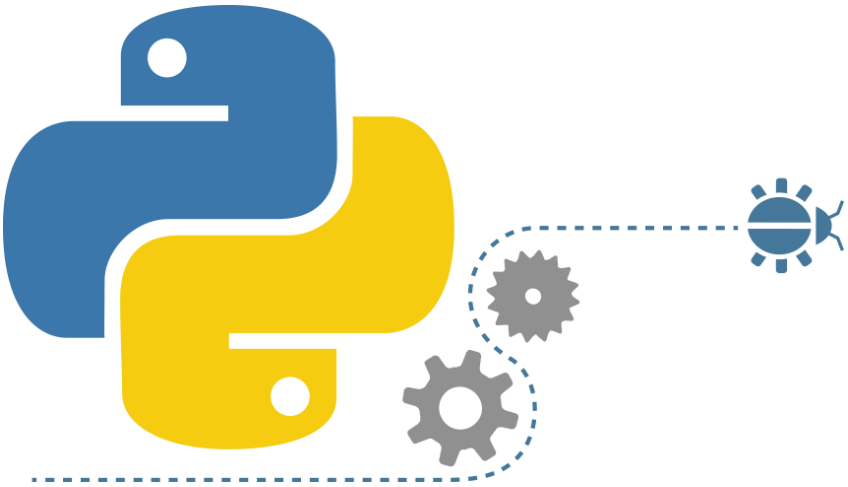
Application Design for an app launch on Google Play Store



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Submitted to: Cyberrrace Infovision Pvt Ltd

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Section 1

System requirement specifications:

1)A PC or Laptop with Minimum Intel Dual Core Processor with at least speed of 2.0 Ghz

2)Minimum of 2gb Ram 1600Mhz

3)If the System is a 64-bit architecture than 64-bit application must be installed and If the System is a 32-bit architecture than 32-bit application must be installed.

4)Operating System: Windows 7 and Above, Linux or Mac OS X

5)Disk Space of minimum 5 GB

Section 2

Technology used:

a) Python: the first technology(software) we used to program the information as per requirements was python. Python is a programming language which is at a high level interpreted, interactive and object-oriented scripting language. python is designed to be highly readable.it uses English keywords frequently where as other languages uses punctuations, and it has fewer syntactical construction than other languages.

- Python is interpreted
- Python is interactive
- Python is object oriented

Python is a programming language that is easier to understand and enables our project to be completed at a faster rate due to features it offers.

b) Anaconda Navigator: anaconda is a free and open-source distribution of python programing languages and R programming languages for scientific computing (data science, large scale data processing).it aims to simplify package management and deployment.

Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda® distribution that allows you to launch applications and easily manage conda packages, environments, and channels without using command-line commands. Navigator can search for packages on Anaconda Cloud or in a local Anaconda Repository. It is available for Windows, macOS, and Linux.

- Spyder present in anaconda navigator is an integrated development environment (IDE) for python. Sypder was used throughout our program.

c)Microsoft excel**:** Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS.it features calculations graphic tools, pivot tables and a macro programing language called visual Basic for applications. Our data(information) in order to process by making use of python programming language was provide to us by Microsoft Excel. Through Microsoft excel we were enable to access the data making use of the pd.read_csv([provide location of the file]) functions present in python .we were able to read data and make our logical programming statements

d)WampServer: Wamp server is a database system that we used in python in order to store data and retrieve it WampServer is a utility designed to allows

you to create Web applications and manage your server and databases. WampServer is a Windows web development environment. It allows you to create web applications with Apache2, PHP and a MySQL database. It also comes with PhpMyAdmin and SQLite Manager to easily manage your databases. WampServer installs automatically (installer), and its usage is very intuitive. You will be able to tune your server without even touching the setting files. WampServer is the only packaged solution that will allow you to reproduce your production server. Once WampServer is installed, you have the possibility to add as many Apache, MySQL, and PHP releases as you want. WampServer also has a tray icon to manage your server and its settings.

e) Microsoft Word**:**

Microsoft Word is a word processing program that was first developed by Microsoft in 1983. Since that time, Microsoft has released an abundance of updated versions, each offering more features and incorporating better technology than the one before it. The most current web-based version of Microsoft Word is Office 365, but the software version of Microsoft Office 2019 includes Word 2019.

Section 3:

Data provided by the client:

Data set 1 provided by the client is a

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver
2	Photo Editor & Candy Camera & Grid	ART_AND_DESIGN	4.1	159	19M	10,000+	Free	0	Everyone	Art & Design	7-Jan-18	1.0.0	4.0.3 and up
3	Coloring book moana	ART_AND_DESIGN	3.9	967	14M	500,000+	Free	0	Everyone	Art & Design;	15-Jan-18	2.0.0	4.0.3 and up
4	U Launcher Lite â€“ FREE Live Cool Th	ART_AND_DESIGN	4.7	87510	8.7M	5,000,000+	Free	0	Everyone	Art & Design	1-Aug-18	1.2.4	4.0.3 and up
5	Sketch - Draw & Paint	ART_AND_DESIGN	4.5	215644	25M	50,000,000+	Free	0	Teen	Art & Design	8-Jun-18	Varies with de	4.2 and up
6	Pixel Draw - Number Art Coloring Bo	ART_AND_DESIGN	4.3	967	2.8M	100,000+	Free	0	Everyone	Art & Design;	20-Jun-18	1.1	4.4 and up
7	Paper flowers instructions	ART_AND_DESIGN	4.4	167	5.6M	50,000+	Free	0	Everyone	Art & Design	26-Mar-17	1	2.3 and up
8	Smoke Effect Photo Maker - Smoke E	ART_AND_DESIGN	3.8	178	19M	50,000+	Free	0	Everyone	Art & Design	26-Apr-18	1.1	4.0.3 and up
9	Infinite Painter	ART_AND_DESIGN	4.1	36815	29M	1,000,000+	Free	0	Everyone	Art & Design	14-Jun-18	6.1.61.1	4.2 and up
10	Garden Coloring Book	ART_AND_DESIGN	4.4	13791	33M	1,000,000+	Free	0	Everyone	Art & Design	20-Sep-17	2.9.2	3.0 and up
11	Kids Paint Free - Drawing Fun	ART_AND_DESIGN	4.7	121	3.1M	10,000+	Free	0	Everyone	Art & Design;	3-Jul-18	2.8	4.0.3 and up
12	Text on Photo - Fonteee	ART_AND_DESIGN	4.4	13880	28M	1,000,000+	Free	0	Everyone	Art & Design	27-Oct-17	1.0.4	4.1 and up
13	Name Art Photo Editor - Focus n Filte	ART_AND_DESIGN	4.4	8788	12M	1,000,000+	Free	0	Everyone	Art & Design	31-Jul-18	1.0.15	4.0 and up
14	Tattoo Name On My Photo Editor	ART_AND_DESIGN	4.2	44829	20M	10,000,000+	Free	0	Teen	Art & Design	2-Apr-18	3.8	4.1 and up
15	Mandala Coloring Book	ART_AND_DESIGN	4.6	4326	21M	100,000+	Free	0	Everyone	Art & Design	26-Jun-18	1.0.4	4.4 and up
16	3D Color Pixel by Number - Sandbox	ART_AND_DESIGN	4.4	1518	37M	100,000+	Free	0	Everyone	Art & Design	3-Aug-18	1.2.3	2.3 and up
17	Learn To Draw Kawaii Characters	ART_AND_DESIGN	3.2	55	2.7M	5,000+	Free	0	Everyone	Art & Design	6-Jun-18	NaN	4.2 and up
18	Photo Designer - Write your name w	ART_AND_DESIGN	4.7	3632	5.5M	500,000+	Free	0	Everyone	Art & Design	31-Jul-18	3.1	4.1 and up
19	350 Diy Room Decor Ideas	ART_AND_DESIGN	4.5	27	17M	10,000+	Free	0	Everyone	Art & Design	7-Nov-17	1	2.3 and up
20	FlipaClip - Cartoon animation	ART_AND_DESIGN	4.3	194216	39M	5,000,000+	Free	0	Everyone	Art & Design	3-Aug-18	2.2.5	4.0.3 and up
21	ibis Paint X	ART_AND_DESIGN	4.6	224399	31M	10,000,000+	Free	0	Everyone	Art & Design	30-Jul-18	5.5.4	4.1 and up
22	Logo Maker - Small Business	ART_AND_DESIGN	4	450	14M	100,000+	Free	0	Everyone	Art & Design	20-Apr-18	4	4.1 and up
23	Boys Photo Editor - Six Pack & Men's	ART_AND_DESIGN	4.1	654	12M	100,000+	Free	0	Everyone	Art & Design	20-Mar-18	1.1	4.0.3 and up

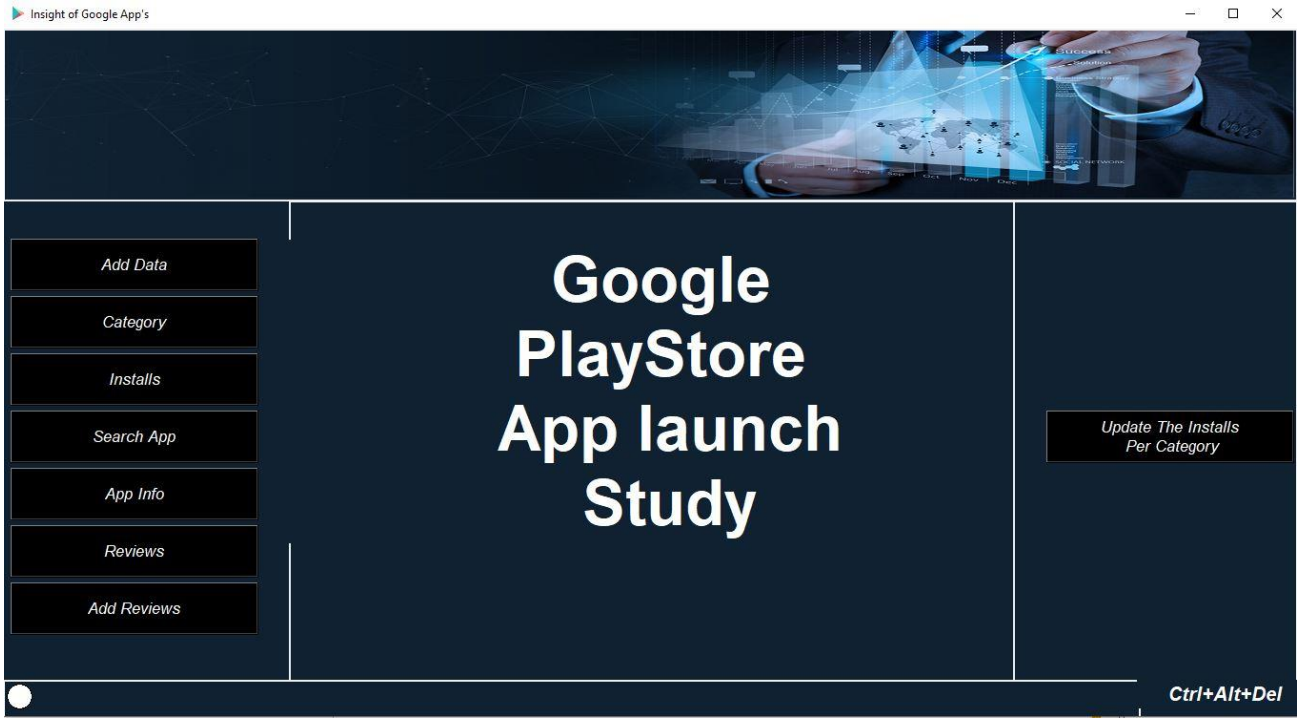
Data set 2 provided by the client is a User Review Dataset

	A	B	C	D	E
13	10 Best Foods for You	Useful information The amount spelling er	Positive	0.2	0.1
14	10 Best Foods for You	Thank you! Great app!! Add arthritis, eyes,	Positive	0.75	0.875
15	10 Best Foods for You	Greatest ever Completely awesome maint	Positive	0.9921875	0.866666667
16	10 Best Foods for You	Good health..... Good health first priority..	Positive	0.55	0.511111111
17	10 Best Foods for You	nan	nan	nan	nan
18	10 Best Foods for You	Health It's important world either life . thir	Positive	0.45	1
19	10 Best Foods for You	Mrs sunita bhati I thankful developers,to m	Positive	0.6	0.666666667
20	10 Best Foods for You	Very Useful in diabetes age 30. I need cont	Positive	0.295	0.1
21	10 Best Foods for You	One greatest apps.	Positive	1	1
22	10 Best Foods for You	good nice	Positive	0.65	0.8
23	10 Best Foods for You	Healthy Really helped	Positive	0.35	0.35
24	10 Best Foods for You	God health	Neutral	0	0
25	10 Best Foods for You	HEALTH SHOULD ALWAYS BE TOP PRIORITY.	Positive	0.78125	0.5
26	10 Best Foods for You	An excellent A useful	Positive	0.65	0.5
27	10 Best Foods for You	I found lot wealth form health...	Neutral	0	0
28	10 Best Foods for You	Because I found important.	Positive	0.4	1
29	10 Best Foods for You	Healthy Eating	Positive	0.5	0.5
30	10 Best Foods for You	Very good Simply good	Positive	0.805	0.69
31	10 Best Foods for You	On test....	Neutral	0	0
32	10 Best Foods for You	Good.!!	Positive	1	0.6
33	10 Best Foods for You	Thanks advice. Downloaded Adobe reader	Positive	0.2	0.2
34	10 Best Foods for You	No recipe book Unable recipe book.	Negative	-0.5	0.5
35	10 Best Foods for You	Absolutely Fabulous Phenomenal	Positive	0.45	0.75

Section 4:

Screenshots of the respective codes of the questions and their outputs

The MainScreen

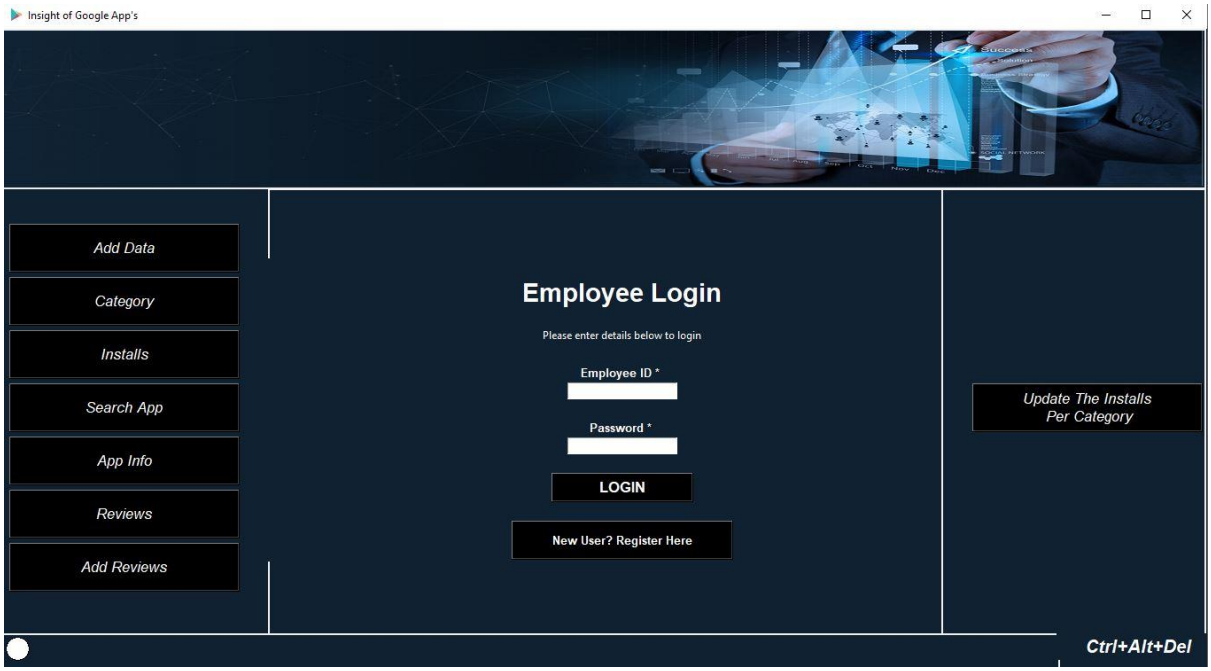



```
#==============================================main
    screen=====================================================
root=Tk()
root.title("Insight of Google App's")
width_value=root.winfo_screenwidth()
height_value=root.winfo_screenheight()
root.geometry("%dx%d+250+100"%(1360,720))
root.configure(background='#102131')
root.iconbitmap(r"C:\\InternshipFinal\\google.ico")
#================================top
    canvas=============================================================================
photocanvas=Canvas(root,width =1355,height=177,bg='#102131')
photocanvas.place(x=0,y=0)
myimg=PhotoImage(file="C:\\InternshipFinal\\predictive_analytics_banner.png")
photocanvas.create_image(0,0,anchor=NW,image=myimg)
photocanvas.image =myimg

#==============================================main canvas
    ============================
mcanvas=Canvas(width = 760,height=500,bg='#102131',bd='0')
```

```
mcanvas.place(x=300,y=180)
head=Label(mcanvas,text="Google \nPlayStore \n App launch
    \nStudy",width=30,font=("Lucida",50,'bold'),fg='#ffffff',bg='#102131')
mcanvas.create_window(400, 200, window=head)
#=====================================================options================
    ================================
lbl_over = Button(root,text = "Add
    Data",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=add_ap
    p_data)
#lbl_over.bind("<Button-1>")
lbl_over.place(x=8,y=220)

lbl_category = Button(root,text =
    "Category",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=ca
    tegory)
#lbl_category.bind("<Button-1>")
lbl_category.place(x=8,y=220+60)

lbl_Installs = Button(root,text =
    "Installs",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=inst
    all)
#lbl_Installs.bind("<Button-1>")
lbl_Installs.place(x=8,y=220+60+60)

lbl_searchapp = Button(root,text = "Search
    App",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=fn.searc
    happ)
#lbl_searchapp.bind("<Button-1>")
lbl_searchapp.place(x=8,y=220+60+120)

lbl_machine = Button(root,text = "App
    Info",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=app)
lbl_machine.bind("<Button-1>")
lbl_machine.place(x=8,y=220+60+120+60)

lbl_review = Button(root,text =
    "Reviews",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=rre
    v)
#lbl_review.bind("<Button-1>")
lbl_review.place(x=8,y=220+60+120+120)
```

