'ACCESS_WRITE',
      'ADAPTIVE_THRESH_GAUSSIAN_C',
      'ADAPTIVE_THRESH_MEAN_C',
      'AGAST_FEATURE_DETECTOR_AGAST_5_8',
      'AGAST_FEATURE_DETECTOR_AGAST_7_12D',
      'AGAST_FEATURE_DETECTOR_AGAST_7_12S',
      'AGAST_FEATURE_DETECTOR_NONMAX_SUPPRESSION',
      'AGAST_FEATURE_DETECTOR_OAST_9_16',
      'AGAST_FEATURE_DETECTOR_THRESHOLD',
      'AKAZE',
      'AKAZE_DESCRIPTOR_KAZE',
      'AKAZE_DESCRIPTOR_KAZE_UPRIGHT',
      'AKAZE_DESCRIPTOR_MLDB',
      'AKAZE_DESCRIPTOR_MLDB_UPRIGHT',
      'AKAZE_create',
      'AffineFeature',
      'AffineFeature_create',
      'AffineTransformer',
      'AgastFeatureDetector',
      'AgastFeatureDetector_AGAST_5_8',
      'AgastFeatureDetector_AGAST_7_12d',
      'AgastFeatureDetector_AGAST_7_12s',
      'AgastFeatureDetector_NONMAX_SUPPRESSION',
      'AgastFeatureDetector_OAST_9_16',
      'AgastFeatureDetector_THRESHOLD',
```

```
 'AgastFeatureDetector_create',
 'Algorithm',
 'AlignExposures',
 'AlignMTB',
 'AsyncArray',
 'BFMatcher',
 'BFMatcher_create',
 'BORDER_CONSTANT',
 'BORDER_DEFAULT',
 'BORDER_ISOLATED',
 'BORDER_REFLECT',
 'BORDER_REFLECT101',
 'BORDER_REFLECT_101',
 'BORDER_REPLICATE',
 'BORDER_TRANSPARENT',
 'BORDER_WRAP',
 'BOWImgDescriptorExtractor',
 'BOWKMeansTrainer',
 'BOWTrainer',
 'BRISK',
 'BRISK_create',
 'BackgroundSubtractor',
 'BackgroundSubtractorKNN',
 'BackgroundSubtractorMOG2',
 'BaseCascadeClassifier',
 'CALIB_CB_ACCURACY',
 'CALIB_CB_ADAPTIVE_THRESH',
 'CALIB_CB_ASYMMETRIC_GRID',
 'CALIB_CB_CLUSTERING',
```

```
#Concept of dir()
import cv2
dir(cv2)

import dask; bokeh



from google.colab import files

iris=files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

Saving iris.csv to iris.csv

```
import pandas as pd
iris=pd.read_csv('iris.csv')


#print(iris.head(3))
print(iris.Species.value_counts())
print(iris.columns)
```

```
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
```

```
Name: Species, dtype: int64
Index(['Id', 'SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm', 'PetalWidthCm',
       'Species'],
      dtype='object')
```

```
#dir(pd)
```

```
#Concept of uploading files

from google.colab import files

iris=files.upload()
import pandas as pd
iris=pd.read_csv('iris.csv')
print(iris.Species.value_counts())
iris.columns
iris.plot(kind='scatter',x='SepalLengthCm',y='PetalLengthCm')
print(iris.head())
import plotly.express as px
#df=px.data.iris()
fig=px.scatter_3d(iris,x='SepalLengthCm', y='SepalWidthCm', z= 'PetalLengthCm')
import seaborn as sns
sns.pairplot(iris)
#fig.show()

data=pd.read_csv('titanic_train.csv')
sns.countplot(data['Survived'])
import matplotlib.pyplot as plt
plt.show()
```

```
import matplotlib.pyplot as plt
import numpy as np

from sklearn.metrics import accuracy_score
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.gaussian_process import GaussianProcessClassifier
from sklearn.gaussian_process.kernels import RBF
from sklearn import datasets

iris = datasets.load_iris()
X = iris.data[:, 0:2]  # we only take the first two features for visualization
y = iris.target

n_features = X.shape[1]

C = 10
kernel = 1.0 * RBF([1.0, 1.0])  # for GPC

# Create different classifiers.
classifiers = {
    "L1 logistic": LogisticRegression(
        C=C, penalty="l1", solver="saga", multi_class="multinomial", max_iter=10000
    ),
    "L2 logistic (Multinomial)": LogisticRegression(
        C=C, penalty="l2", solver="saga", multi_class="multinomial", max_iter=10000
    ),
    "L2 logistic (OvR)": LogisticRegression(
        C=C, penalty="l2", solver="saga", multi_class="ovr", max_iter=10000
    ),
```

```
        "Linear SVC": SVC(kernel="linear", C=C, probability=True, random_state=0),
        "GPC": GaussianProcessClassifier(kernel),
    }

    n_classifiers = len(classifiers)

    plt.figure(figsize=(3 * 2, n_classifiers * 2))
    plt.subplots_adjust(bottom=0.2, top=0.95)

    xx = np.linspace(3, 9, 100)
    yy = np.linspace(1, 5, 100).T
    xx, yy = np.meshgrid(xx, yy)
    Xfull = np.c_[xx.ravel(), yy.ravel()]

    for index, (name, classifier) in enumerate(classifiers.items()):
        classifier.fit(X, y)

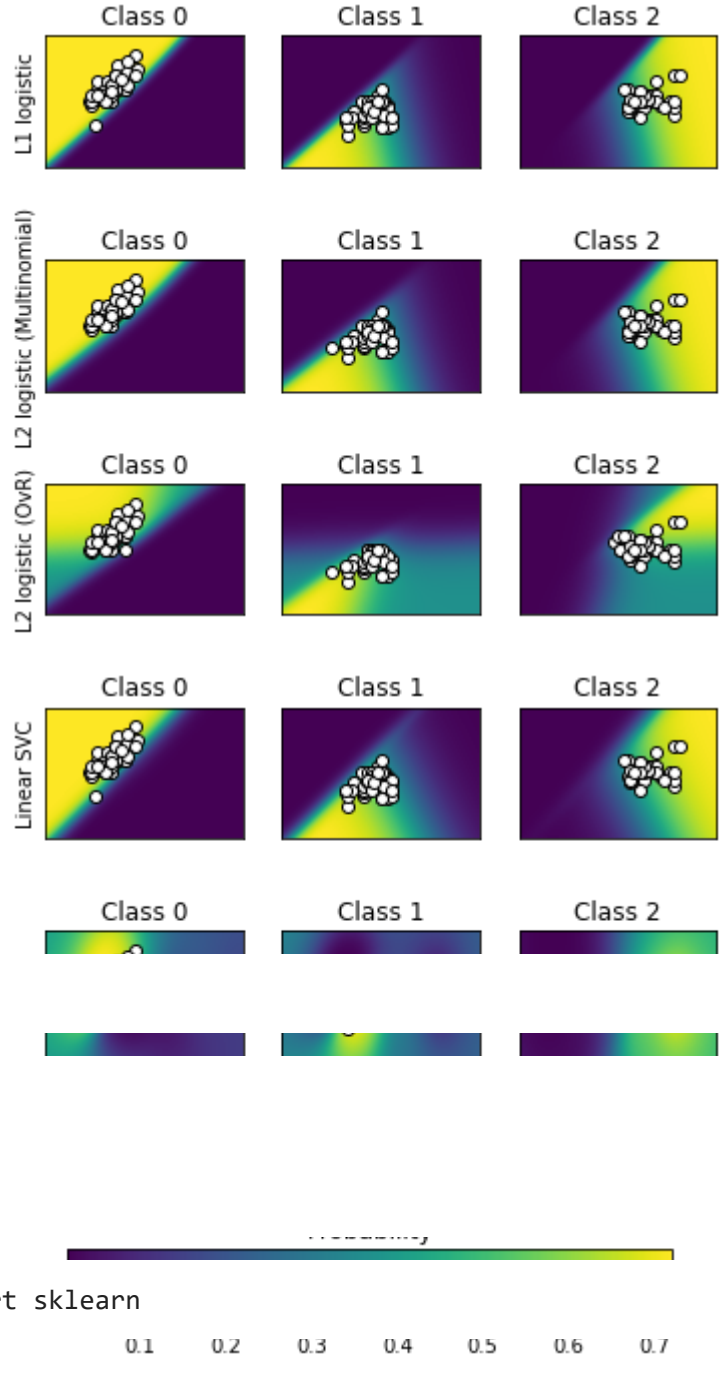
        y_pred = classifier.predict(X)
        accuracy = accuracy_score(y, y_pred)
        print("Accuracy (train) for %s: %0.1f%% " % (name, accuracy * 100))

        # View probabilities:
        probas = classifier.predict_proba(Xfull)
        n_classes = np.unique(y_pred).size
        for k in range(n_classes):
            plt.subplot(n_classifiers, n_classes, index * n_classes + k + 1)
            plt.title("Class %d" % k)
            if k == 0:
                plt.ylabel(name)
            imshow_handle = plt.imshow(
                probas[:, k].reshape((100, 100)), extent=(3, 9, 1, 5), origin="lower"
            )
            plt.xticks(())
            plt.yticks(())
            idx = y_pred == k
            if idx.any():
                plt.scatter(X[idx, 0], X[idx, 1], marker="o", c="w", edgecolor="k")

    ax = plt.axes([0.15, 0.04, 0.7, 0.05])
    plt.title("Probability")
    plt.colorbar(imshow_handle, cax=ax, orientation="horizontal")

    plt.show()
```

```
Accuracy (train) for L1 logistic: 83.3%
Accuracy (train) for L2 logistic (Multinomial): 82.7%
Accuracy (train) for L2 logistic (OvR): 79.3%
Accuracy (train) for Linear SVC: 82.0%
Accuracy (train) for GPC: 82.7%
```




```
import sklearn
```

```
dir(sklearn)
```

```
['__SKLEARN_SETUP__',
 '__all__',
 '__builtins__',
 '__cached__',
 '__check_build',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
```

```
 '__version__',
 '_config',
 '_distributor_init',
 '_loss',
 'base',
 'clone',
 'config_context',
 'datasets',
 'exceptions',
 'externals',
 'feature_extraction',
 'gaussian_process',
 'get_config',
 'linear_model',
 'logger',
 'logging',
 'metrics',
 'model_selection',
 'multiclass',
 'os',
 'preprocessing',
 'random',
 'set_config',
 'setup_module',
 'show_versions',
 'svm',
 'sys',
 'utils']
```

```
dir(qrcode)
```

```
['ERROR_CORRECT_H',
 'ERROR_CORRECT_L',
 'ERROR_CORRECT_M',
 'ERROR_CORRECT_Q',
 'LUT',
 'QRCode',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 'base',
 'constants',
 'exceptions',
 'image',
 'main',
 'make',
 'run_example',
 'util']
```

```
dir(sklearn.datasets)
```

```
['__all__',
```

```
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 '_base',
 '_california_housing',
 '_covtype',
 '_kddcup99',
 '_lfw',
 '_olivetti_faces',
 '_openml',
 '_rcv1',
 '_samples_generator',
 '_species_distributions',
 '_svmlight_format_fast',
 '_svmlight_format_io',
 '_twenty_newsgroups',
 'clear_data_home',
 'data',
 'descr',
 'dump_svmlight_file',
 'fetch_20newsgroups',
 'fetch_20newsgroups_vectorized',
 'fetch_california_housing',
 'fetch_covtype',
 'fetch_kddcup99',
 'fetch_lfw_pairs',
 'fetch_lfw_people',
 'fetch_olivetti_faces',
 'fetch_openml',
 'fetch_rcv1',
 'fetch_species_distributions',
 'get_data_home',
 'load_boston',
 'load_breast_cancer',
 'load_diabetes',
 'load_digits',
 'load_files',
 'load_iris',
 'load_linnerud',
 'load_sample_image',
 'load_sample_images',
 'load_svmlight_file',
 'load_svmlight_files',
 'load_wine',
 'make_biclusters',
 'make_blobs',
 'make_checkerboard',
 'make_circles',
 'make_classification',
 'make_friedman1',
 'make_friedman2'
```

```
import sklearn
```

```
print(sklearn.__version__)
```

```
1.0.2
```

```
import keras
```

```
print(keras.__version__)
```

```
2.8.0
```

```
import keyword as kw
dir(kw)
```

```
['__all__',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__spec__',
 'iskeyword',
 'kwlist',
 'main']
```

```
print(kw.kwlist)
```

```
['False', 'None', 'True', 'and', 'as', 'assert', 'async', 'await', 'break', 'class',
```

```
print(len(kw.kwlist))
```

```
35
```