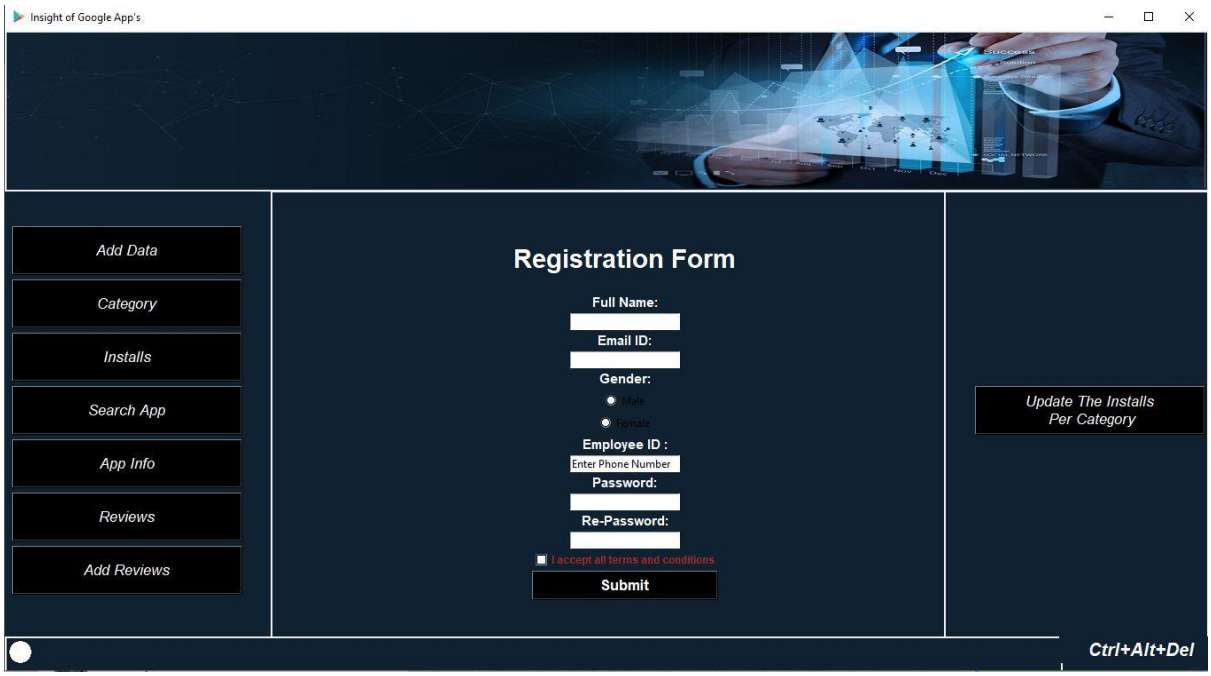
```
lbl_lastupdate = Button(root,text = "Add
    Reviews",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=add
    _rev)
lbl_lastupdate.bind("<Button-1>")
lbl_lastupdate.place(x=8,y=220+60+120+180)
#====================================right canvas==========================
rcanvas=Canvas(width = 295,height=500,bg='#102131')
rcanvas.place(x=1060,y=180)
Button(rcanvas,text = "Update The Installs\n Per
    Category",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',command=Up
    date_cat).place(x=35,y=220)
#====================================bottom
    canvas============================
bottom=Canvas(width = 1190,height=500,bg='#102131')
bottom.place(x=0,y=682)
ball=bottom.create_oval(4,4,30,30,fill='#ffffff')

#================================================group
    name=============================================
name=Label(root,text="Ctrl+Alt+Del",width=15,height=1,font=("Helvetica",15,'bold','italic'),fg='
    #ffffff',bg='#102131')
name.place(x=1190,y=682)
root.mainloop()
```

Login Form



```
def login():
   global mcanvas
   global username_verify
   global password_verify
   mcanvas.delete("all")
   val=Label(mcanvas,width=400,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
   mcanvas.create_window(400,250, window=val)
   # df= pd.read_csv("C:\\Users\\Harsh\\Desktop\\internship\\googleplaystore-App-data.csv")
   username_verify = StringVar()
   password_verify = StringVar()
   Label(val, text="Employee Login", width="400", height="2", font=("Lucida", 22, 'bold'), fg='white',
bg='#102131').pack()

   Label(val, text="", bg='#102131',width='100', height='17').place(x=45, y=120) # blue background in
middle of window
   Label(val, text="Please enter details below to login", bg='#102131', fg='white').pack()
   Label(val, text="", bg='#102131').pack() # for leaving a space in between
   Label(val, text="Employee ID * ", font=("Open Sans", 10, 'bold'), bg='#102131', fg='white').pack()
   Entry(val, textvar=username_verify).pack()
   Label(val, text="", bg='#102131').pack() # for leaving a space in between
   Label(val, text="Password * ", font=("Open Sans", 10, 'bold'), bg='#102131', fg='white').pack()
   Entry(val, textvar=password_verify, show="*").pack()
   Label(val, text="", bg='#102131').pack() # for leaving a space in between
   Button(val, text="LOGIN", bg="black", width=15, height=1, font=("Open Sans", 13, 'bold'),
fg='white',command=login_verify).pack()
   Label(val, text="", bg='#102131').pack() # for leaving a space in between
   Button(val, text="New User? Register Here", height="2", width="30", bg='black', font=("Open
Sans", 10, 'bold'), fg='white',command=register).pack()

   mcanvas.update()
```

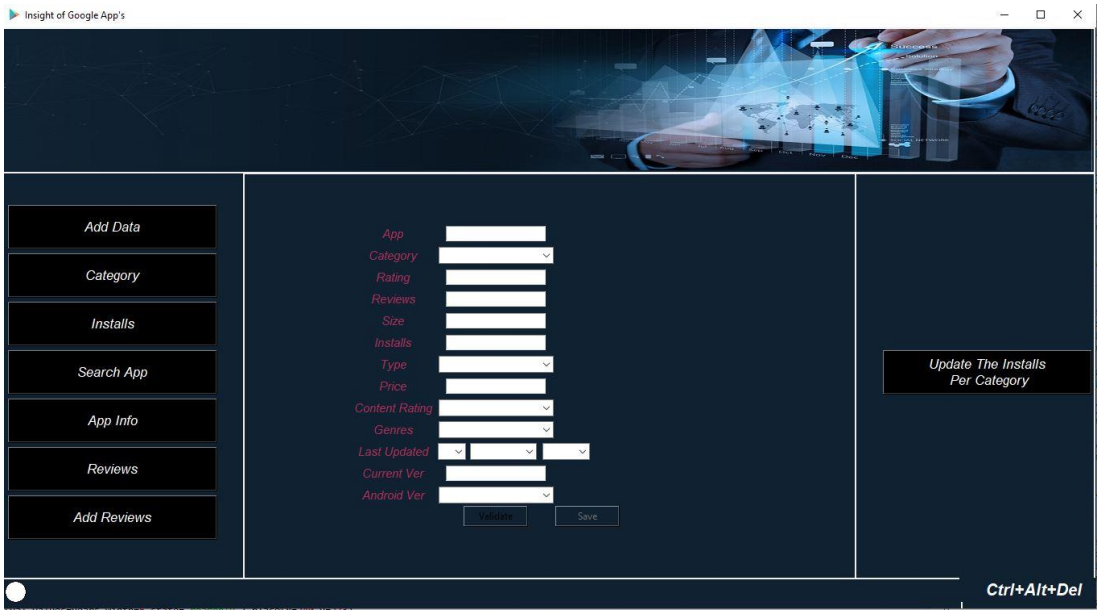
Register Form:




```
def register():

    global mcanvas
    global fullname
    global email
    global password
    global repassword
    global phone
    global gender
    global tnc
    global mcanvas
    mcanvas.delete("all")
    val=Label(mcanvas,width=400,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
    mcanvas.create_window(400,250, window=val)
    fullname = StringVar()
    email = StringVar()
    password = StringVar()
    repassword = StringVar()
    phone= StringVar()
    gender = IntVar()
    tnc = IntVar()
     # configuring the window
    Label(val, text="Registration Form", width='32', height="2", font=("Lucida", 22, 'bold'), fg='white',
bg='#102131').pack()
    Label(val, text="", bg='#102131', width='100', height='20').place(x=45, y=120)
    Label(val, text="Full Name:", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
    Entry(val, textvar=fullname).pack()
    Label(val, text="Email ID:", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
```

```
    Entry(val, textvar=email).pack()
    Label(val, text="Gender:", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
    Radiobutton(val, text="Male", variable=gender, value=1, bg='#102131').pack()
    Radiobutton(val, text="Female", variable=gender, value=2, bg='#102131').pack()
    Label(val, text="Employee ID :", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
    Entry(val, textvar=phone).pack()
    phone.set('Enter Phone Number')
    # droplist = OptionMenu(val, university, *list1)
    # droplist.config(width=17)
    # university.set('--select your university--')
    # droplist.pack()
    Label(val, text="Password:", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
    Entry(val, textvar=password, show="*").pack()
    Label(val, text="Re-Password:", font=("Open Sans", 11, 'bold'), fg='white', bg='#102131',
anchor=W).pack()
    entry_4 = Entry(val, textvar=repassword, show="*")
    entry_4.pack()
    Checkbutton(val, text="I accept all terms and conditions", variable=tnc, bg='#102131',
font=("Open Sans", 9, 'bold'), fg='brown').pack()
    Button(val, text='Submit', width=20, font=("Open Sans", 13, 'bold'), bg='black',
fg='white',command=register_user).pack()
    mcanvas.update()
```

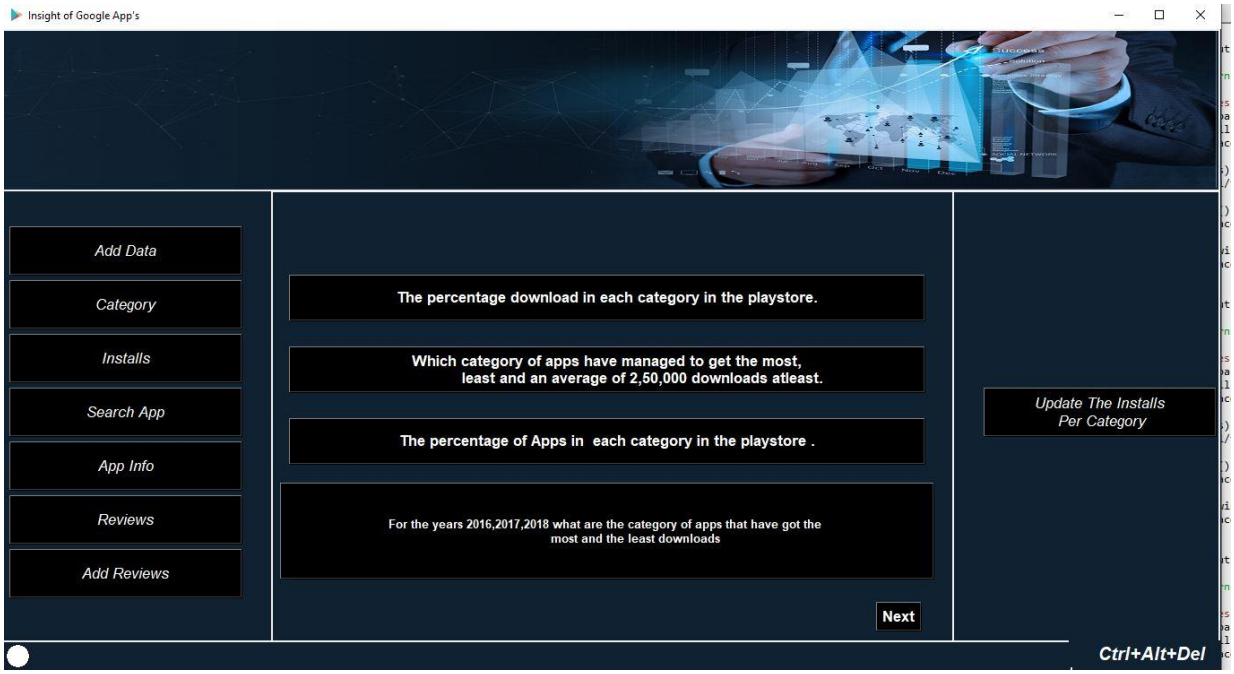
The Frame To Add the Data Which can be accessed only after login

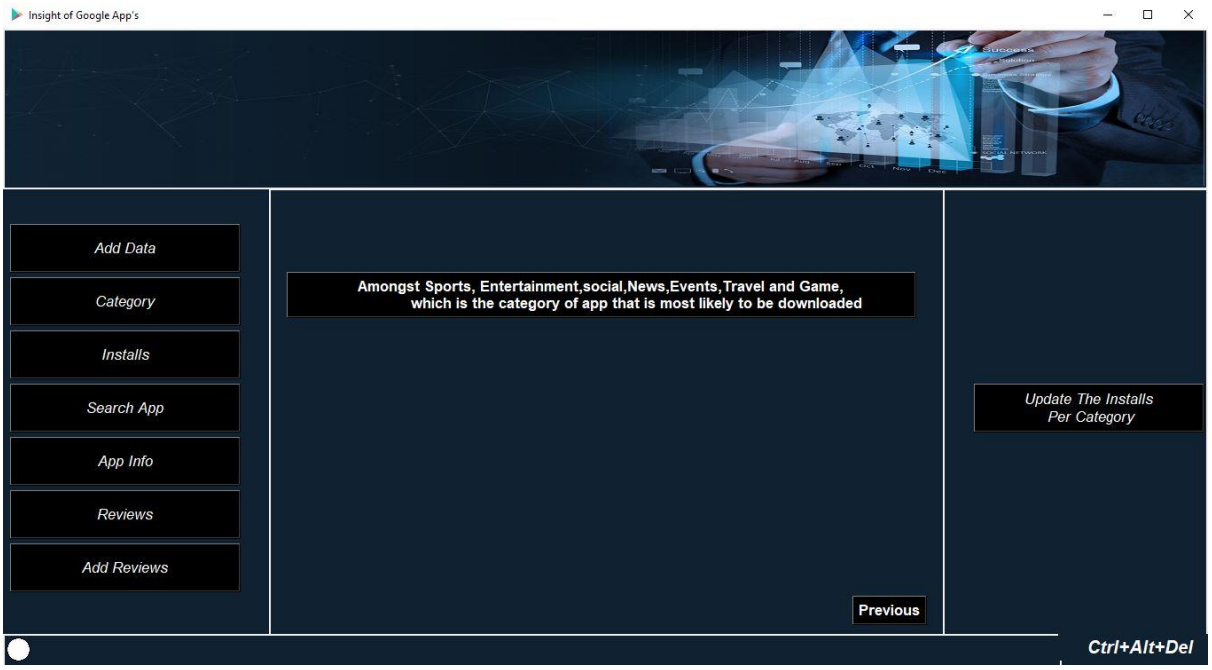


```
def add_app_data():
    global mcanvas,screen,df,data
    dates=[]
    month=['January', 'February', 'March', 'April','May','June','July','August','September', 'October',
'November','December']
    years=[]
    for i in range(1,32):
        dates.append(i)
    for i in range(2010,2020):
        years.append(i)

    data=pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    mcanvas.delete("all")
    val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
    mcanvas.create_window(300,250, window=val)

    header=data.columns.tolist()
    category= list(OrderedDict.fromkeys(data['Category']))
    content=list(OrderedDict.fromkeys(data['Content Rating']))
    genre=list(OrderedDict.fromkeys(data['Genres']))


    txt=[]
    datecombo=[]
    for i in range(1,14):
        Label(val,text=header[i-
1],width=11,font=("Lucida",11,'italic'),fg='#ab3059',bg='#102131').grid(row=i,column=0,padx=2,pady
=2)

    for i in range(1,14):
        if i!=2 and i!=10 and i!=9 and i!=7 and i!=11 and i!=13:
            txtfield=tk.Entry(val,bg="white")
            txt.append(txtfield)
            txtfield.grid(row=i,column=1,padx=2,pady=2)
        elif i==2:
            combo=ttk.Combobox(val,values=category)
            txt.append(combo)
            combo.grid(row=2,column=1,padx=2,pady=2)
        elif i==9:
            combo=ttk.Combobox(val,values=content,state="readonly")
            txt.append(combo)
            combo.grid(row=9,column=1,padx=2,pady=2)
        elif i==10:
            combo=ttk.Combobox(val,values=genre,state="readonly")
```

```
            txt.append(combo)
            combo.grid(row=10,column=1,padx=2,pady=2)
        elif i==7:
            combo=ttk.Combobox(val,values=['Free','Paid'],state="readonly")
            txt.append(combo)
            combo.grid(row=7,column=1,padx=2,pady=2)
        elif i==11:

            combo=ttk.Combobox(val,values=dates,width=2,state="readonly").place(x=110,y=273)
            datecombo.append(combo)


            combo=ttk.Combobox(val,values=month,width=10,state="readonly").place(x=150,y=273)
            datecombo.append(combo)


            combo=ttk.Combobox(val,values=years,width=6,state="readonly").place(x=240,y=273)
            datecombo.append(combo)


        elif i==13:
            combo=ttk.Combobox(val,values=list(data['Android Ver'].unique()),state="readonly")
            txt.append(combo)

            combo.grid(row=13,column=1,padx=2,pady=2)


btn_save=tk.Button(val,text='Save',state="disabled",width=10,bg="#102131",command=lambda:savеing(txt,btn_save,'C:\\InternshipFinal\\App-data.csv',datecombo))

btn_validate=tk.Button(val,text='Validate',width=10,bg="#102131",command=lambda:validate(txt,btn_save,datecombo))
    btn_validate.grid(row=14,column=1)
    btn_save.grid(row=14,column=2)
    mcanvas.create_window()
    mcanvas.update()
```

Category Frame



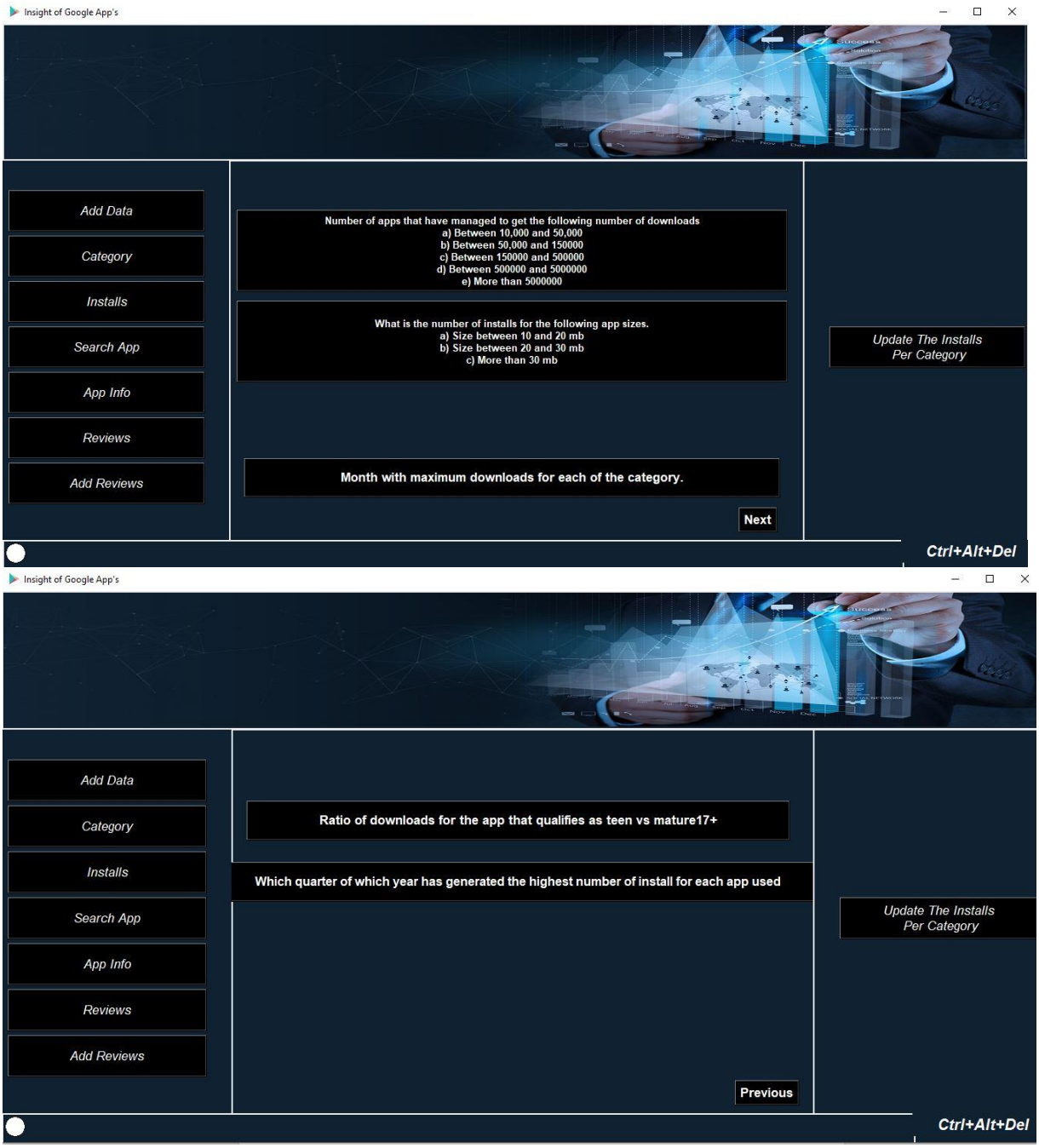



```
def category():
   global mcanvas

   mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q1 = Button(mcanvas,text = "The percentage download in each category in the
    playstore.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.f
    unctq1)
```

```
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 120, window=q1)

    q3 = Button(mcanvas,text = """Which category of apps have managed to get the most,
            least and an average of 2,50,000 downloads
     atleast.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.f
     unctq3)
#    q4.bind("<Button-1>", function_q4)
#    q4.place(x=40,y=120)
    mcanvas.create_window(375,200, window=q3)


    q0 = Button(mcanvas,text = "The percentage of Apps in  each category in the playstore
     .",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.functq0)
#    q5.bind("<Button-1>", function_q5)
    mcanvas.create_window(375,280, window=q0)

    q6 = Button(mcanvas,text = """For the years 2016,2017,2018 what are the category of apps
     that have got the
            most and the least
     downloads""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black',command=f
     n.functq6)
    #    q5.bind("<Button-1>", function_q5)
    mcanvas.create_window(375,380, window=q6)

    b=Button(mcanvas,
     text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nextc1)
    mcanvas.create_window(700,475, window=b)
    mcanvas.update()

def nextc1():
    global mcanvas

    mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
    q8 = Button(mcanvas,text = """Amongst Sports, Entertainment,social,News,Events,Travel
     and Game,
            which is the category of app that is most likely to be
     downloaded""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command
     =fn.functq8)
#    q3.bind("<Button-1>", function_q3)
```

```
mcanvas.create_window(375, 120, window=q8)
b=Button(mcanvas,
 text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=category)
mcanvas.create_window(700,475, window=b)
```

Installs Screen

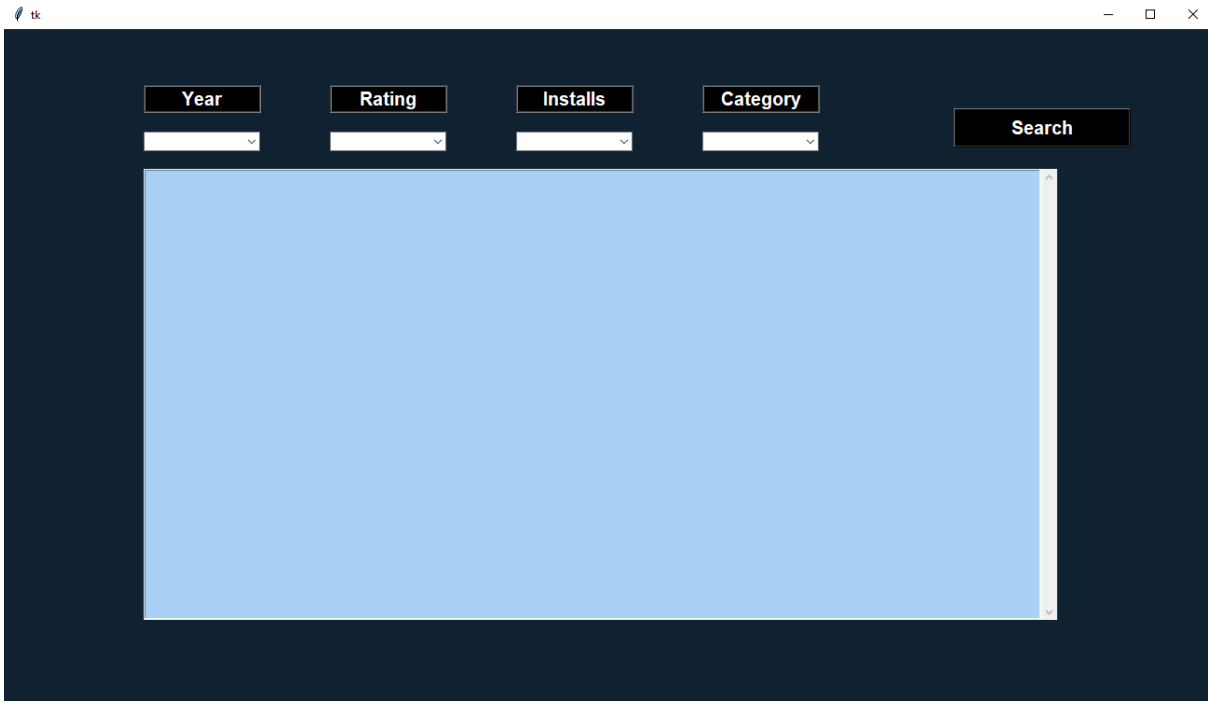



```
def install():
  global mcanvas
  mcanvas.delete("all")
  #   q=mcanvas.create_rectangle(40,40,500,80,fill='black')
```

```
    q2 = Button(mcanvas,text = """Number of apps that have managed to get the following
     number of downloads
a) Between 10,000 and 50,000
b) Between 50,000 and 150000
c) Between 150000 and 500000
d) Between 500000 and 5000000
e) More than
     5000000""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black',command=fn.
     functq2)
    #    q3.bind("<Button-1>", function_q3)
#    q3.place(x=40,y=120)
    mcanvas.create_window(375,120, window=q2)

    q5 = Button(mcanvas,text = """What is the number of installs for the following app sizes.
a) Size between 10 and 20 mb
b) Size between 20 and 30 mb
c) More than 30
     mb""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black',command=fn.funct
     q5)
    #    q4.bind("<Button-1>", function_q4)
#    q4.place(x=40,y=200)
    mcanvas.create_window(375,240, window=q5)


    q10_1 = Button(mcanvas,text = "Month with maximum downloads for each of the
     category.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=func
     t10)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 420, window=q10_1)
    b=Button(mcanvas,
     text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nexti1)
    mcanvas.create_window(700,475, window=b)


    mcanvas.update()
def nexti1():
    global mcanvas

    mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
```

```
    q10_2 = Button(mcanvas,text = "Ratio of downloads for the app that qualifies as teen vs
     mature17+",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.
     functq10_2)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 120, window=q10_2)

    q11 = Button(mcanvas,text = "Which quarter of which year has generated the highest
     number of install for each app
     used",width=78,height=2,font=("Lucida",12,'bold'),fg='#ffffff',bg='black',command=fn.funct
     q1)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 200, window=q11)
    b=Button(mcanvas,
     text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=install)
    mcanvas.create_window(700,475, window=b)

     mcanvas.update()
```

The Search App



Code:-

```
def month(x):
    if x[0:3]=='Jan':
        return 1
    elif x[0:3]=='Feb':
        return 2
    elif x[0:3]=='Mar':
```

```
        return 3
    elif x[0:3]=='Apr':
        return 4
    elif x[0:3]=='Ma' or x[0:3]=='May':
        return 5
    elif x[0:3]=='Jun':
        return 6
    elif x[0:3]=='Jul':
        return 7
    elif x[0:3]=='Aug':
        return 8
    elif x[0:3]=='Sep':
        return 9
    elif x[0:3]=='Oct':
        return 10
    elif x[0:3]=='Nov':
        return 11
    elif x[0:3]=='Dec':
        return 12

def install():
    global sample
    Installs=[]
    for i in sample['Installs']:  #converting string based installs into integer based
        if i=='Free':
            Installs.append(0)
        else:
            Installs.append(int(i.replace('+','').replace(',','')))
    return Installs

def dates_str_to_int():
    global sample
    dates=sample['Last Updated']
    year=[]
    counter=0
    for i in dates:
```

```
        year.append([int(i[-8:-6]),month(i[:-9]),int(i[-4:])])
        counter=counter+1
    return year

def display(x,y,z):
    for i in x:
        for j in set(i):
            y.insert('end',j)

def filtering(value,canvas_listbox):
    global sample
    installs=install()
    year=dates_str_to_int()
    rating=sample['Rating']

    category=sample['Category'].unique()
    ans=[]
    for i in category:
        ans.append([])

    for i in range(len(installs)):
        if i!=10472 and installs[i]==value[0]:
            if rating[i]>=value[1]:
                if year[i][2]==value[2]:
                    for j in range(len(category)):
                        if category[j]==sample['Category'][i] :
                            ans[j].append(sample['App'][i])
    canvas_listbox.delete(0,'end')
    display(ans,canvas_listbox,category)


def getting(install,rating,year,category,canvas_listbox):
    if install.get().strip()!='' and rating.get().strip()!='' and year.get().strip()!=''  and
     category.get().strip()!='':
```

```
    value=[int(install.get().replace(',','').replace('+','')),float(rating.get()),int(year.ge
    t()),str(category.get())]
        filtering(value,canvas_listbox)
    else:
        tk.messagebox.showerror('Error','Please select values')


def searchapp():
    global screen,sample


    sample = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    screen = tk.Tk()
    w=1300
    h=730
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    category=list(sample['Category'].unique())


    big_frame = tk.Frame(screen,bg='#102131',width='1300',height='730')
    big_frame.place(x=0,y=0)

    sample.drop(index=[10472],inplace=True)
    sample=sample.replace(np.NaN,0)


    year=[2010,2011,2012,2013,2014,2015,2016,2017,2018]
    rating=[]
    for i in range(5):
        for j in range(10):
            rating.append(i+(j/10))
```

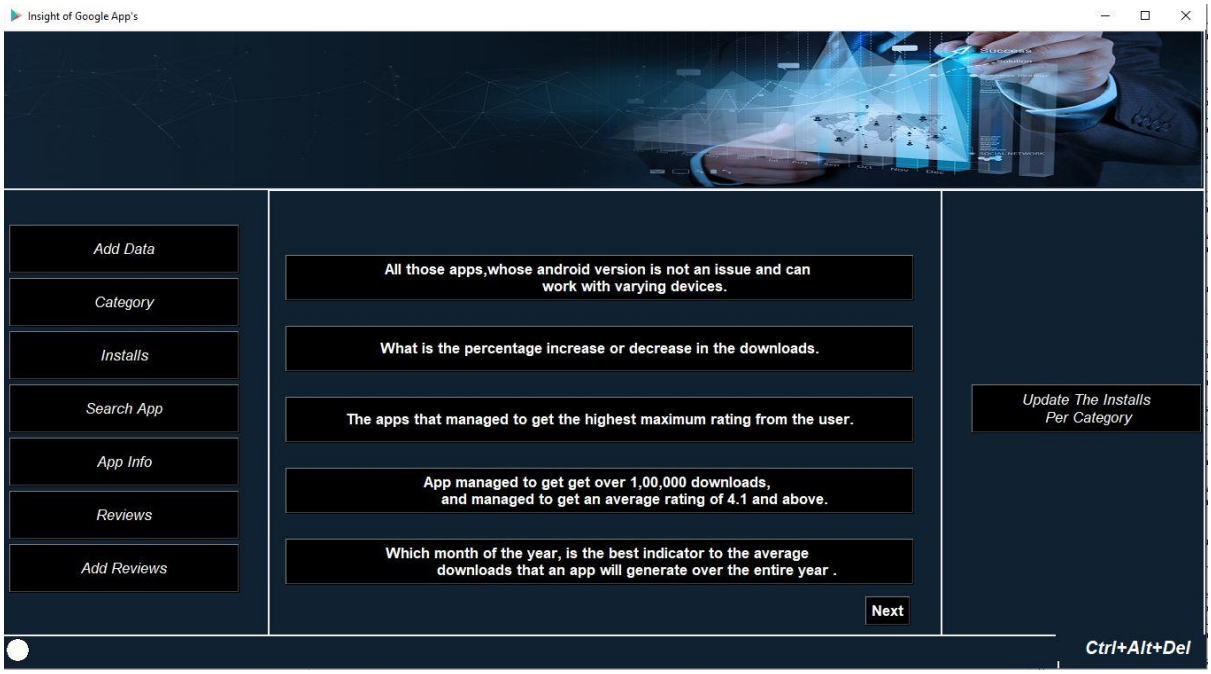
```
rating.append(5.0)


tk.Label(big_frame,text='Installs',width=10,height=1,font=("Helvetica",15,'bold
'),fg='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=550,y=60)

tk.Label(big_frame,text='Rating',width=10,height=1,font=("Helvetica",15,'bold'
),fg='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=350,y=60)

tk.Label(big_frame,text='Year',width=10,height=1,font=("Helvetica",15,'bold'),f
g='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=150,y=60)

tk.Label(big_frame,text='Category',width=10,height=1,font=("Helvetica",15,'bo
ld'),fg='#ffffff',bg='#000000', borderwidth=2,
relief="groove").place(x=750,y=60)

combo_category=ttk.Combobox(big_frame,width=17,values=category,state="r
eadonly")
combo_category.place(x=750,y=110)

combo_install=ttk.Combobox(big_frame,width=17,values=['0','10+','100+','1,0
00+','10,000+','1,00,000+','10,00,000+','1,00,00,000+'],state="readonly")
combo_install.place(x=550,y=110)

combo_rating=ttk.Combobox(big_frame,width=17,values=rating,state="readon
nly")
combo_rating.place(x=350,y=110)

combo_year=ttk.Combobox(big_frame,width=17,values=year,state="readonly"
)
combo_year.place(x=150,y=110)

canvas=tk.Canvas(big_frame,width=970,height=450,bg='pink')
canvas.place(x=150,y=150)
scroll1=tk.Scrollbar(canvas)
```