Open in Colab

Learn Python in 2 hr

There are 16 programs to explain the various concepts in python programming such as:

- Syntex,
- Loop,
- if-else,
- Data Structures,
- Strings,
- File Handaling,
- Exception Handaling,
- Random Numbers,
- Command Line Argunment
- Use of Libraries

Self learning resource

Tutorial on Python (Byte of Python) **Click Here**

1 Hello World

Learning: How to print and run python program

```
print ("Hello World")
```

```
Hello World
```

Assingment 1.1: WAP to print your name three times

2 Add numbers and Concatenate strings

Learning: How to declare variable, add, concatenate and print the result.

2.1 Add two numbers

```
a = 10
b = 220
```

```
c = a + b       # Add two numbers
print (a, " + ", b, " --> ", c)
```

```
     10  +  220  -->  230
```

2.2 Concatenate two strings

```
a = "Bhagat"
b = " Singh"
c = a + b       # Concatinate two strings
print (a, " + ", b, " --> ", c)
```

```
     Bhagat  +   Singh  -->  Bhagat Singh
```

**2.3 Concate

nate string with number**

```
a = "Bhagat"
b = 100
c = a + str(b)      # Concatinate string with number
print (a, " + ", b, " --> ", c)
```

```
     Bhagat  +  100  -->  Bhagat100
```

Assingment 2.1: WAP to add three numbers and print the result.

Assingment 2.2: WAP to concatinate three strings and print the result.

---

3 Input from user

Learning: How to take input from user

3.1 Input two strings from user and concatinate them

```
a = input("Enter First String: ")
b = input("Enter Second String: ")
c = a + b       # concatinate two strings
print  (a, " + ", b, "      --> ", c)

# Run the program with (1) Two strings and (2) Two numbers
```

```
     Enter First String: First
     Enter Second String: Second
```

```
First  +  Second       -->  FirstSecond
```

3.2 Input two numbers from user and add them

```
a = int(input("Enter First No: "))
b = int(input("Enter Second No: "))
c = a + b
print (a, " + ", b, " --> ", c)
```

```
Enter First No: 34
Enter Second No: 32
34  +  32  -->  66
```

---

4 Loop

Learning: Learn various loops.

4.1 While Loop

```
i=1
while i <= 10:
    print (i)
    i = i+1
```

```
1
2
3
4
5
6
7
8
9
10
```

4.2 Range Function

```
print ("range(10)        --> ", list(range(10)))
print ("range(10,20)     --> ", list(range(10,20)))
print ("range(0,20,2)    --> ", list(range(2,20,2)))
print ("range(-10,-20,2) --> ", list(range(-10,-20,2)))
print ("range(-10,-20,-2)--> ", list(range(-10,-20,-2)))
```

```
range(10)        -->  [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

```
range(10,20)     -->  [10, 11, 12, 13, 14, 15, 16, 17, 18, 19]
range(0,20,2)    -->  [2, 4, 6, 8, 10, 12, 14, 16, 18]
range(-10,-20,2) -->  []
range(-10,-20,-2)-->  [-10, -12, -14, -16, -18]
```

4.3 For loop

4.3.1 For loop - Version 1

```
for i in range(0,10):
    print (i)
```

```
0
1
2
3
4
5
6
7
8
9
```

4.3.2 For loop - Version 2

```
for i in range(0,20,2):
    print (i)
```

```
0
2
4
6
8
10
12
14
16
18
```

4.3.3 For loop - Version 3

```
for i in range(0,-10,-1):
    print (i)
```

```
0
-1
-2
-3
```

```
-4
-5
-6
-7
-8
-9
```

4.4 Print table of 5

```
for i in range(1,11):
    print (5," * ", i , " = ", i * 5)
```

```
 5  *  1  =  5
 5  *  2  =  10
 5  *  3  =  15
 5  *  4  =  20
 5  *  5  =  25
 5  *  6  =  30
 5  *  7  =  35
 5  *  8  =  40
 5  *  9  =  45
 5  *  10  =  50
```

4.5 Sum all numbers from 1 to 10

4.5.1 Version 1