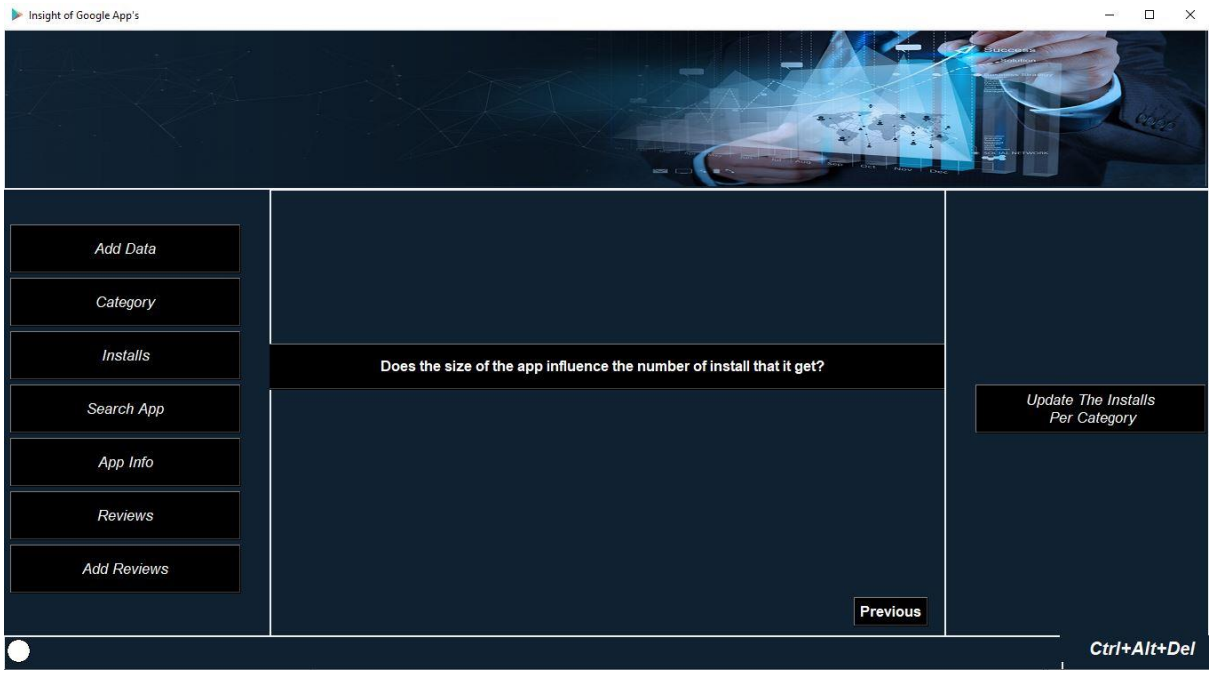
```
canvas_listbox=tk.Listbox(canvas,yscrollcommand =
scroll1.set,height=20,width=96,bg='#A9D0F5',font=('Calibri',14,'bold'))
canvas_listbox.pack( side = 'left', fill = 'both' )
scroll1.pack(side='right', fill='y' )
scroll1.config( command = canvas_listbox.yview )
```

```
btn_search=tk.Button(big_frame,text='Search',height=1,font=("Helvetica",15,'
bold'),fg="white",width=15,bg="black",command=lambda:getting(combo_inst
all,combo_rating,combo_year,combo_category,canvas_listbox))
btn_search.place(x=1020,y=85)
```

```
screen.mainloop()
```

The App Information Screen

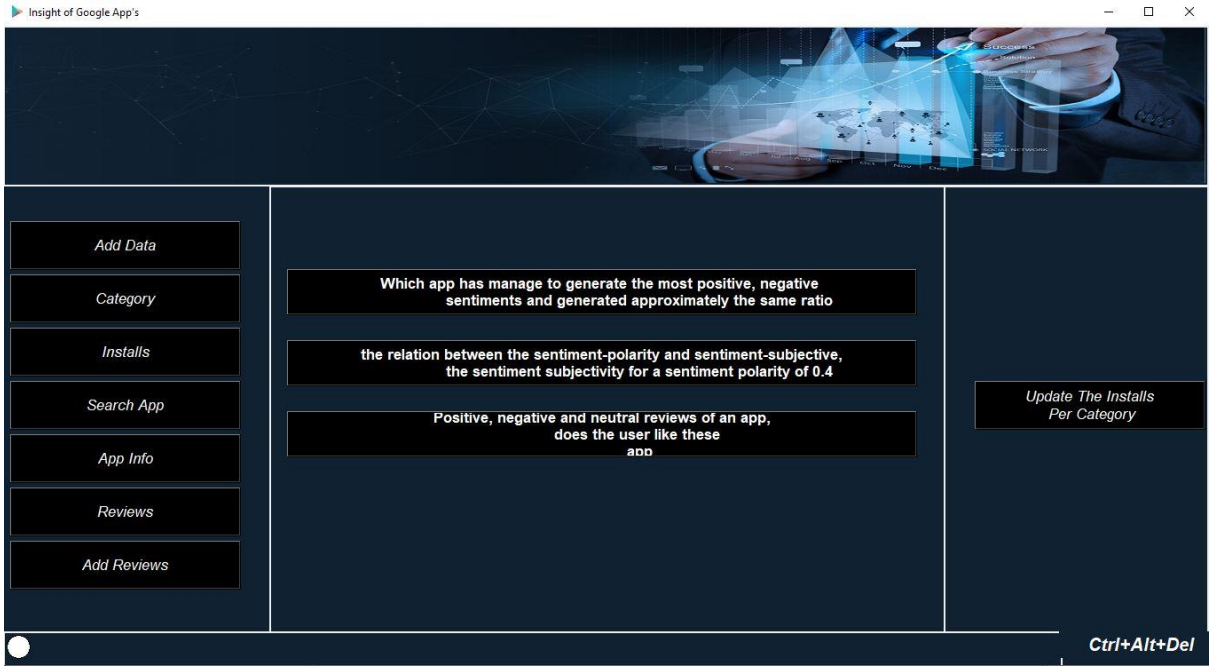





```
def app():
   global mcanvas

   mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q7 = Button(mcanvas,text = """All those apps,whose android version is not an issue and can
            work with varying
    devices.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.f
    unctq7)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 100, window=q7)

   q7_2 = Button(mcanvas,text = "What is the percentage increase or decrease in the
    downloads.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn
    .functq7_2)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 180, window=q7_2)

   q4 = Button(mcanvas,text = "The apps that managed to get the highest maximum rating
    from the
    user.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.funct
    q4)
#    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,260, window=q4)
   q9 = Button(mcanvas,text = """App managed to get get over 1,00,000 downloads,
```

```
            and managed to get an average rating of 4.1 and
     above.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.fu
     nctq9)
#    q5.bind("<Button-1>", function_q5)
    mcanvas.create_window(375,340, window=q9)
    q16 = Button(mcanvas,text = """Which month of the year, is the best indicator to the
     average
             downloads that an app will generate over the entire year
     .""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=funct16)
#    q5.bind("<Button-1>", function_q5)
    mcanvas.create_window(375,420, window=q16)
    b=Button(mcanvas,
     text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nexta1)
    mcanvas.create_window(700,475, window=b)

    mcanvas.update()
def nexta1():
    global mcanvas

    mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
    q17 = Button(mcanvas,text = "Does the size of the app influence the number of install that it
     get?",width=78,height=2,font=("Lucida",12,'bold'),fg='#ffffff',bg='black',command=fn.functq
     17)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 200, window=q17)
    b=Button(mcanvas,
     text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=app)
    mcanvas.create_window(700,475, window=b)


    mcanvas.update()
```

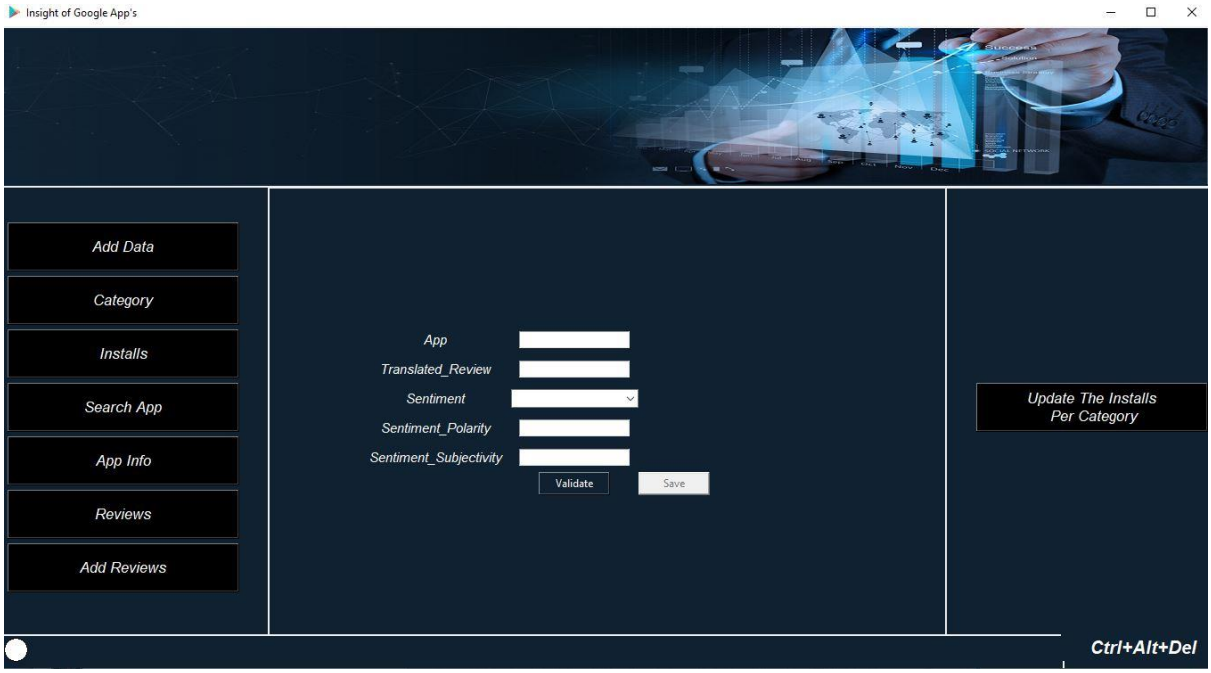
The Review Screen




```
def rrev():
    global mcanvas

    mcanvas.delete("all")
    q12 = Button(mcanvas,text = """Which app has manage to generate the most positive,
     negative
              sentiments and generated approximately the same
     ratio""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=twelve
     )
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 120, window=q12)

    q13 = Button(mcanvas,text = """the relation between the sentiment-polarity and sentiment-
     subjective,
              the sentiment subjectivity for a sentiment polarity of
     0.4""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fn.functi
     on_q13)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 200, window=q13)
#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
    q14_15 = Button(mcanvas,text = """Positive, negative and neutral reviews of an app,
              does the user like these
```

```
app""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=fourtee
n)
#   q3.bind("<Button-1>", function_q3)
mcanvas.create_window(375, 280, window=q14_15)

mcanvas.update()
```

Q18) The Frame To add reviews




```
def check1(x):
    d=[]

    for i in x:
       if i.get()=='':
          tk.messagebox.showwarning('Fields empty','Please provide all the fields')
          return True

    try:
      if(isinstance(float(x[3].get()), float) and isinstance(float(x[4].get()), float)):
         if x[2].get()=='Neutral':
            if float(x[3].get())==0 and 1>=float(x[4].get())>=0:
               d.append(False)
            else:
               tk.messagebox.showwarning('Neutral sentiment','Please provide a 0 in Sentiment
polarity and Sentiment Subjectivity.')
               return True
```

```
            elif x[2].get()=='Positive':
                if float(x[3].get())>0 and 1>=float(x[4].get())>=0:
                    d.append(False)
                else:
                    tk.messagebox.showwarning('Positive sentiment','Please provide a positive value in
Sentiment polarity and Sentiment Subjectivity.')
                    return True
            elif x[2].get()=='Negative':
                if float(x[3].get())<0 and 1>=float(x[4].get())>=0:
                    d.append(False)
                else:
                    tk.messagebox.showwarning('Positive sentiment','Please provide a negative value in
Sentiment polarity and non negative value in Sentiment Subjectivity.')
                    return True
        except:
            tk.messagebox.showwarning('Wrong Value','Please provide a float value in Sentiment polarity
and Sentiment Subjectivity.')
            return True

        if set(d)==False:
            return False
        tk.messagebox.showinfo('Validate Succesfully','Now click on the Save Button')

def validate2(x,y):
    global sample
    App=x[0].get()
    d=0
    ap=sample['App'].unique()
    for i in ap:
        if i.strip()==App.strip():
            msg='App named '+App+' is already present'
            tk.messagebox.showerror("Error",msg)
            d=1
    if(check1(x)):
        d=1
    if d==0:
        y.config(state='normal')

def add_rev():
    global screen,df,data,sample

    dates=[]
    sample=pd.read_csv('C:\\InternshipFinal\\user.csv')
    header2=sample.columns.tolist()
    global mcanvas
    val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
```

```
    mcanvas.create_window(300,250, window=val)
    txt=[]
    datecombo=[]
    month=['January', 'February', 'March', 'April','May','June','July','August','September', 'October',
'November','December']
    years=[]
    for i in range(1,32):
        dates.append(i)
    for i in range(2010,2020):
        years.append(i)

    mcanvas.delete("all")
    val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
    mcanvas.create_window(300,250, window=val)

    txt2=[]
    for i in range(1,6):
        tk.Label(val,text=header2[i-
1],width=17,font=("Lucida",11,'italic'),fg='#ffffff',bg='#102131').grid(row=i,column=0,padx=5,pady=5
)

    for i in range(1,6):
        if i!=3:
            txtfield=tk.Entry(val,bg="white")
            txt2.append(txtfield)
            txtfield.grid(row=i,column=2)
        elif i==3:
            combo=ttk.Combobox(val,values=['Positive','Negative','Neutral'],state="readonly")
            txt2.append(combo)
            combo.grid(row=3,column=2)


btn_save1=tk.Button(val,text='Save',state="disabled",fg='#ffffff',width=10,command=lambda:savein
g(txt2,btn_save1,'C:\\InternshipFinal\\user.csv',''))

btn_validate1=tk.Button(val,text='Validate',width=10,fg='#ffffff',bg="#102131",command=lambda:v
alidate2(txt2,btn_save1))
    btn_validate1.grid(row=7,column=2)
    btn_save1.grid(row=7,column=3)
    root.mainloop()
```

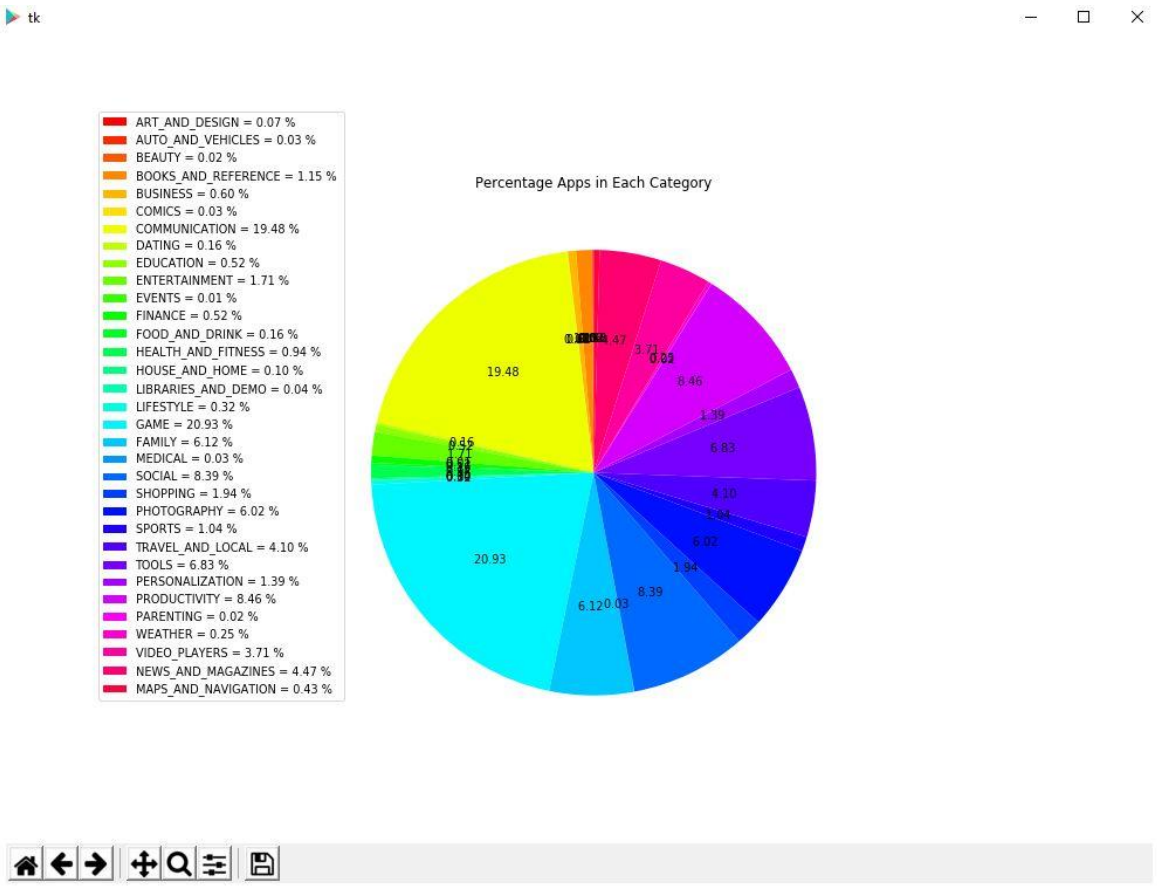
1) What is the percentage download in each category on the playstore?

Code: def functq1():

```
global screen
screen = Tk()
big_frame = Frame(screen,width='1010',height=750)
big_frame.place(x=10,y=60)
screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
w=1000
h=900
ws=screen.winfo_screenwidth()
hs=screen.winfo_screenheight()
x=(ws/2)-(w/2)
y=(hs/2)-(h/2)
screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
screen.configure(background='white')



df = pd.DataFrame()
df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
list1={}
print(list1)


df['Installs']=df['Installs'].str.replace('+','')
df['Installs']=df['Installs'].str.replace(',','')
```

```
df['Installs']=df['Installs'].astype(int)

# print(sum(df['Installs']))

category ={}

sum1=[]

for i in df['Category']:

   category.update({i:0})

for i in category.keys():

      t2 = (df[i==(df.Category)].Installs).tolist()

      sum1.append(sum(t2))

      category.update({i:float(((sum(t2))/(sum(df['Installs'])))*100)})

print(category)

list1=list(category.values())

# print(list1)

 figure1 = plt.Figure(figsize=(14,9), dpi=70)


# color = cm.rainbow(np.linspace(0, 1, len(x_label)))

#fig1, ax1 = plt.subplots()

axesObject = figure1.add_subplot(111)

labels = ['{0} = {1:1.2f} % '.format(i,j) for i,j in
zip(category.keys(),category.values())]


theme = plt.get_cmap('hsv')

axesObject.set_prop_cycle("color", [theme(1. * i / len(list1))for i in
range(len(list1))])
```

```
    axesObject.pie(list1,autopct='%1.2f ',startangle=90)

    axesObject.set_title("Percentage Apps in Each Category")

    #ax3.xlim(0,3.0)

    canvas = FigureCanvasTkAgg(figure1,big_frame)

    canvas.draw()

    canvas.get_tk_widget().pack( fill=BOTH, expand=True)

    toolbar = NavigationToolbar2Tk(canvas,big_frame)

    toolbar.update()

    canvas._tkcanvas.pack( fill=BOTH, expand=True)

    figure1.legend(labels,bbox_to_anchor=(0.3,1))

    string="""From The Above Pie Chart,

     We get the percentage Apps in Each Category """

Label(screen,text=string,font=("Calibri",13,'italic'),fg='#102131',bg='white').pla
ce(x=500,y=560)

    button = Button(master=screen, text="Quit", command=_quit)

    button.pack(side=BOTTOM)

    screen.mainloop()
```



2) How many apps have managed to get the following number of downloads

a) Between 10,000 and 50,000

b) Between 50,000 and 150000

c) Between 150000 and 500000

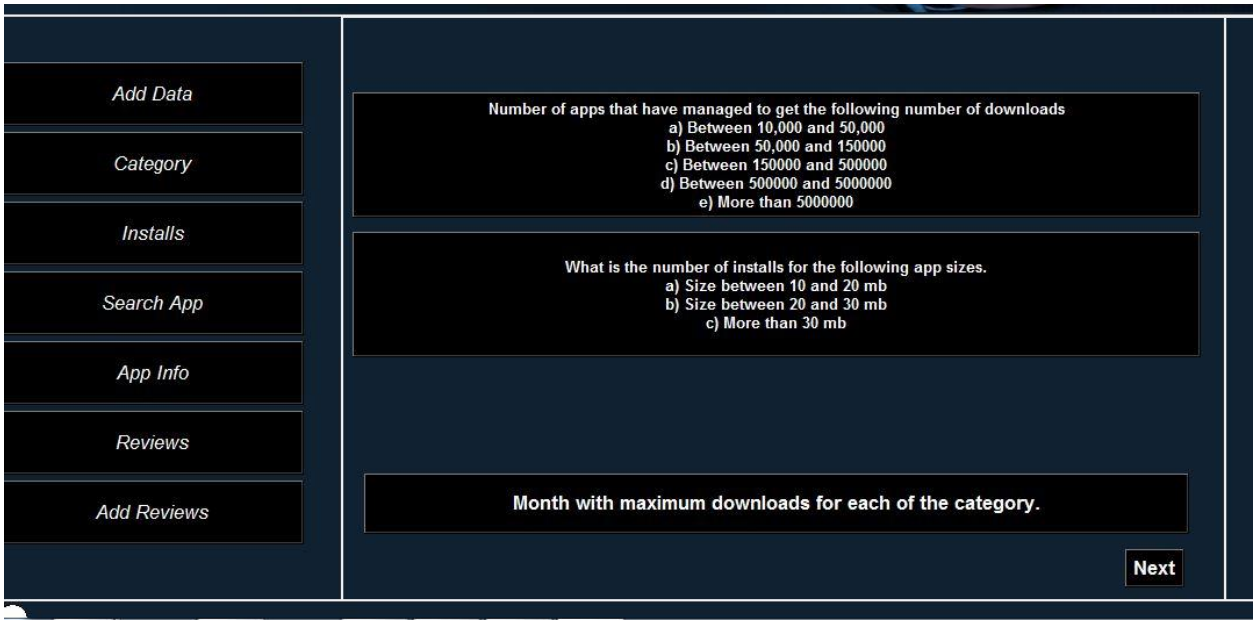
d) Between 500000 and 5000000

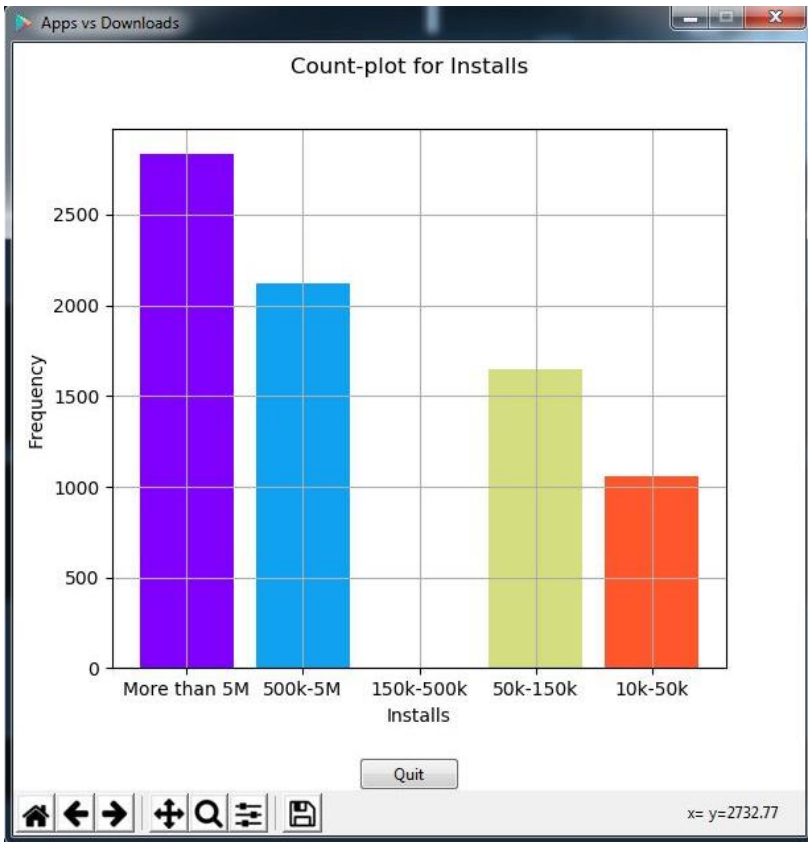
e) More than 5000000

Code:
```
def functq2():
    # initializing the tkinter window
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
   df=df.replace(np.NaN,-1)
  df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
  df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
  df['Installs'] = pd.to_numeric(df['Installs'])
  list2=["More than 5M","500k-5M","150k-500k","50k-150k","10k-50k"]
  dict1,dict2,dict3,dict4,dict5={},{},{},{},{}
```

```
    #    dict6={}
    dict1=(pd.value_counts(df['Installs']>=5000000))
    a1=len(df)-dict1.values[0]
    dict2=(pd.value_counts((df["Installs"]>=500000) &
(df["Installs"]<5000000)))
    a2=len(df)-dict2.values[0]
    dict3=(pd.value_counts((df["Installs"]>=150000) & (df["Installs"]<500000)))
    a3=len(df)-dict3.values[0]
    dict4=(pd.value_counts((df["Installs"]>=50000) & (df["Installs"]<150000)))
    a4=len(df)-dict4.values[0]
    dict5=(pd.value_counts((df["Installs"]>=10000) & (df["Installs"]<50000)))
    a5=len(df)-dict5.values[0]
    #    dict6=pd.value_counts(df["Installs"]<10000)
    #    a6=len(df)-dict6.values[0]
    list1=[a1,a2,a3,a4,a5]
    color = cm.rainbow(np.linspace(0, 2, 10))
    fig=Figure(figsize=(5,4),dpi=100)
   chart=fig.add_subplot(111)
   chart.bar(list2,list1,color=color)
   chart.set_ylabel("Frequency")
   chart.set_xlabel("Installs")
   chart.grid()
   fig.suptitle("Count-plot for Installs")
   canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
   canvas.draw()
   canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

   toolbar = NavigationToolbar2Tk(canvas, screen)
   toolbar.update()

   canvas.mpl_connect("key_press_event", on_key_press)
   # this is necessary on Windows to prevent
               # Fatal Python Error: PyEval_RestoreThread: NULL tstate

  button = Button(master=screen, text="Quit", command=_quit)
  button.pack(side=BOTTOM)
```

screen.mainloop()





3) Which category of apps have managed to get the most,least and an average of 2,50,000 downloads atleast.

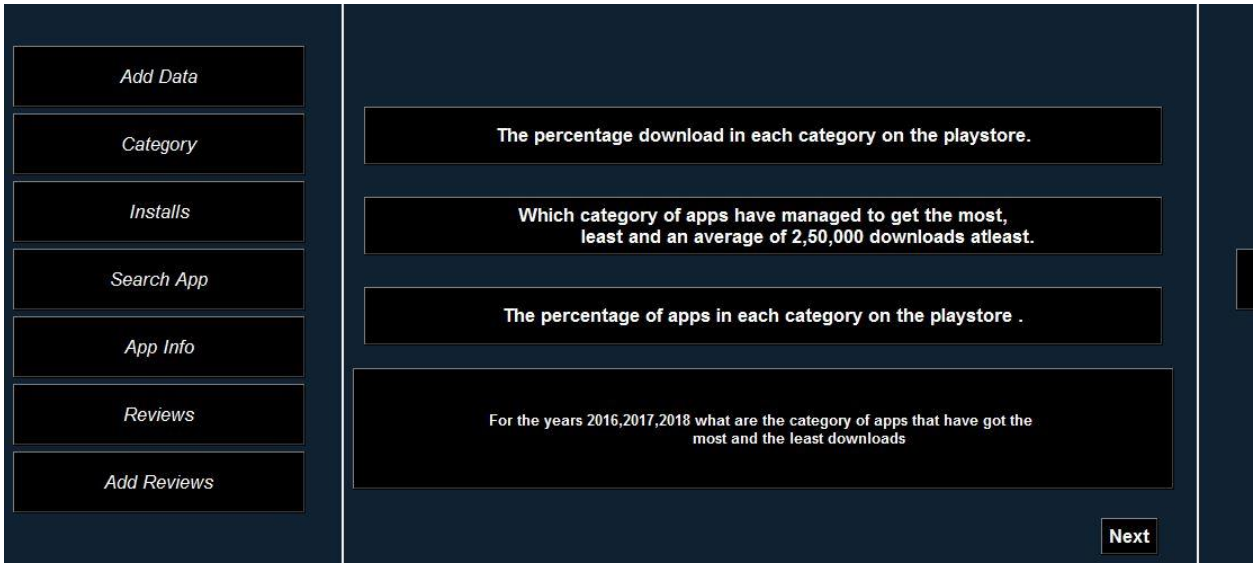
Code:

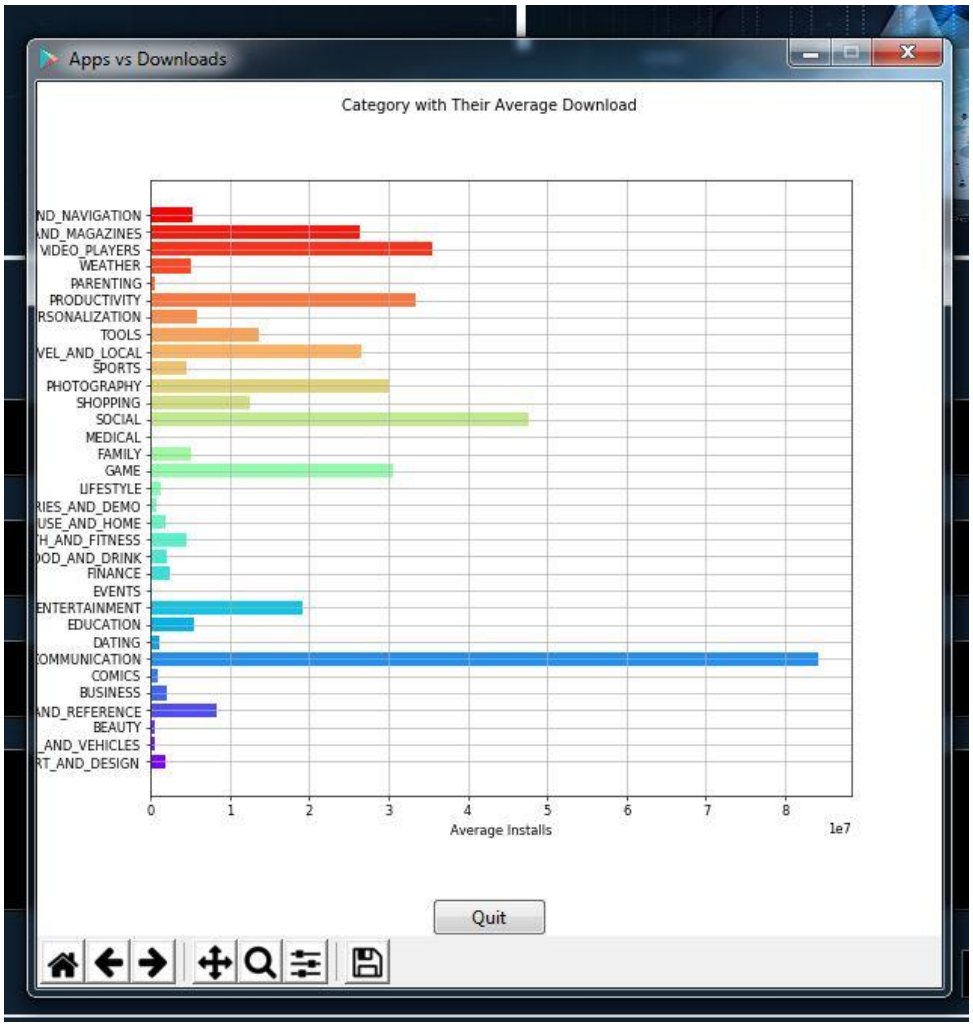
```
def functq3():
```

```
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")
    w = 600  # width for the window size
    h = 600  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of
the screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the
window
    screen.configure(background='white')  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    df['Installs'] = pd.to_numeric(df['Installs'])
    category=df['Category'].unique()
    list1=df['Installs']
    ans=[]
    count = []

    for i in category:
        total=0
        c=0
        for j in range(len(df['Category'])):
            if df['Category'][j]==i:
                total=total+list1[j]
                c+=1
     #   print(total)
        ans.append(total)
        count.append(c)
    #print(ans)
```

```
#    print(count)
    cat,avg = [],[]
    for index in range(len(ans)):
        cat.append(category[index])
        avg.append(round(ans[index]/count[index]))
  # print(avg)
  #  print(cat)
    lowest = []
    for index in range(len(avg)):
        if avg[index]<250000:
            lowest.append(category[index])

#    print(lowest)
    label = category
#    print(label)
    val = avg
    color = cm.rainbow(np.linspace(0, 1, len(label)))
    fig=Figure(figsize=(8,5),dpi=60)
    chart=fig.add_subplot(111)
    chart.barh(label,val,color=color)
    chart.set_ylabel("Category")
    chart.set_xlabel("Average Installs")
    chart.grid()
    fig.suptitle("Category with Their Average Download")

    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                  # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
```

```
button.pack(side=BOTTOM)
screen.mainloop()
```