```
s=0
for i in range(1,11):
    s=s+i
print ("Sum is --> ",s)
```

```
 Sum is -->  55
```

4.5.2 Version 2

```
print ("Sum is --> ", sum(range(1,11)))
```

```
 Sum is -->  55
```

Assingment 4.1: WAP to print the table of 7, 9.

Assingment 4.2: WAP to print the table of n and n is given by user.

Assingment 4.3: WAP to add all the numbers from 1 to n and n is given by user.

5 If-Else - Conditional Checking

Learning: if-else Condition

5.1 Input two numbers from user and compare them

```
a = int(input("Enter First No: "))
b = int(input("Enter Second No: "))
if  a > b:
    print (a," > ",b)
else:
    print (a," < ",b)
```

```
 Enter First No: 49
 Enter Second No: 54
 49  <  54
```

5.2 Check weather a number is odd or even

```
n = int(input("Enter a No: "))
if  n % 2 == 0:
    print (n," is even")
else:
    print (n," is odd")
```

```
 Enter a No: 54
 54  is even
```

5.3 Check weather a number is prime of not

```
n = int(input("Enter a No: "))
f=0
for i in range(2, n//2 + 1):
    if  n % i == 0:
        f=1
        break

if f==0:
    print ("Prime")
else:
    print ("Not Prime")
```

```
 Enter a No: 56
 Not Prime
```

5.4 Conditional Checking - Compare strings

```
a = input("Enter First String : ")
b = input("Enter Second String: ")

if a == b:
    print ("a == b")
elif a >= b:
    print ("a > b")
else:
    print ("a < b")
```

```
 Enter First String : Number
 Enter Second String: Prime
 a < b
```

Assingment 5.1: WAP to find max amoung three numbers and input from user. [Try max() function]

Assingment 5.2: WAP to add all numbers divisible by 7 and 9 from 1 to n and n is given by the user.

Assingment 5.3: WAP to add all prime numbers from 1 to n and n is given by the user.

6 Functions

Learning: How to declare and call function

6.1 Add two numbers

```
def Add(a,b):
    c=a+b
    return c

print ("Add(10,20) -->", Add(10,20))
print ("Add(20,50) -->", Add(20,50))
print ("Add(80,200) -->", Add(80,200))
```

```
 Add(10,20) --> 30
 Add(20,50) --> 70
 Add(80,200) --> 280
```

6.2 Prime number

```
def IsPrime(n):
    for i in range(2, n//2 + 1):
        if n%i==0:
            return 0
    return 1

print ("IsPrime(20)  --> ", IsPrime(20))
print ("IsPrime(23)  --> ", IsPrime(23))
print ("IsPrime(200) --> ", IsPrime(200))
print ("IsPrime(37)  --> ", IsPrime(37))
```

```
 IsPrime(20)  -->  0
 IsPrime(23)  -->  1
 IsPrime(200) -->  0
 IsPrime(37)  -->  1
```

6.3 Add 1 to n

```
def AddN(n):
    s= sum(range(n+1))
    return s

print ("AddN(10)  --> ", AddN(10))
print ("AddN(20)  --> ", AddN(20))
print ("AddN(50)  --> ", AddN(50))
print ("AddN(200) --> ", AddN(200))
```

```
 AddN(10)  -->  55
 AddN(20)  -->  210
 AddN(50)  -->  1275
 AddN(200) -->  20100
```

Assingment 6.1: WAP using function that add all odd numbers from 1 to n, n is given by the user.

Assingment 6.2: WAP using function that add all prime numbers from 1 to n, n given by the user.

---

7 Math library

Learning: Use math library

```
import math as m
print ("exp(-200)    --> ", m.exp(-200))  # Exponential function
print ("log(100,2)   --> ", m.log(100,2)) # Log
print ("log(100,10)  --> ", m.log(100,10))# Log
print ("log10(100)   --> ", m.log10(100)) # Log 10
print ("m.cos(30)    --> ", m.cos(30))    # cos
print ("m.sin(30)    --> ", m.sin(30))    # sin
```

```
print ("m.tan(30)    --> ", m.tan(30))    # tan
print ("m.sqrt(324)  --> ", m.sqrt(324))
print ("m.ceil(89.9) --> ", m.ceil(89.9))
print ("m.floor(89.9)--> ", m.floor(89.9))
```

```
exp(-200)    -->  1.3838965267367376e-87
log(100,2)   -->  6.643856189774725
log(100,10)  -->  2.0
log10(100)   -->  2.0
m.cos(30)    -->  0.15425144988758405
m.sin(30)    -->  -0.9880316240928618
m.tan(30)    -->  -6.405331196646276
m.sqrt(324)  -->  18.0
m.ceil(89.9) -->  90
m.floor(89.9)-->  89
```

---

8 Strings

Learning: How to handle string

8.1 Indexing in string

```
var = 'Hello World!'
print ("var      --> ", var)
print ("var[0]   --> ", var[0])
print ("var[1:5] --> ", var[1:5])
print ("var[:-5] --> ", var[:-5])
```

```
var      -->  Hello World!
var[0]   -->  H
var[1:5] -->  ello
var[:-5] -->  Hello W
```

8.2 String length, upper, lower

```
var = 'Hello World!'
print ("String --> ", var)
print ("Length --> : ", len(var))
print ("Upper  --> : ", var.upper())
print ("Lower  --> : ", var.lower())
```

```
String -->  Hello World!
Length --> :  12
Upper  --> :  HELLO WORLD!
Lower  --> :  hello world!
```

8.3 String formatting

```
name=input("Enter your name: ")
age=int(input("Enter your age : "))
price=float(input("Enter the book price: "))
s="\nYour name is %s, age is %d and book price is %f" %(name.upper(),age,price)
print (s)
```

```
Enter your name: Rohan
Enter your age : 21
Enter the book price: 45.34

Your name is ROHAN, age is 21 and book price is 45.340000
```

8.4 String in Triple Quotes

```
para_str = """This is a long string that is made up of
several lines and non-printable characters such as
TAB ( \t ) and they will show up that way when displayed.
NEWLINEs within the string, whether explicitly given like
this within the brackets [ \n ], or just a NEWLINE within
the variable assignment will also show up.
"""
print (para_str)
```

```
This is a long string that is made up of
several lines and non-printable characters such as
TAB (    ) and they will show up that way when displayed.
NEWLINEs within the string, whether explicitly given like
this within the brackets [
 ], or just a NEWLINE within
the variable assignment will also show up.
```

8.5 String strip

```
var =" Indian   Army    "

print("String    --> ", var)
print("Length    --> ", len(var))
print("var strip --> ", var.strip())
print("Length of var after strip --> ", len(var.strip()))
```

```
String    -->   Indian   Army
Length    -->  18
var strip -->  Indian   Army
Length of var after strip -->  13
```

8.6 String split

```
var =" Indian,   Army    "

print("String    --> ", var)
print("Length    --> ", len(var))
print("var split --> ", var.split())
print("var split --> ", var.split(' '))
print("var split --> ", var.split(','))

# Strip + Split
print("var split --> ", var.strip().split(','))
```

```
String    -->   Indian,   Army
Length    -->  19
var split -->  ['Indian,', 'Army']
var split -->  ['', 'Indian,', '', '', 'Army', '', '', '', '']
var split -->  [' Indian', '   Army    ']
var split -->  ['Indian', '   Army']
```

8.7 Count in string

```
var=" Indian Army    "
print ("String       --> ", var)
print ("Count of ' ' --> ", var.count(' '))
print ("Count of 'a' --> ", var.count('a'))
print ("Count of 'n' --> ", var.count('an'))
```

```
String       -->   Indian Army
Count of ' ' -->  6
Count of 'a' -->  1
Count of 'n' -->  1
```

8.8 Reverse a String