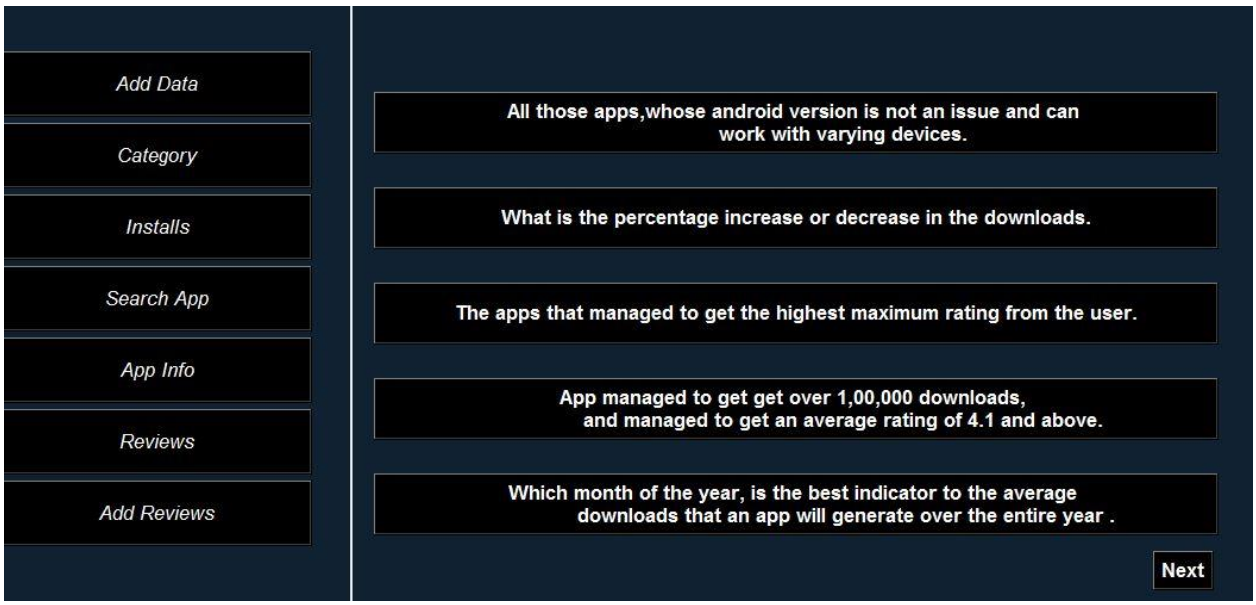


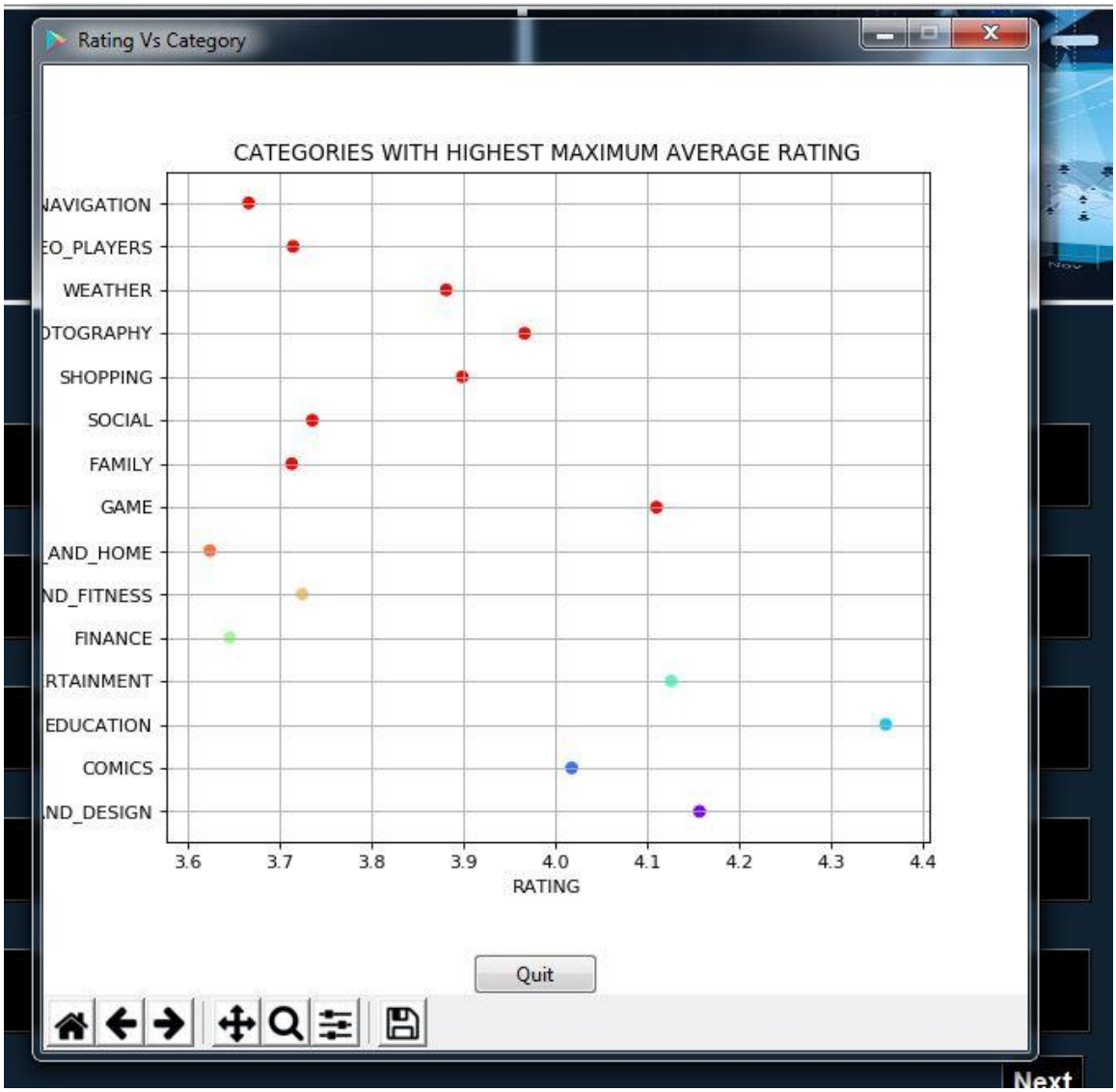
4) Which category of apps have managed to get the highest maximum average ratings from the users.Display the result using suaitable visualization tool(s) and also update the data into the database.

Code:

```
def functq4():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Rating Vs Category ")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    category ={}
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
    catreview = {}
    for index in range(len(df)):

        if df['Category'][index] in catreview:
            catreview[df['Category'][index]][0]+=df['Rating'][index]
            catreview[df['Category'][index]][1]+=1
#           rating+=df['Rating'][index]
        else:
            catreview[df['Category'][index]]=[df['Rating'][index],1]
#           rating+=df['Rating'][index]
    total=0
    count=0
    for i in df['Rating']:
            total+=i
            count+=1
    avg= total/count
    y=[]
    x=[]
    for i in catreview:
        if catreview[i][0]/catreview[i][1]>=avg:
            avgcat = (catreview[i][0]/catreview[i][1])
            x.append(i)
            y.append(float(avgcat))
```

```
#    print(y)
#    print(x)
    color = cm.rainbow(np.linspace(0, 2, 15))
    figure3 = plt.Figure(figsize=(5,4), dpi=80)
    ax3 = figure3.add_subplot(111)
    ax3.scatter(y,x,color=color)
    scatter3 = FigureCanvasTkAgg(figure3, screen)
    scatter3.get_tk_widget().place(x=10,y=0)
    ax3.grid()
    ax3.set_xlabel("RATING")
    ax3.set_ylabel("CATEGORY")
    ax3.set_title('CATEGORIES WITH HIGHEST MAXIMUM AVERAGE RATING')
    canvas = FigureCanvasTkAgg(figure3, master=screen)  # A
tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)
    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()
#    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()
```





5) What is the number of installs for the following app sizes.

a) Size between 10 and 20 mb

b) Size between 20 and 30 mb

c) More than 30 mb

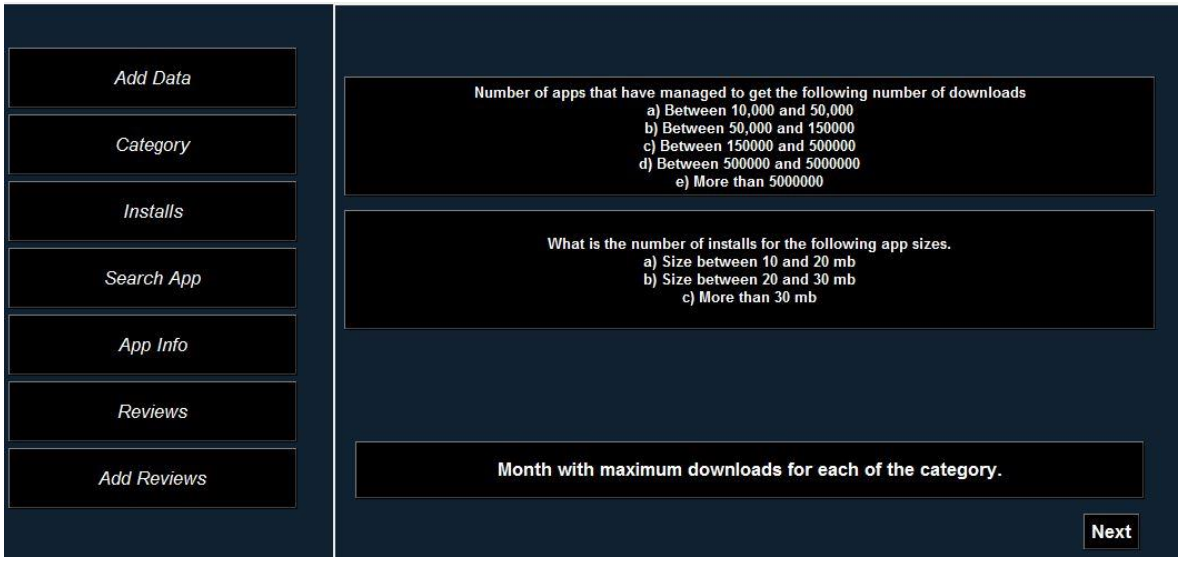
code:

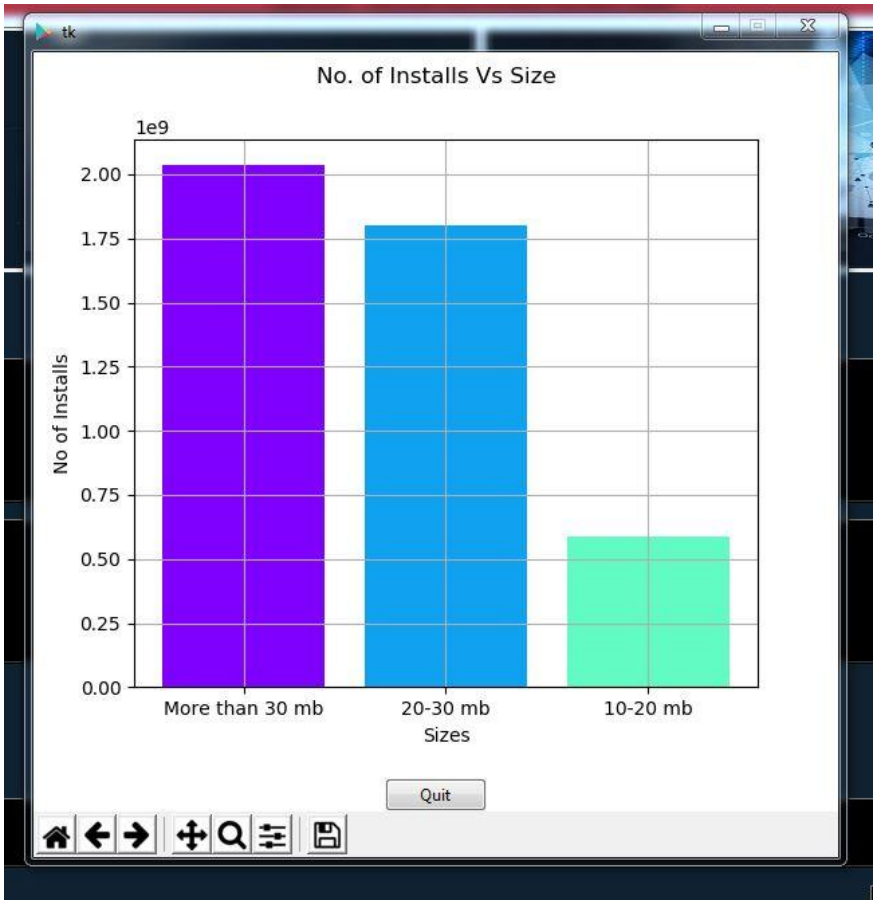
```
def functq5():
global screen
screen = Tk()
screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
w = 600  # width for the window size
h = 600  # height for the window size
ws = screen.winfo_screenwidth()  # width of the screen
hs = screen.winfo_screenheight()  # height of the screen
x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
```

```
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')    # configuring the window
    df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    list2=['More than 30 mb','20-30 mb','10-20 mb']
    df['Size'] = df['Size'].map(lambda x: x.rstrip('M'))
    df['Size'] = df['Size'].map(lambda x: str(round((float(x.rstrip('k'))/1024), 1)) if
x[-1]=='k' else x)
    df['Size'] = df['Size'].map(lambda x: np.nan if x.startswith('Varies') else x)
    df['Size']=df['Size'].replace(np.NaN,-999)
    df['Size']=df['Size'].astype(float)
    #print(df['Category'].unique())

    #print(df['Size'])
    df['Installs']=df['Installs'].str.replace('+','')
    df['Installs']=df['Installs'].str.replace(',','')
    df['Installs']=df['Installs'].astype(int)
    dict1,dict2,dict3,dict4,dict5,dict6={},{},{},{},{},{}
    a,b,c=[],[],[]
    for i in range(len(df)):
        if df["Size"][i]>=30:
            a.append(df['Installs'][i])
        elif 20<=df["Size"][i]<30:
            b.append(df['Installs'][i])
        elif 10<=df["Size"][i]<20:
            c.append(df['Installs'][i])
    a2=(sum(b))
    a3=(sum(c))
    a1=(sum(a))

    #    dict1=(pd.value_counts(df["Size"]>=30))
    #    a1=len(df)-dict1.values[0]
    #    print(a1)
    #    dict2=(pd.value_counts((df["Size"]>=20) & (df["Size"]<30)))
```

```
#    a2=len(df)-dict2.values[0]
#    print(a2)
#    dict3=(pd.value_counts((df["Size"]>=10) & (df["Size"]<20)))
#    a3=len(df)-dict3.values[0]
#    print(a3)
   #dict4=(pd.value_counts((df["Size"]<10)))
   #a4=len(df)-dict4.values[0]
   #print(a4)
list1=[a1,a2,a3]
print(list1)
#    plt.bar(list2,list1 , color='green')
#    plt.title("mb vs app")
#    plt.xlabel("Downloads")
#    plt.ylabel("App")
#    plt.xticks(rotation=90)
color = cm.rainbow(np.linspace(0, 2, 10))
fig=Figure(figsize=(5,4),dpi=100)
chart=fig.add_subplot(111)
chart.bar(list2,list1,color=color)
chart.set_ylabel("No of Installs")
chart.set_xlabel("Sizes")
chart.grid()
fig.suptitle("No. of Installs Vs Size")

canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
canvas.draw()
canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

toolbar = NavigationToolbar2Tk(canvas, screen)
toolbar.update()

canvas.mpl_connect("key_press_event", on_key_press)
  # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate
button = Button(master=screen, text="Quit", command=_quit)
button.pack(side=BOTTOM)
```

screen.mainloop()





6) For the years 2016,2017,2018 what are the category of apps that have got the most and the least downloads

Code:

```
def functq6():
    global screen
    screen=Tk()
```

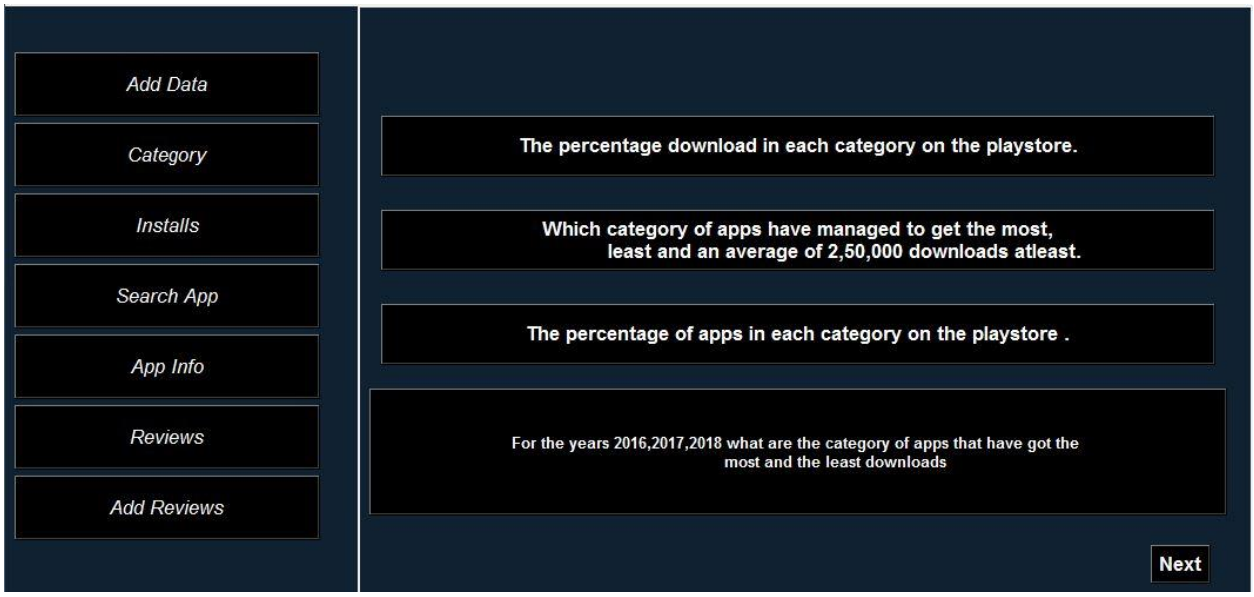
```
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w=700
    h=600
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    screen.configure(background='white')

#    big_frame =
tk.Frame(root,bg='white',width='700',height=550,bd=4,relief=RIDGE)
#    big_frame.place(x=10,y=60)

#    adjustWindow(root)  # configuring the window

#    Label(screen,text="").pack()



#
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    #print(df.head(5))

    #df.drop(9148,axis=0, inplace=True)
    #df.drop(10472,axis=0,inplace=True)

    # Data cleaning for "Installs" column
    #print(df['Installs'].head(5))
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    #print(df['Installs'].head(5))



    df['Installs'] = pd.to_numeric(df['Installs'])
```