```
var="Indian Army"
print ("String    --> ", var)
print ("var[::1]  --> ", var[::1])
print ("var[::2]  --> ", var[::2])
print ("var[::-1] --> ", var[::-1])
print ("var[::-2] --> ", var[::-2])

var=var[::-1]
print ("var after reverse --> ", var)
```

```
String    -->  Indian Army
var[::1]  -->  Indian Army
var[::2]  -->  Ida ry
var[::-1] -->  ymrA naidnI
var[::-2] -->  yr adI
var after reverse -->  ymrA naidnI
```

8.9 Palindrome

```
s1="Indian Army"
s2="malayalam"
s3="madam"
s4="teacher"
print ("s1 --> ", s1==s1[::-1])
print ("s2 --> ", s2==s2[::-1])
print ("s3 --> ", s3==s3[::-1])
print ("s4 --> ", s4==s4[::-1])
```

```
s1 -->  False
s2 -->  True
s3 -->  True
s4 -->  False
```

9 Random Numbers/String

Learning: Generate Random Numbers/String

9.1 Generate random number between 0 and 1

```
import random as r
print (r.random())
print (r.random())
print (round(r.random(),4))
```

```
0.7512486175763348
0.5015832763034391
0.7335
```

9.2 Generate random integer number

```
import random as r
print (r.randint(1, 100))
print (r.randint(1, 100))
print (r.randint(-10, 10))
print (r.randint(-10, 10))
```

```
88
47
-5
4
```

9.3 Generate random real number

```
import random as r
print (r.uniform(1, 100))
print (r.uniform(1, 100))
print (r.uniform (-10, 10))
print (r.uniform (-10, 10))
print (round(r.uniform (-10, 10),2))
```

```
97.39127815370512
99.35262788984427
1.5886268848088747
-4.72371568384482
3.54
```

9.4 Select sample from a list of elements

```
import random as r

A=[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

print (r.sample(A, 4))
print (r.sample(A, 2))
print (r.sample(range(0,100), 2))
print (r.sample(range(-100,100), 5))
```

```
[1, 8, 10, 3]
[3, 8]
[60, 70]
[12, -55, 54, -86, 30]
```

9.5 Generate random string

```
import string as s
import random as r
print ("String        --> ",s.ascii_letters)

passwd=r.sample(s.ascii_letters, 6)
print ("Selected Char --> ",passwd)

passwd1="".join(passwd)
```

```
print ("passwd1       --> ",passwd1)

passwd2="+".join(passwd)
print ("passwd2       --> ",passwd2)

passwd3="*".join(passwd)
print ("passwd3       --> ",passwd3)
```

```
String        -->  abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
Selected Char -->  ['h', 's', 'Z', 'l', 'P', 'k']
passwd1       -->  hsZlPk
passwd2       -->  h+s+Z+l+P+k
passwd3       -->  h*s*Z*l*P*k
```

9.6 Generate random digits

```
import string as s
import random as r
print ("Digits --> ",s.digits)

otp=r.sample(s.digits, 5)
print ("Selected num1 --> ",otp)
otp="".join(otp)
print ("otp1          --> ",otp)

otp=r.sample(s.digits, 5)
print ("Selected num2 --> ",otp)
otp="".join(otp)
print ("otp2          --> ",otp)

otp=r.sample(s.digits, 5)
print ("Selected num2 --> ",otp)
otp="".join(otp)
print ("otp3          --> ",otp)
```

```
Digits -->  0123456789
Selected num1 -->  ['1', '7', '8', '2', '9']
otp1          -->  17829
Selected num2 -->  ['1', '3', '9', '5', '2']
otp2          -->  13952
Selected num2 -->  ['0', '2', '1', '6', '3']
otp3          -->  02163
```

9.7 Generate random string + digits

```
import string as s
import random as r
print ("String + Digits --> ",s.ascii_letters + s.digits)
```

```
mixPasswd=r.sample(s.ascii_letters + s.digits, 5)
print ("\nSelected Str1 --> ",mixPasswd)
mixPasswd="".join(mixPasswd)
print ("mixPasswd1    --> ",mixPasswd)

mixPasswd=r.sample(s.ascii_letters + s.digits, 6)
print ("\nSelected Str2 --> ",mixPasswd)
mixPasswd="".join(mixPasswd)
print ("mixPasswd2    --> ",mixPasswd)

splChar="#@!~%^&*()_+=-[]{}|"
mixPasswd=r.sample(splChar + s.ascii_letters + s.digits, 8)
print ("\nSelected Str3 --> ",mixPasswd)
mixPasswd="".join(mixPasswd)
print ("mixPasswd3    --> ",mixPasswd)
```

```
String + Digits -->  abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Selected Str1 -->  ['e', 'K', 't', 'o', 'R']
mixPasswd1    -->  eKtoR

Selected Str2 -->  ['D', 'u', 'J', '5', 'T', 'M']
mixPasswd2    -->  DuJ5TM

Selected Str3 -->  ['p', 'W', '{', 'b', '_', '+', '6', '#']
mixPasswd3    -->  pW{b_+6#
```

---

10 Exception Handaling

Learning: How to handle exceptions

10.1 Error Generation

```
for i in range(-5,6):
  print ("100/",i," --> ", 100/i)
```

```
100/ -5  -->  -20.0
100/ -4  -->  -25.0
100/ -3  -->  -33.333333333333336
100/ -2  -->  -50.0
100/ -1  -->  -100.0
---------------------------------------------------------------------------
ZeroDivisionError                         Traceback (most recent call last)
<ipython-input-39-5eb017879ab5> in <module>()
      1 for i in range(-5,6):
----> 2         print ("100/",i," --> ", 100/i)

ZeroDivisionError: division by zero
```

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10.2 Exception handaling for division by zero

```
for i in range(-5,6):
    try:
        print ("100/",i," --> ", 100/i)
    except:
        print ("error")
```

```
 100/ -5  -->  -20.0
 100/ -4  -->  -25.0
 100/ -3  -->  -33.333333333333336
 100/ -2  -->  -50.0
 100/ -1  -->  -100.0
 error
 100/ 1  -->  100.0
 100/ 2  -->  50.0
 100/ 3  -->  33.333333333333336
 100/ 4  -->  25.0
 100/ 5  -->  20.0
```

10.3 Exception handaling for array out of index

```
L=[1,2,3,4,5]

for i in range(8):
    try:
        print (i," --> ",L[i])
    except:
        print ("error")
```

```
 0  -->  1
 1  -->  2
 2  -->  3
 3  -->  4
 4  -->  5
 error
 error
 error
```

10.4 Exception handaling for file not found

```
fileName=input("Enter File Name: ")
fp=open(fileName)   # Open the file in reading mode
fp.close()
print ("Done")
```

```
Enter File Name: SampleFile.csv
---------------------------------------------------------------------------
FileNotFoundError                         Traceback (most recent call last)
<ipython-input-42-df3155df6860> in <module>()
      1 fileName=input("Enter File Name: ")
----> 2 fp=open(fileName)       # Open the file in reading mode
      3 fp.close()
      4 print ("Done")

FileNotFoundError: [Errno 2] No such file or directory: 'SampleFile.csv'
```

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10.5 Exception handaling for file not found

```
fileName=input("Enter File Name: ")
try:
    fp=open(fileName)   # Open the file in reading mode
    fp.close()
except:
    print ("Error !! \"%s\" File Not Found"%(fileName))

print ("Done")
```

```
Enter File Name: test.csv
Error !! "test.csv" File Not Found
Done
```

11 Data Structure 1 - List

Learning: How to use list, add, delete and search in the list.

Note: Read more about list and try yourself

11.1 List Declaration

```
L = ["Pratham",  'Sharma', 3.14,  3 ]
print ("Original List: ", L)
print ("Number of elements in list: ", len(L))
```

```
Original List:  ['Pratham', 'Sharma', 3.14, 3]
Number of elements in list:  4
```

11.2 List Iteration

```
L = ["Pratham",  'Sharma', 3.14,  3 ]
print ("Original List: ", L)
```

```
i=0
while i < len(L):
    print (L[i])
    i+=1
```

```
 Original List:  ['Pratham', 'Sharma', 3.14, 3]
 Pratham
 Sharma
 3.14
 3
```

11.3 List Iteration using for loop

```
L = ["Pratham",  'Sharma', 3.14,  3 ]
print ("Original List: ", L)
for i in range(0, len(L)):
    print (L[i])
```

```
 Original List:  ['Pratham', 'Sharma', 3.14, 3]
 Pratham
 Sharma
 3.14
 3
```

11.4 List Iteration using for loop

```
L = ["Pratham",  'Sharma', 3.14,  3 ]
print ("Original List --> ", L)
for s in L:
  print (s)
```

```
 Original List -->  ['Pratham', 'Sharma', 3.14, 3]
 Pratham
 Sharma
 3.14
 3
```

11.5 Adding and deleting from list

```
L = ["Pratham",  'Sharma', 3.14,  3 ]
print ("Original List       --> ", L)

L.append("Rahul")
print ("List After Adding   --> ", L)
```

```
del L[1]
print ("List After Deleting --> ", L)
```

```
Original List       -->  ['Pratham', 'Sharma', 3.14, 3]
List After Adding   -->  ['Pratham', 'Sharma', 3.14, 3, 'Rahul']
List After Deleting -->  ['Pratham', 3.14, 3, 'Rahul']
```

11.6 Sum/Average of List

```
L=[3, 6, 9, 12, 5, 3, 2]
print ("Original List --> ", L)

print ("Sum     --> ", sum(L))
print ("Average --> ", sum(L)/len(L))
print ("Average --> ", sum(L)//len(L))

print ("L * 3   --> ", L * 3)     # Every element get tripled
print ("L + L   --> ", L + L)     # Every element get doubled
```

```
Original List -->  [3, 6, 9, 12, 5, 3, 2]
Sum     -->  40
Average -->  5.714285714285714
Average -->  5
L * 3   -->  [3, 6, 9, 12, 5, 3, 2, 3, 6, 9, 12, 5, 3, 2, 3, 6, 9, 12, 5, 3, 2]
L + L   -->  [3, 6, 9, 12, 5, 3, 2, 3, 6, 9, 12, 5, 3, 2]
```

11.7 Min/Max/Sort the list

```
L=[3, 6, 9, 12, 5, 3, 2]
print ("Original List --> ", L)

print ("max --> ", max(L))
print ("min --> ", min(L))

print ("\nBefore Sort            --> ", L)
L.sort()

print ("After Sort (Asending)  --> ", L)

L.sort(reverse=True)
print ("After Sort (Desending) --> ", L)
```

```
Original List -->  [3, 6, 9, 12, 5, 3, 2]
max -->  12
min -->  2

Before Sort            -->  [3, 6, 9, 12, 5, 3, 2]
After Sort (Asending)  -->  [2, 3, 3, 5, 6, 9, 12]
After Sort (Desending) -->  [12, 9, 6, 5, 3, 3, 2]
```

11.8 Merge lists and select elements

```
L1 = [3, 6, 9]
L2 = [12, 5, 3, 2]
L3 = L1 + L2
print ("L1 --> ",L1)
print ("L2 --> ",L2)
print ("L3 --> ",L3)

print ("\nL3[2:]  --> ",L3[2:])
print ("L3[2:5] --> ",L3[2:5])
print ("L3[:-1] --> ",L3[:-1])
print ("L3[::2] --> ",L3[::2])
```

```
     L1 -->  [3, 6, 9]
     L2 -->  [12, 5, 3, 2]
     L3 -->  [3, 6, 9, 12, 5, 3, 2]

     L3[2:]  -->  [9, 12, 5, 3, 2]
     L3[2:5] -->  [9, 12, 5]
     L3[:-1] -->  [3, 6, 9, 12, 5, 3]
     L3[::2] -->  [3, 9, 5, 2]
```

11.9 Multiply all elements of the list by a constant

```
L = [12, 5, 3, 2, 7]
print ("Original List --> ", L)

newL = [ i * 5 for i in L ]
print ("After Multiply with constant --> ", newL)
```

```
     Original List -->  [12, 5, 3, 2, 7]
     After Multiply with constant -->  [60, 25, 15, 10, 35]
```

11.10 Searching in the list

```
L=[3, 6, 9, 12, 5, 3, 2]
print ("Original List --> ", 6 in L)
print ("Original List --> ", 10 in L)
print ("Original List --> ", 12 in L)

if (6 in L) == True:
    print ("Present")
else:
    print ("Not Present")

if 10 in L == False:
```

```
    print ("Not Present")
else:
    print ("Present")
```

```
 Original List -->  True
 Original List -->  False
 Original List -->  True
 Present
 Present
```

---

12 Data Structure 2 - Dictionary

Learning: How to use Dictionary, add, delete, search in Dictionary

Note: Read more about Dictionary and try yourself

12.1 Declare Dictionary

```
CGPA={1:8.9, 2:5.6, 4:6.7, 7:9.1, 8:5.3}
print ("Dictionary      --> ", CGPA)
print ("Num of elements --> ", len(CGPA))

print ("CGPA of 1       --> ", CGPA[1])
print ("CGPA of 4       --> ", CGPA[4])
print ("CGPA of 7       --> ", CGPA[7])
print ("CGPA of 3       --> ", CGPA[3])
```

```
 Dictionary      -->  {1: 8.9, 2: 5.6, 4: 6.7, 7: 9.1, 8: 5.3}
 Num of elements -->  5
 CGPA of 1       -->  8.9
 CGPA of 4       -->  6.7
 CGPA of 7       -->  9.1
 ---------------------------------------------------------------------------
 KeyError                                  Traceback (most recent call last)
 <ipython-input-54-598d6ecb7ab2> in <module>()
       6 print ("CGPA of 4       --> ", CGPA[4])
       7 print ("CGPA of 7       --> ", CGPA[7])
 ----> 8 print ("CGPA of 3       --> ", CGPA[3])

 KeyError: 3
```

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12.2 Triverse dictionary

```
CGPA={1:8.9, 2:5.6, 4:6.7, 7:9.1, 8:5.3}
for k in CGPA:
    print ("CGPA of ", k, " --> ", CGPA[k])
```

```
CGPA of  1  -->  8.9
CGPA of  2  -->  5.6
CGPA of  4  -->  6.7
CGPA of  7  -->  9.1
CGPA of  8  -->  5.3
```

12.3 Getting Keys and Values

```
CGPA={1:8.9, 2:5.6, 4:6.7, 7:9.1, 8:5.3}
print ("Dictionary --> ", CGPA)
print ("Keys       --> ", list(CGPA.keys()))
print ("Values     --> ", list(CGPA.values()))
```

```
Dictionary -->  {1: 8.9, 2: 5.6, 4: 6.7, 7: 9.1, 8: 5.3}
Keys       -->  [1, 2, 4, 7, 8]
Values     -->  [8.9, 5.6, 6.7, 9.1, 5.3]
```

12.4 Updating, Adding and Deleting from Dictionary

```
CGPA={1:8.9,2:5.6,4:6.7,7:9.1,8:5.3}
print ("Original Dictionary --> ", CGPA)

CGPA[4] = 9.2
print ("After Updating (4)  --> ", CGPA)

CGPA[3] = 8.6
print ("After Adding (3)    --> ", CGPA)

del CGPA[1]
print ("After Deleting (1)  --> ", CGPA)

CGPA.clear()
print ("After Clear         --> ", CGPA)

del CGPA
print ("After Delete        --> ", CGPA)
```

```
Original Dictionary -->  {1: 8.9, 2: 5.6, 4: 6.7, 7: 9.1, 8: 5.3}
After Updating (4)  -->  {1: 8.9, 2: 5.6, 4: 9.2, 7: 9.1, 8: 5.3}
After Adding (3)    -->  {1: 8.9, 2: 5.6, 4: 9.2, 7: 9.1, 8: 5.3, 3: 8.6}
```

12.5 Checking for Key in Dictionary

```
CGPA={1:8.9, 2:5.6, 4:6.7, 7:9.1, 8:5.3}
print ("Original Dictionary --> ", CGPA)
print ("Is Key 2 Present    --> ", 2 in CGPA)
print ("Is Key 9 Present    --> ", 9 in CGPA)
```

```
Original Dictionary -->  {1: 8.9, 2: 5.6, 4: 6.7, 7: 9.1, 8: 5.3}
Is Key 2 Present    -->  True
Is Key 9 Present    -->  False
```

12.6 More example1