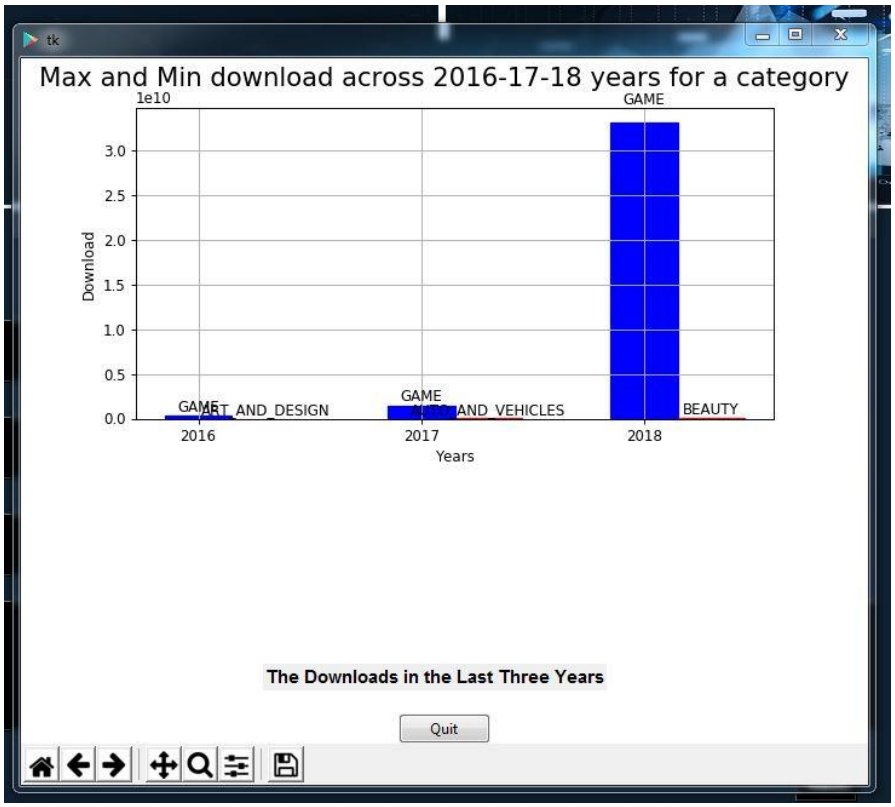
```
d = pd.DatetimeIndex(df['Last Updated'])
df['year'] = d.year
df['month'] = d.month
#print((df['year'][5]))
#6) For the years 2016,2017,2018 what are the category of apps that have got the most and the least downloads. What is the percentage increase or decrease that the
dict_2016 = {}
dict_2017 = {}
dict_2018 = {}

Category = []
for cat in df['Category'].unique():
    Category.append(cat)
    dict_2016[cat]=0
    dict_2017[cat]=0
    dict_2018[cat]=0
#print(Category)
for index in range(len(df)):
    if df['year'][index]==2016:
        dict_2016[df['Category'][index]] += df['Installs'][index]
    if df['year'][index]==2017:
        dict_2017[df['Category'][index]] += df['Installs'][index]
    if df['year'][index]==2018:
        dict_2018[df['Category'][index]] += df['Installs'][index]

#print(len(dict_2016))
#print(len(dict_2017))
#print(len(dict_2018))
#print(dict_2016)
#print(dict_2017)
#print(dict_2018)
max_2016_install = ["",0]
max_2017_install = ["",0]
max_2018_install = ["",0]
```

```
    min_2016_install = ["",99999999999]
    min_2017_install = ["",99999999999]
    min_2018_install = ["",99999999999]

    for cat in dict_2016:
        if max_2016_install[1] < dict_2016[cat]:
            max_2016_install[1] = dict_2016[cat]
            max_2016_install[0] = cat
        if max_2017_install[1] < dict_2017[cat]:
            max_2017_install[1] = dict_2017[cat]
            max_2017_install[0] = cat
        if max_2018_install[1] < dict_2018[cat]:
            max_2018_install[1] = dict_2018[cat]
            max_2018_install[0] = cat

        if min_2016_install[1] > dict_2016[cat]:
            min_2016_install[1] = dict_2016[cat]
            min_2016_install[0] = cat
        if min_2017_install[1] > dict_2017[cat]:
            min_2017_install[1] = dict_2017[cat]
            min_2017_install[0] = cat
        if min_2018_install[1] > dict_2018[cat]:
            min_2018_install[1] = dict_2018[cat]
            min_2018_install[0] = cat
    #print(max_2016_install)
    #print(max_2017_install)
    #print(max_2018_install)
    #print(min_2016_install)
    #print(min_2017_install)
    #print(min_2018_install)
    max_install =
[max_2016_install[1],max_2017_install[1],max_2018_install[1]]
    min_install =
[min_2016_install[1],min_2017_install[1],min_2018_install[1]]
    Years = ['2016','2017','2018']
```

```
   pos = np.arange(len(Years))
   bar_width = 0.3

   figure2 = plt.Figure(figsize=(8,4), dpi=85)

   chart = figure2.add_subplot(111)

   Max_bar =
chart.bar(Years,max_install,bar_width,color='blue',edgecolor='blue')
   Min_bar =
chart.bar(pos+bar_width,min_install,bar_width,color='red',edgecolor='red')
   chart.grid()
   chart.set_ylabel("Download")
   chart.set_xlabel('Years')
   figure2.suptitle('Max and Min download across 2016-17-18 years for a
category',fontsize=18)
   plt.legend(['max','min'],loc=10)

   max_month =
[max_2016_install[0],max_2017_install[0],max_2018_install[0]]
   min_month =
[min_2016_install[0],min_2017_install[0],min_2018_install[0]]

   for idx,rect in enumerate(Max_bar):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,max_month[idx],ha='center', va='bottom', rotation=0)

   for idx,rect in enumerate(Min_bar):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,min_month[idx],ha='center', va='bottom', rotation=0)
   canvas = FigureCanvasTkAgg(figure2, master=screen)
   canvas.get_tk_widget().pack()
   toolbar = NavigationToolbar2Tk(canvas, screen)
```

```
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
      # this is necessary on Windows to prevent
      # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    Label(screen,text="The Downloads in the Last Three
Years",font=("Helvetica",11,'bold') ,borderwidth=2).place(x=200,y=500)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)



    screen.mainloop()
```





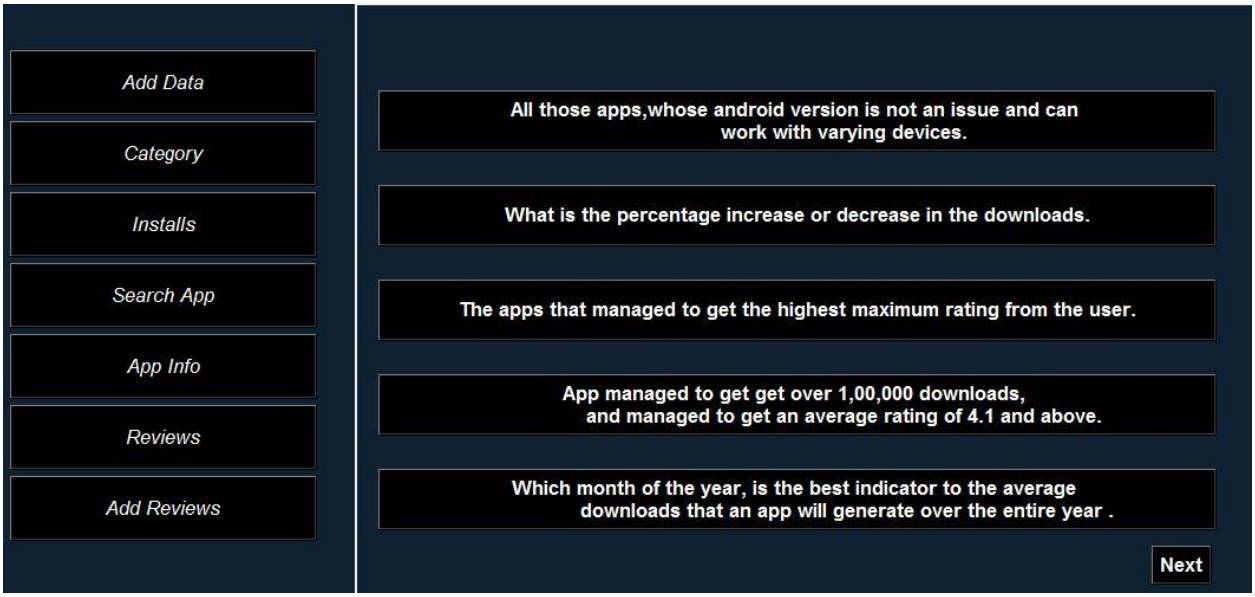
7)All those apps , whose android version is not an issue and can work with varying devices ,what is the percentage increase or decrease in the downloads

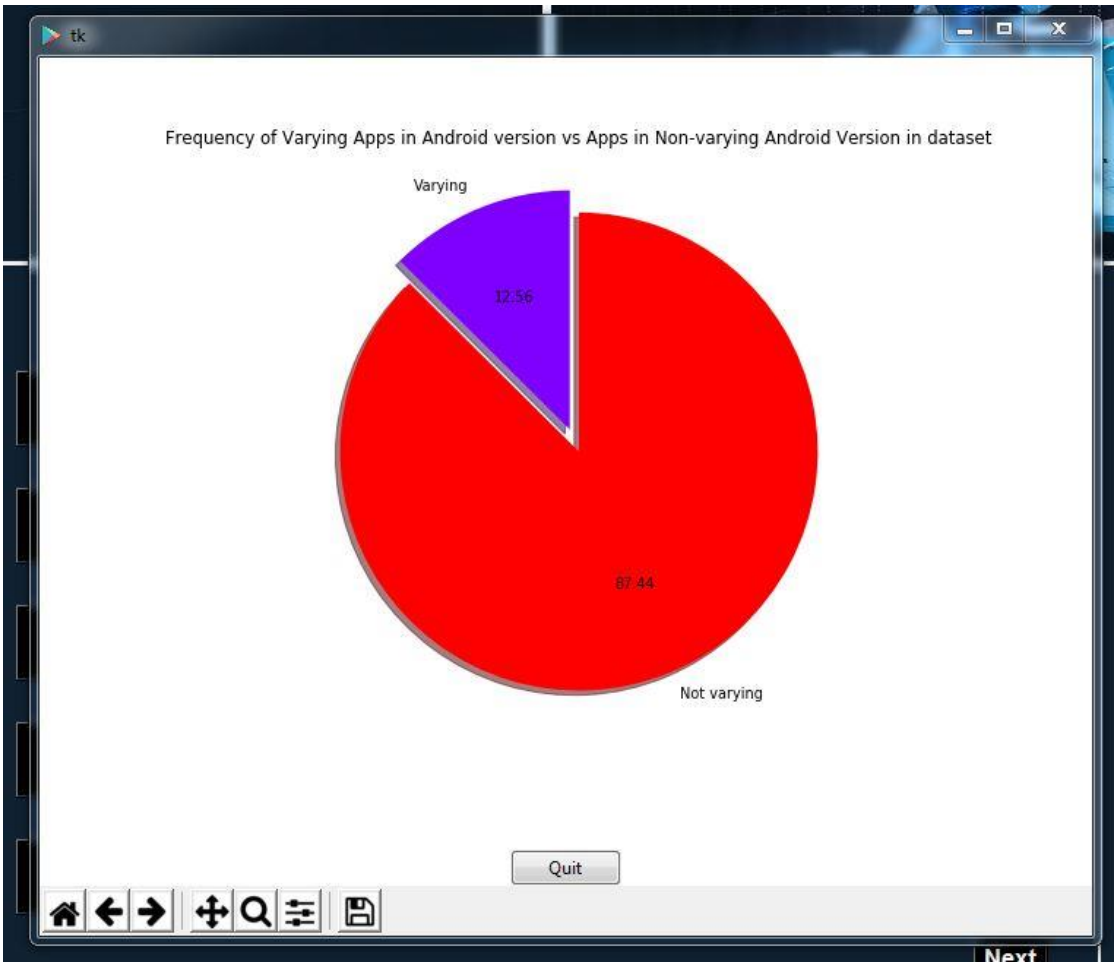
Code:

```
def functq7():
    global screen
    screen=Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w=720
    h=600
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    screen.configure(background='white')
    df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
```

```
df['Installs'] = pd.to_numeric(df['Installs'])

varwith=[]
novar=[]
varcategory={}
nocat={}
for i in range(len(df['App'])):
    if df['Android Ver'][i]=='Varies with device':
        varwith.append(df['Installs'][i])
        if df['Category'][i] in varcategory:
            varcategory[df['Category'][i]]+=df['Installs'][i]
        else:
            varcategory[df['Category'][i]]=df['Installs'][i]
    else:
        novar.append(df['Installs'][i])
        if df['Category'][i] in nocat:
            nocat[df['Category'][i]]+=df['Installs'][i]
        else:
            nocat[df['Category'][i]]=df['Installs'][i]

#     print(varwith)
#     print(novar)
#     print(varcategory)
#     print(nocat)
sumvarcategory=sum(varwith)
sumnocat=sum(novar)
#     print(sumvarcategory)
#     print(sumnocat)
x=(len(varwith),len(novar))
#     print(x)
androidver = ['Varying', 'Not varying']
figure1 = plt.Figure(figsize=(10,7), dpi=70)

color = cm.rainbow(np.linspace(0, 1, len(x)))
#fig1, ax1 = plt.subplots()
axesObject = figure1.add_subplot(111)
```

```
    #     labels = ['{0} '.format(i,j) for i,j in zip(catcount.keys(),catcount.values())]

     theme = plt.get_cmap('hsv')
    #     axesObject.set_prop_cycle("color", [theme(1. * i / len(catcount))for i in
range(len(catcount))])

axesObject.pie(x,labels=androidver,autopct='%1.2f',startangle=90,colors=color
,shadow=True,explode=[0.1,0])
     axesObject.set_title("Frequency of Varying Apps in Android version vs Apps
in Non-varying Android Version in dataset")
    #ax3.xlim(0,3.0)
    #     figure1.legend(labels,bbox_to_anchor=(0.3,1))
     canvas = FigureCanvasTkAgg(figure1, master=screen)  # A tk.DrawingArea.
     canvas.draw()
     canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

     toolbar = NavigationToolbar2Tk(canvas, screen)
     toolbar.update()

     canvas.mpl_connect("key_press_event", on_key_press)
      # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate

     button = Button(master=screen, text="Quit", command=_quit)
     button.pack(side=BOTTOM)
     screen.mainloop()
```






```
def functq7_2():
    global screen

    screen = tk.Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
```

```
    big_frame =
tk.Frame(screen,bg='white',width='700',height=450,bd=4,relief=RIDGE)
    big_frame.place(x=10,y=60)

    w=720
    h=550
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))

    screen.configure(background='white')

    tk.Label(screen,text="",bg='white').pack()


    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    #print(df.head(5))

    #df.drop(9148,axis=0, inplace=True)
    #df.drop(10472,axis=0,inplace=True)

    # Data cleaning for "Installs" column
    #print(df['Installs'].head(5))
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    #print(df['Installs'].head(5))


    df['Installs'] = pd.to_numeric(df['Installs'])

    d = pd.DatetimeIndex(df['Last Updated'])
    df['year'] = d.year
    df['month'] = d.month
```