```
HomeTown={"Prashant":"Delhi", "Govind":"Gwalior", "Anil":"Morena", "Pankaj":"Agra"}
print ("Original Dictionary --> ", HomeTown)
print ("Home Town of Prashant is --> ", HomeTown["Prashant"])
print ("Home Town of Govind is   --> ", HomeTown["Govind"])
print ("Home Town of Anil is     --> ", HomeTown["Anil"])
print ("Home Town of Pankaj is   --> ", HomeTown["Pankaj"])
```

```
Original Dictionary -->  {'Prashant': 'Delhi', 'Govind': 'Gwalior', 'Anil': 'Morena',
Home Town of Prashant is -->  Delhi
Home Town of Govind is   -->  Gwalior
Home Town of Anil is     -->  Morena
Home Town of Pankaj is   -->  Agra
```

12.7 More example2

```
HomeTown={"Prashant":"Delhi", "Govind":"Gwalior", "Anil":"Morena", "Pankaj":"Agra"}
print ("Original Dictionary --> ", HomeTown)

for d in HomeTown:
    print ("Home Town of ", d, " is  --> ", HomeTown[d])
```

```
Original Dictionary -->  {'Prashant': 'Delhi', 'Govind': 'Gwalior', 'Anil': 'Morena',
Home Town of  Prashant  is  -->  Delhi
Home Town of  Govind  is  -->  Gwalior
Home Town of  Anil  is  -->  Morena
Home Town of  Pankaj  is  -->  Agra
```

13 Data Structure 3 - Tuple

Learning: How to use Tuple, add, delete, search in Tuple

Note: Read more about Tuple and try yourself

13.1 Declare Tuple

```
# Method 1
T = ("Pratham", 'Sharma', 3.14, 3)

print ("T               -->", T)
print ("Num of elements -->", len(T))
print ("Type of Object  -->", type(T))
```

```
     T               --> ('Pratham', 'Sharma', 3.14, 3)
     Num of elements --> 4
     Type of Object  --> <class 'tuple'>
```

```
# Method 2
T = tuple(["Pratham", 'Sharma', 3.14, 3])   # Convert list to tuple
#T = tuple(("Pratham", 'Sharma', 3.14, 3))  # Also Works

print ("T               -->", T)
print ("Num of elements -->", len(T))
print ("Type of Object  -->", type(T))
```

```
     T               --> ('Pratham', 'Sharma', 3.14, 3)
     Num of elements --> 4
     Type of Object  --> <class 'tuple'>
```

13.2 Tuple Iteration

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T -->", T)

i = 0
while i < len(T):
    print (T[i])
    i += 1
```

```
     T --> ('Pratham', 'Sharma', 3.14, 3)
     Pratham
     Sharma
     3.14
     3
```

13.3 Tuple iteration using for loop

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T -->", T)

for i in range(0, len(T)):
    print (T[i])
```

```
 T --> ('Pratham', 'Sharma', 3.14, 3)
 Pratham
 Sharma
 3.14
 3
```

13.4 Tuple iteration using for loop

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T -->", T)

for s in T:
    print (s)
```

```
 T --> ('Pratham', 'Sharma', 3.14, 3)
 Pratham
 Sharma
 3.14
 3
```

13.5 Accessing/Selecting in Tuple

```
# Example 1:
T = (3, 6, 9, 12, 5, 3, 2)
print ("T     -->", T)

print ("T[1]  -->", T[1])
print ("T[2]  -->", T[2])
print ("T[-1] -->", T[-1])
print ("T[-2] -->", T[-2])
```

```
 T     --> (3, 6, 9, 12, 5, 3, 2)
 T[1]  --> 6
 T[2]  --> 9
 T[-1] --> 2
 T[-2] --> 3
```

```
# Example 2:
```

```
T = (3, 6, 9, 12, 5, 3, 2)
print ("T        -->", T)

print ("T[1:3]   -->", T[1:3])
print ("T[2:]    -->", T[2:])
print ("T[2:5]   -->", T[2:5])
print ("T[:2]    -->", T[:2])
print ("T[:-1]   -->", T[:-1])
print ("T[-4:-1] -->", T[-4:-1])
```

```
T        --> (3, 6, 9, 12, 5, 3, 2)
T[1:3]   --> (6, 9)
T[2:]    --> (9, 12, 5, 3, 2)
T[2:5]   --> (9, 12, 5)
T[:2]    --> (3, 6)
T[:-1]   --> (3, 6, 9, 12, 5, 3)
T[-4:-1] --> (12, 5, 3)
```

13.6 Sum/Average of Tuple

```
T = (3, 6, 9, 12, 5, 3, 2)
print ("T       -->", T)
print ("Sum     -->", sum(T))
print ("Average -->", sum(T)/len(T))
print ("Average -->", sum(T)//len(T))
```

```
T       --> (3, 6, 9, 12, 5, 3, 2)
Sum     --> 40
Average --> 5.714285714285714
Average --> 5
```

13.7 Min/Max in Tuple

```
# Example 1
T = (3, 6, 9, 12, 5, 3, 2)               # Integer Tuple
print ("T   -->", T)
print ("Max -->", max(T))
print ("Min -->", min(T))
```

```
T   --> (3, 6, 9, 12, 5, 3, 2)
Max --> 12
Min --> 2
```

```
# Example 2
T = ("Ram", "Shyam", "Human", "Ant")      # String Tuple
print ("T   -->", T)
print ("Max -->", max(T))
print ("Min -->", min(T))
```

```
T   --> ('Ram', 'Shyam', 'Human', 'Ant')
Max --> Shyam
Min --> Ant
```

13.8 Merging Tuples

```
T1 = (3, 6, 9)
T2 = (12, 5, 3, 2)

print ("T1 -->", T1)
print ("T2 -->", T2)

T3 = T1 + T2
print ("T3 -->", T3)

T4 = T1 + T2 + T1 + T2
print ("T4 -->", T4)
```

```
T1 --> (3, 6, 9)
T2 --> (12, 5, 3, 2)
T3 --> (3, 6, 9, 12, 5, 3, 2)
T4 --> (3, 6, 9, 12, 5, 3, 2, 3, 6, 9, 12, 5, 3, 2)
```

13.9 Merging part of Tuples

```
T1 = (3, 6, 9)
T2 = (12, 5, 3, 2)

print ("T1 -->", T1)
print ("T2 -->", T2)

T3 = T1[1:2] + T2[1:3]
print ("T3 -->", T3)

T4 = T1[:-2] + T2[:-3]
print ("T4 -->", T4)
```

```
T1 --> (3, 6, 9)
T2 --> (12, 5, 3, 2)
T3 --> (6, 5, 3)
T4 --> (3, 12)
```

13.10 Searching in the tuple

```
T = (3, 6, 9, 12, 5, 3, 2)
print ("T       -->", T)
```

```
print ("6  in T -->", 6 in T)
print ("10 in T -->", 10 in T)
print ("12 in T -->", 12 in T)
```

```
T       --> (3, 6, 9, 12, 5, 3, 2)
6  in T --> True
10 in T --> False
12 in T --> True
```

13.11 Adding element to Tuple (Error)

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T -->", T)

T[2] = 900               # Error; 'tuple' object does not support item assignment
print ("T -->", T)

#Tuples are unchangeable. We cannot add items to it.
```

```
T --> ('Pratham', 'Sharma', 3.14, 3)
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-74-fb1d27ae8658> in <module>()
      2 print ("T -->", T)
      3
----> 4 T[2] = 900               # Error; 'tuple' object does not support item
assignment
      5 print ("T -->", T)
      6

TypeError: 'tuple' object does not support item assignment
```

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13.12 Adding element to Tuple - (Jugaad)

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T         -->", T)

T1 = list(T)
T1.append(9.8)
T = tuple(T1)

print ("After Add -->", T)
```

```
T         --> ('Pratham', 'Sharma', 3.14, 3)
After Add --> ('Pratham', 'Sharma', 3.14, 3, 9.8)
```

13.13 Inserting element in Tuple - (Jugaad)

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T            -->", T)

T1 = list(T)
T1.insert(2, "Rahul")
T = tuple(T1)

print ("After Insert -->", T)
```

```
T            --> ('Pratham', 'Sharma', 3.14, 3)
After Insert --> ('Pratham', 'Sharma', 'Rahul', 3.14, 3)
```

13.14 Deleting from Tuple (Error)

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T            -->", T)

del T[1]

print ("After Delete -->", T)
```

```
T            --> ('Pratham', 'Sharma', 3.14, 3)
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-77-0baff4d8a5c8> in <module>()
      2 print ("T            -->", T)
      3
----> 4 del T[1]
      5
      6 print ("After Delete -->", T)

TypeError: 'tuple' object doesn't support item deletion
```

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13.15 Deleting from Tuple - (Jugaad)

```
T = ("Pratham", 'Sharma', 3.14, 3)
print ("T            -->", T)

T1 = list(T)
del T1[1]
T = tuple(T1)

print ("After Delete -->", T)
```

```
T            --> ('Pratham', 'Sharma', 3.14, 3)
```

```
After Delete --> ('Pratham', 3.14, 3)
```

---

14 Data Structure 4 - Set

Learning: How to use Set, add, delete, search in Set

Note: Read more about Set and try yourself

14.1 Declare Set

```
s = set(['A', 'B', 'E', 'F','E', 'F' ])
print ("Original set           --> ", s)
print ("Num of elements in set --> ", len(s))
```

```
Original set           -->  {'E', 'A', 'F', 'B'}
Num of elements in set -->  4
```

14.2 Opertions on Sets

```
a = set(['A', 'B', 'E', 'F' ])
b = set(["A", "C", "D", "E"])
print ("Original set a      --> ", a)
print ("Original set b      --> ", b)
print ("Union of a and b    --> ", a.union(b))
print ("Intersection of a,b --> ", a.intersection(b))
print ("Difference a - b    --> ", a - b)
print ("Difference a - b    --> ", a.difference(b))
print ("Difference b - a    --> ", b - a)
print ("Difference b - a    --> ", b.difference(a))
print ("Symetric Diff a - b --> ", a.symmetric_difference(b))
print ("Symetric Diff b - a --> ", b.symmetric_difference(a))
```

```
Original set a      -->  {'E', 'A', 'F', 'B'}
Original set b      -->  {'E', 'A', 'D', 'C'}
Union of a and b    -->  {'B', 'D', 'F', 'E', 'A', 'C'}
Intersection of a,b -->  {'E', 'A'}
Difference a - b    -->  {'F', 'B'}
Difference a - b    -->  {'F', 'B'}
Difference b - a    -->  {'D', 'C'}
Difference b - a    -->  {'D', 'C'}
Symetric Diff a - b -->  {'F', 'D', 'C', 'B'}
Symetric Diff b - a -->  {'B', 'F', 'D', 'C'}
```

14.3 Add, delete, pop element from set

```
a = set(['A', 'B', 'E', 'F' ])
```

```
print ("Original set a       --> ", a)
a.add("D")
print ("Set After Adding (D) --> ", a)
a.add("D")
print ("Set After Adding (D) --> ", a)
a.remove("D")
print ("Set After Deleting(D)--> ", a)
a.pop()
print ("Set After pop        --> ", a)
a.pop()
print ("Set After pop        --> ", a)
```

```
Original set a       -->  {'E', 'A', 'F', 'B'}
Set After Adding (D) -->  {'B', 'D', 'F', 'E', 'A'}
Set After Adding (D) -->  {'B', 'D', 'F', 'E', 'A'}
Set After Deleting(D)-->  {'B', 'F', 'E', 'A'}
Set After pop        -->  {'F', 'E', 'A'}
Set After pop        -->  {'E', 'A'}
```

---

15 Command Line Argument

Learning: How to Take input from command line and process it

Note: Run the program at cmd line

15.1 Add two numbers given at cmd line

Note: To run the program at cmd line

- python Program.py 10 20

```
import sys
print (sys.argv)
a = int(sys.argv[1])    # First Number
b = int(sys.argv[2])    # Second Number
c = a + b
print (a, " + ", b, " --> ", c)
```

```
['/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py', '-f', '/root/.local/
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-82-a3d67294dc12> in <module>()
      1 import sys
      2 print (sys.argv)
----> 3 a = int(sys.argv[1])    # First Number
      4 b = int(sys.argv[2])    # Second Number
      5 c = a + b

ValueError: invalid literal for int() with base 10: '-f'
```

SEARCH STACK OVERFLOW

15.2 Concatinate two strings given at cmd line

Note: To run the program at cmd line

- python Program.py FirstString SecondString

```
import sys
print (sys.argv)
s = sys.argv[1] + " " + sys.argv[2]
print (sys.argv[1], " + ", sys.argv[2], " --> ", s)
```

```
['/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py', '-f', '/root/.local/
-f  +  /root/.local/share/jupyter/runtime/kernel-2c370b3f-04bb-4872-8f9b-8559cbd8132b
```

15.3 Add all the numbers given at cmd line

Note: To run the program at cmd line

- python Program.py
- python Program.py 10
- python Program.py 10 20 30 40

```
import sys
print (sys.argv)
sum=0
for s in sys.argv[1:]:
    sum += int(s)

print ("Sum is --> ", sum)
```

```
['/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py', '-f', '/root/.local/
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-84-87063e0e9afe> in <module>()
      3 sum=0
      4 for s in sys.argv[1:]:
----> 5         sum += int(s)
      6
      7 print ("Sum is --> ", sum)

ValueError: invalid literal for int() with base 10: '-f'

SEARCH STACK OVERFLOW
```

16 File Handling

Learning: How to open the file, read the file and write in the file

16.1 Writing 1 to 10 in file

```
fp=open('result.txt','w')   # Open the file in writing mode
for  i in range(1,11):
    fp.write(str(i) + "\n") # Writing to the file line by line
fp.close()

print ("Writing done !! \nOpen result.txt to view the content")
```

```
 Writing done !!
 Open result.txt to view the content
```

16.2 Read a file and print its content

```
fp=open('result.txt')       # Open the file in reading mode
for line in fp:             # print line by line
    print (line.strip())
fp.close()
```

```
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
```

16.3 Read from one file, Convert it to upper case and write to other file

```
Readfp=open('result.txt')       # Open the file in reading mode
Writefp=open('abc.txt','w') # Open the file in writing mode
for line in Readfp:
    Writefp.write(line.upper())

Writefp.close()
Readfp.close()
```

```
print ("Writing done !! \nOpen result.txt to view the content")
```

```
     Writing done !!
     Open result.txt to view the content
```

```
# OpenCV  for Computer Vision Applications

import cv2
import numpy as np

img = cv2.imread("Resources/lena.png")
kernel = np.ones((5,5),np.uint8)

imgGray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
imgBlur = cv2.GaussianBlur(imgGray,(7,7),0)
imgCanny = cv2.Canny(img,150,200)
imgDialation = cv2.dilate(imgCanny,kernel,iterations=1)
imgEroded = cv2.erode(imgDialation,kernel,iterations=1)

cv2_imshow(imgGray)
cv2_imshow(imgBlur)
cv2_imshow(imgCanny)
cv2_imshow(imgDialation)
cv2_imshow(imgEroded)
cv2.waitKey(0)
```

```
import cv2
import numpy as np

img = np.zeros((512,512,3),np.uint8)
#print(img)
#img[:]= 255,0,0

cv2.line(img,(0,0),(img.shape[1],img.shape[0]),(0,255,0),3)
cv2.rectangle(img,(0,0),(250,350),(0,0,255),2)
cv2.circle(img,(400,50),30,(255,255,0),5)
cv2.putText(img," OPENCV  ",(300,200),cv2.FONT_HERSHEY_COMPLEX,1,(0,150,0),3)


cv2_imshow(img)

cv2.waitKey(0)
```

```
#Face Detection

import cv2

faceCascade= cv2.CascadeClassifier("Resources/haarcascade_frontalface_default.xml")
img = cv2.imread('Resources/lena.png')
imgGray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)

faces = faceCascade.detectMultiScale(imgGray,1.1,4)
```

```
for (x,y,w,h) in faces:
    cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2)


cv2_imshow(img)
cv2.waitKey(0)
```

```
pip install speedtest-cli
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting speedtest-cli
  Downloading speedtest_cli-2.1.3-py2.py3-none-any.whl (23 kB)
Installing collected packages: speedtest-cli
Successfully installed speedtest-cli-2.1.3
```

```
import speedtest
wifi  = speedtest.Speedtest()
print("Wifi Download Speed is ", wifi.download())
print("Wifi Upload Speed is ", wifi.upload())
```

```
Wifi Download Speed is  575165992.7897485
Wifi Upload Speed is  339905029.7011327
```

https://sdhanaraj.blogspot.com/2022/02/170-python-projects-with-source-code.html

https://medium.com/coders-camp/130-python-projects-with-source-code-61f498591bb

```
https://sdhanaraj.blogspot.com/2022/02/170-python-projects-with-source-code.html
```

```
!whoami
```

```
root
```

```
!whoami
```

```
root
```

```
!pip install PyQRCode
!pip install pypng
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting PyQRCode
  Downloading PyQRCode-1.2.1.zip (41 kB)
     |████████████████████████████████| 41 kB 775 kB/s
Building wheels for collected packages: PyQRCode
  Building wheel for PyQRCode (setup.py) ... done
  Created wheel for PyQRCode: filename=PyQRCode-1.2.1-py3-none-any.whl size=36247 sha
  Stored in directory: /root/.cache/pip/wheels/aa/14/ad/f09824edf35fdc5fd8acc01b60ff5
Successfully built PyQRCode
Installing collected packages: PyQRCode
Successfully installed PyQRCode-1.2.1
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pypng
  Downloading pypng-0.20220715.0-py3-none-any.whl (58 kB)
     |████████████████████████████████| 58 kB 4.7 MB/s
Installing collected packages: pypng
Successfully installed pypng-0.20220715.0
```

```
import pyqrcode
import png
link = " amit is https://www.instagram.com/the.clever.programmer/"
qr_code = pyqrcode.create(link)
qr_code.png("instagram2.png", scale=5)
```

Calculating Execution Time of a Python Program

```
from time import time
start = time()

# Python program to create acronyms
word = "Artificial Intelligence"
text = word.split()
a = " "
for i in text:
    a = a+str(i[0]).upper()
print(a)

end = time()
execution_time = end - start
print("Execution Time : ", execution_time)
```

```
 AI
Execution Time :  0.00027179718017578125
```

Decode a QR Code using Python

```
!pip install pyzbar
!pip install pillow
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pyzbar
  Downloading pyzbar-0.1.9-py2.py3-none-any.whl (32 kB)
Installing collected packages: pyzbar
Successfully installed pyzbar-0.1.9
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Requirement already satisfied: pillow in /usr/local/lib/python3.7/dist-packages (7.1
```

```
!apt install libzbar0
```

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libnvidia-common-460
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  libv4l-0 libv4lconvert0
The following NEW packages will be installed:
  libv4l-0 libv4lconvert0 libzbar0
0 upgraded, 3 newly installed, 0 to remove and 12 not upgraded.
Need to get 193 kB of archives.
After this operation, 760 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4lconvert0 amd64 1.14.2-
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l-0 amd64 1.14.2-1 [41
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libzbar0 amd64 0.10+doc-
Fetched 193 kB in 0s (1,806 kB/s)
Selecting previously unselected package libv4lconvert0:amd64.
(Reading database ... 123934 files and directories currently installed.)
Preparing to unpack .../libv4lconvert0_1.14.2-1_amd64.deb ...
Unpacking libv4lconvert0:amd64 (1.14.2-1) ...
Selecting previously unselected package libv4l-0:amd64.
Preparing to unpack .../libv4l-0_1.14.2-1_amd64.deb ...
Unpacking libv4l-0:amd64 (1.14.2-1) ...
Selecting previously unselected package libzbar0:amd64.
Preparing to unpack .../libzbar0_0.10+doc-10.1build2_amd64.deb ...
Unpacking libzbar0:amd64 (0.10+doc-10.1build2) ...
Setting up libv4lconvert0:amd64 (1.14.2-1) ...
Setting up libv4l-0:amd64 (1.14.2-1) ...
Setting up libzbar0:amd64 (0.10+doc-10.1build2) ...
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...
```

```
from pyzbar.pyzbar import decode
```

```
from pyzbar.pyzbar import decode
from PIL import Image
```

```
decocdeQR = decode(Image.open('instagram2.png'))
print(decocdeQR[0].data.decode('ascii'))
```

```
 amit is https://www.instagram.com/the.clever.programmer/
```

Remove Cuss Words using Python

```
pip install better_profanity
```

```
Collecting better_profanity
  Downloading better_profanity-0.7.0-py3-none-any.whl (46 kB)
     |████████████████████████████████| 46 kB 3.0 MB/s
Installing collected packages: better-profanity
Successfully installed better-profanity-0.7.0
```

```
from better_profanity import profanity
text = "Please leave me alone and just piss off"
censored = profanity.censor(text)
print(censored)
```

```
Please leave me alone and just ****
```

https://sdhanaraj.blogspot.com/2022/02/170-python-projects-with-source-code.html

https://medium.com/coders-camp/130-python-projects-with-source-code-61f498591bb

```
https://sdhanaraj.blogspot.com/2022/02/170-python-projects-with-source-code.html
```

```
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```

```
root
```

```
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```

```
root
```

```
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```

```
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Collecting PyQRCode
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Building wheels for collected packages: PyQRCode
  Building wheel for PyQRCode (setup.py) ... done
  Created wheel for PyQRCode: filename=PyQRCode-1.2.1-py3-none-any.whl size=36247 sha
  Stored in directory: /root/.cache/pip/wheels/aa/14/ad/f09824edf35fdc5fd8acc01b60ff5
Successfully built PyQRCode
Installing collected packages: PyQRCode
Successfully installed PyQRCode-1.2.1
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pypng
  Downloading pypng-0.20220715.0-py3-none-any.whl (58 kB)
     |████████████████████████████████| 58 kB 4.7 MB/s
Installing collected packages: pypng
Successfully installed pypng-0.20220715.0
```

```
import pyqrcode
import png
link = " amit is https://www.instagram.com/the.clever.programmer/"
qr_code = pyqrcode.create(link)
qr_code.png("instagram2.png", scale=5)
```

Calculating Execution Time of a Python Program

```
from time import time
start = time()

# Python program to create acronyms
word = "Artificial Intelligence"
text = word.split()
a = " "
for i in text:
    a = a+str(i[0]).upper()
print(a)

end = time()
execution_time = end - start
print("Execution Time : ", execution_time)
```

```
 AI
Execution Time :  0.00027179718017578125
```

Decode a QR Code using Python

```
!pip install pyzbar
!pip install pillow
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting pyzbar
  Downloading pyzbar-0.1.9-py2.py3-none-any.whl (32 kB)
Installing collected packages: pyzbar
Successfully installed pyzbar-0.1.9
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Requirement already satisfied: pillow in /usr/local/lib/python3.7/dist-packages (7.1
```

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```

```
Reading package lists... Done
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The following additional packages will be installed:
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The following NEW packages will be installed:
  libv4l-0 libv4lconvert0 libzbar0
0 upgraded, 3 newly installed, 0 to remove and 12 not upgraded.
Need to get 193 kB of archives.
After this operation, 760 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4lconvert0 amd64 1.14.2-
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 libv4l-0 amd64 1.14.2-1 [41
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libzbar0 amd64 0.10+doc-
Fetched 193 kB in 0s (1,806 kB/s)
Selecting previously unselected package libv4lconvert0:amd64.
(Reading database ... 123934 files and directories currently installed.)
Preparing to unpack .../libv4lconvert0_1.14.2-1_amd64.deb ...
Unpacking libv4lconvert0:amd64 (1.14.2-1) ...
Selecting previously unselected package libv4l-0:amd64.
Preparing to unpack .../libv4l-0_1.14.2-1_amd64.deb ...
Unpacking libv4l-0:amd64 (1.14.2-1) ...
Selecting previously unselected package libzbar0:amd64.
Preparing to unpack .../libzbar0_0.10+doc-10.1build2_amd64.deb ...
Unpacking libzbar0:amd64 (0.10+doc-10.1build2) ...
Setting up libv4lconvert0:amd64 (1.14.2-1) ...
Setting up libv4l-0:amd64 (1.14.2-1) ...
Setting up libzbar0:amd64 (0.10+doc-10.1build2) ...
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...
```

```
from pyzbar.pyzbar import decode
```

```
from pyzbar.pyzbar import decode
from PIL import Image
```