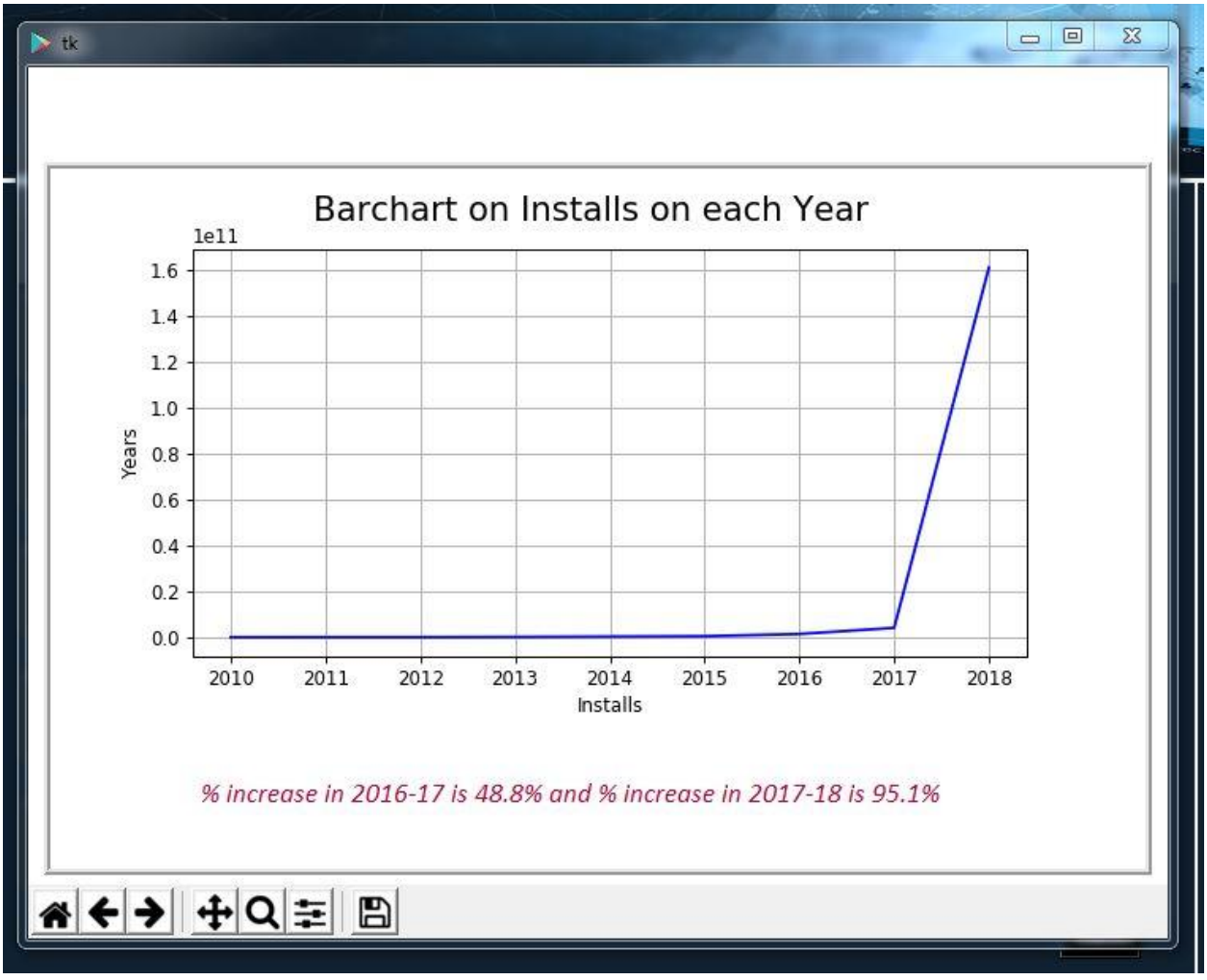
```
#print((df['year'][5]))
```

#6) For the years 2016,2017,2018 what are the category of apps that have got the most and the least downloads. What is the percentage increase or decrease that the

```
dict_years = {}

for year in df['year'].unique():
    dict_years[year]=0

for index in range(len(df)):
    dict_years[df['year'][index]] += df['Installs'][index]



Years = []
list_install  = []



#    for year in dict_years:
#        if year==2016 or year==2017 or year==2018:
#            Years.append(str(year))
#            list_install.append(dict_years[year])
for year in dict_years:
    Years.append((year))
    list_install.append(dict_years[year])

# print(Years)

# print(list_install)
new_dict={}
for i in range(0,9):
    new_dict.update({Years[i]:list_install[i]})
new_dict1=dict(sorted(new_dict.items(),
key=operator.itemgetter(0),reverse=True))
```

```
    keys=list(new_dict1.keys())
    values=list(new_dict1.values())
    print(keys)
    print(values)
    # for i in
    #    print(dict_years)

    x = dict_years[2016]
    y = dict_years[2017]
    z=dict_years[2018]

    per2016=1
    per2017=((y-x)/(x+y))*100
    per2018=((z-y)/(y+z))*100
    # print(per2016,per2017,per2018)


    Years.reverse()
    list_install.reverse()

    figure2 = plt.Figure(figsize=(8,4), dpi=85)

    chart = figure2.add_subplot(111)

    chart.plot(keys,values,color='blue')
    #Min_bar =
chart.bar(pos+bar_width,min_install,bar_width,color='pink',edgecolor='black')

    chart.set_ylabel("Years")
    chart.set_xlabel('Installs')
    figure2.suptitle('Barchart on Installs on each Year ',fontsize=18)
    chart.grid()

    canvas = FigureCanvasTkAgg(figure2, master=big_frame)
    canvas.get_tk_widget().place(x=5,y=10)
```

```
String = """
        % increase in 2016-17 is {:.1f}% and % increase in 2017-18 is {:.1f}%
        """.format(per2017,per2018)

tk.Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='whit
e').place(x=40,y=360)
toolbar = NavigationToolbar2Tk(canvas, screen)
toolbar.update()
screen.mainloop()
```



8)Amongst sports, entertainment, social media,news,events,travel and games, which is the category of app that is most likely to be downloaded in

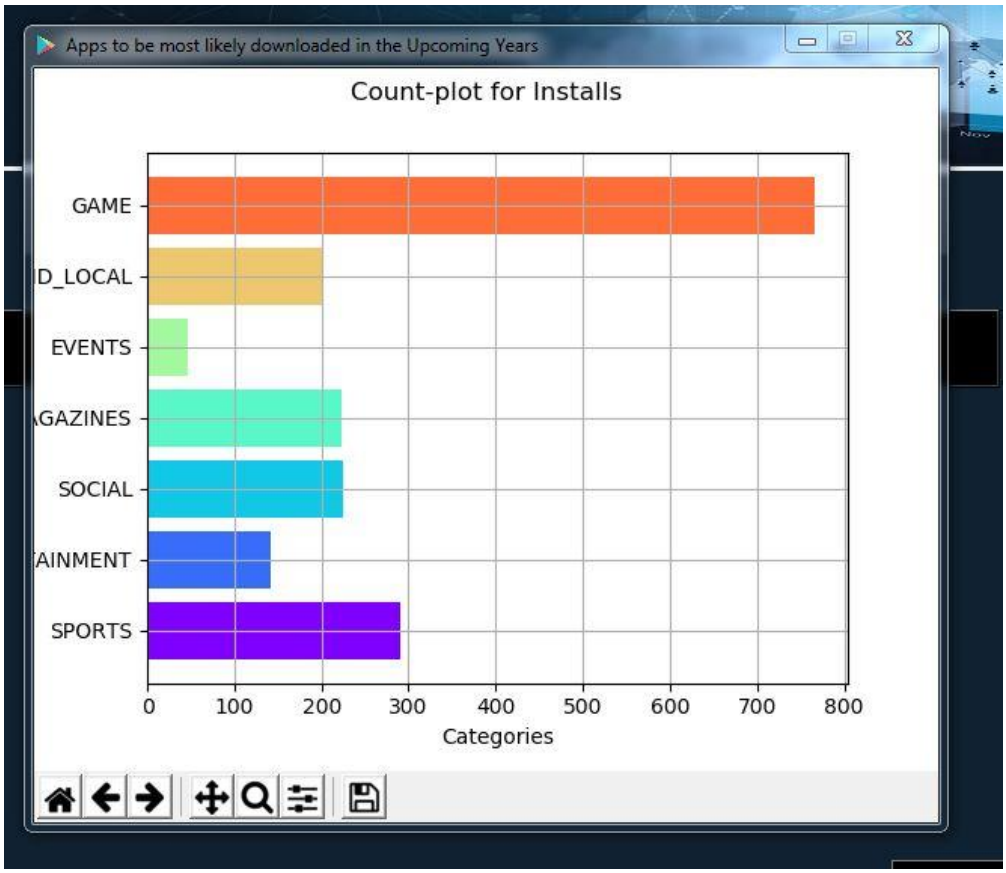
the coming years, kindly make a prediction and back it with suitable findings. Also update the number of downloads that these categories have received into a database.

Code:

```
def functq8():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps to be most likely downloaded in the Upcoming Years")  # mentioning title of the window
    w = 600  # width for the window size
    h = 500  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the screen and where it is placed
    screen.resizable(False, False)      # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)

cat={'SPORTS':0,'ENTERTAINMENT':0,'SOCIAL':0,'NEWS_AND_MAGAZINES':0,'EVENTS':0,'TRAVEL_AND_LOCAL':0,'GAME':0}

    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    #print(df['Installs'].head(5))
    df['Installs'] = pd.to_numeric(df['Installs'])
    d = pd.DatetimeIndex(df['Last Updated'])
    df['year'] = d.year
    df['month'] = d.month

#    dict_2018={}

    for i in range(len(df)):
```

```
        if (df['year'][i]==2018):
            if df['Category'][i] in cat:
                if cat[df['Category'][i]]==0:
                    cat[df['Category'][i]]=1
                else:
                    cat[df['Category'][i]]+=1
#    print(cat)
    color = cm.rainbow(np.linspace(0, 2, 15))
    fig=Figure(figsize=(5,4),dpi=100)
    chart=fig.add_subplot(111)
    k=list(cat.keys())
    v=list(cat.values())
    l=v.index(max(v))
    print(k[l])
    chart.barh(k,v,color=color)

    chart.set_ylabel("No of Installs")
    chart.set_xlabel("Categories")
    chart.grid()
    fig.suptitle("Count-plot for Installs")

    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    String = (f""" The Most Likely App to be downloaded in the
       upcoming Years is {k[l]}""")

Label(screen,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').pla
ce(x=400,y=690)
```

```
button = Button(master=screen, text="Quit", command=_quit)
button.pack(side=BOTTOM)
screen.mainloop()
```



9) All those apps who have managed to get over 1,00,000 downloads, have they managed to get an average rating of 4.1 and above? An we conclude something in co-relation to the number of downloads and the ratings received.

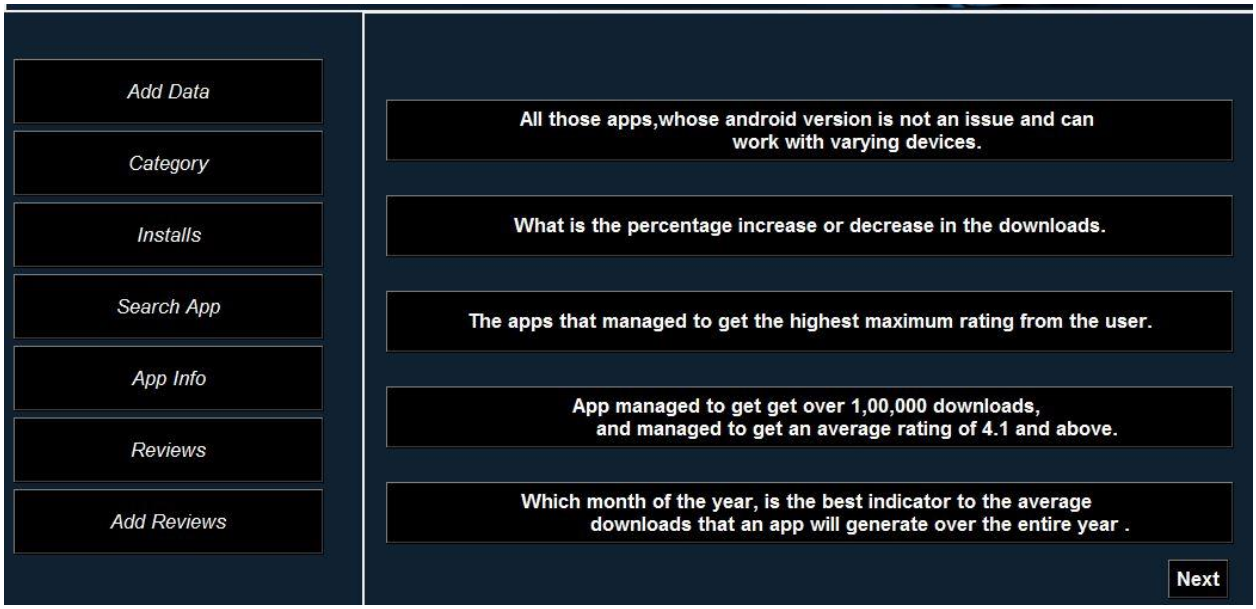
Code:

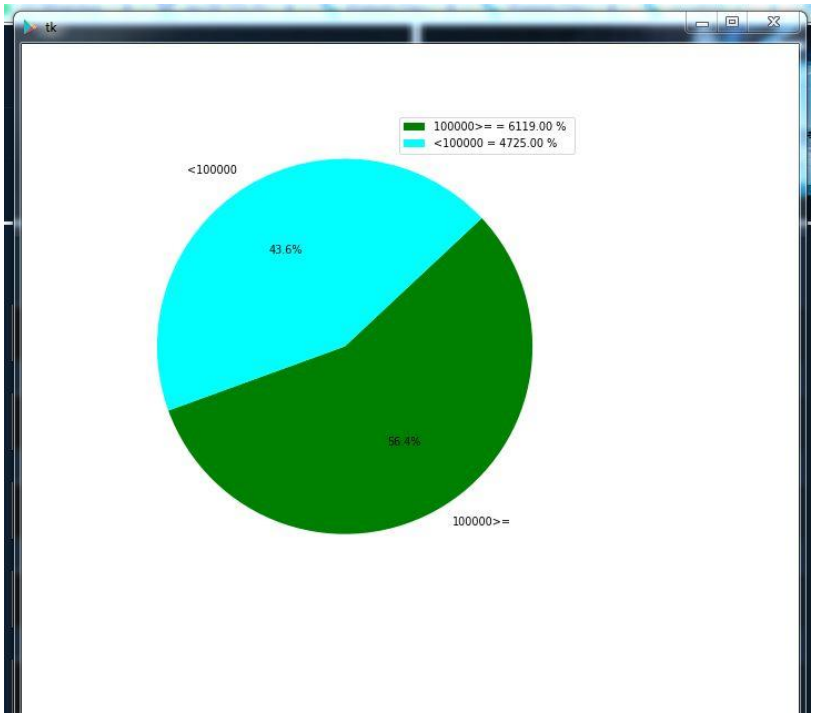
```
def functq9():

    global screen

    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    screen = tk.Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    big_frame = tk.Frame(screen,bg='white',width='600',height='630',bd=4)
    big_frame.place(x=50,y=60)
    w=700
    h=700
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))

    screen.configure(background='white')
    rating = 4.1
    installs = 100000

    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")


    print(df['Rating'])
    temp = []
    for index in range(len(df['Rating'])):
        if df['Rating'][index] >= rating:
            temp.append(1)
        else:
            temp.append(0)
```

```
   cat_rating=
pd.DataFrame(zip(temp,temp),columns=["cat_Ratings","ignore"])

   df = pd.concat([df,cat_rating],axis=1)

   df.drop("ignore",axis=1,inplace=True)

   df.drop(df.index[9148], inplace=True)

   # Data cleaning for "Installs" column
   df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
   df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))

   df['Installs'] = pd.to_numeric(df['Installs'])

   rating_sum = 0

   rate=[]
   #1169
   """ """
   counter=0
   for index in range(len(df)):
      try:
         if df['Installs'][index]>=installs:
            #if df['Rating'][index]>=rating:""" """
               rate.append(1)
               rating_sum+=df['Rating'][index]
               counter+=1
               """ """
         else:
               rate.append(0)
       except:
         #print(index)
         continue
```

```
    #print(len(rate))
    avg_rating = (rating_sum/counter)
    """ """
    #print(df['Installs'].corr(df['Rating']))

    """ """
    val = "Yes" if (rating_sum/counter)>=rating else "No"
    rel = "Greater than" if val == "Yes" else "Lesser than"

    fig, ax = plt.subplots(figsize=(10, 10))

    l1 ='{}>='.format(installs)
    l2 ='<{}'.format(installs)

    size=[rate.count(1),rate.count(0)]
    label = [l1,l2]
    title = 'Count of {}'.format(rating)

    figure1 = plt.Figure(figsize=(8,8), dpi=70)
    labels1 = ['{0} = {1:1.2f} % '.format(i,j) for i,j in zip(label,size)]
    #color = cm.rainbow(np.linspace(0, 1, 10))
    #fig1, ax1 = plt.subplots()
    ax3 = figure1.add_subplot(111)
    ax3.pie(size, labels=label,colors = ['green','cyan'], autopct='%1.1f%%',
startangle=200)
    ax3.set_title(title)
    ax3.legend(labels1,bbox_to_anchor=(1,1))
    #ax3.xlim(0,3.0)
    pie_plot = FigureCanvasTkAgg(figure1, big_frame)
    pie_plot.get_tk_widget().place(x=-50,y=-70)

    Label(big_frame,text="--Results--
",font=("Calibri",13,'italic'),fg='#ad023e',bg='white').place(x=220,y=470)
```

```
   String = "Average rating of all the apps who managed to get over {}
download is {:.1f}".format(installs,avg_rating)


Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=0,y=500)

   String ="""{}! All those apps who have managed to get over {} downloads ,
         they have to get an average rating of {:.1f} which is {} than {}
""".format(val,installs,avg_rating,rel,rating)


Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=0,y=530)


   #ax3.legend(loc=0)

   toolbar = NavigationToolbar2Tk(pie_plot, screen)
   toolbar.update()

   pie_plot.mpl_connect("key_press_event", on_key_press)
    # this is necessary on Windows to prevent
                  # Fatal Python Error: PyEval_RestoreThread: NULL tstate
   button = Button(master=screen, text="Quit", command=_quit)
   button.pack(side=BOTTOM)


   screen.mainloop()
```





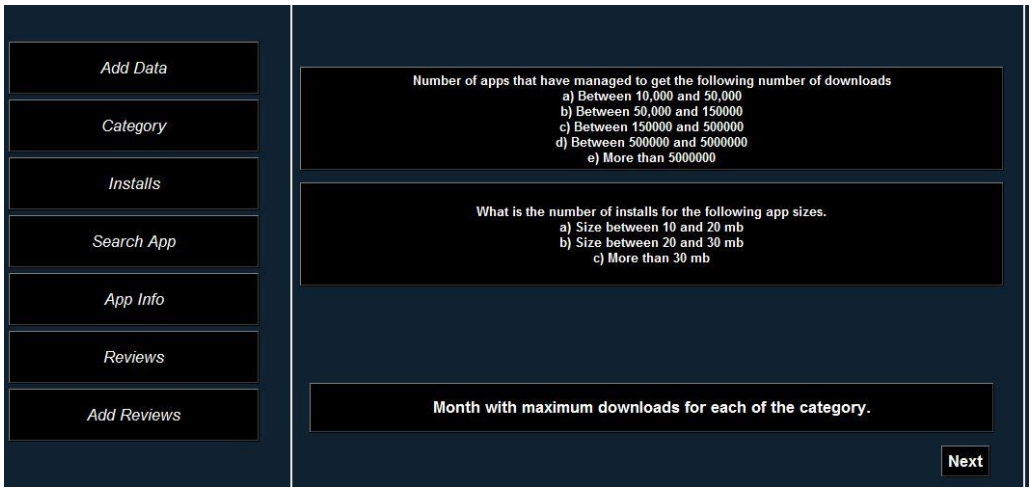
10) Across all the years ,which month has seen the maximum downloads fr each of the category. What is the ratio of downloads for the app that qualifies as teen versus mature17+Across all the years ,which month has seen the maximum downloads fr each of the category. What is the ratio of downloads for the app that qualifies as teen versus mature17+

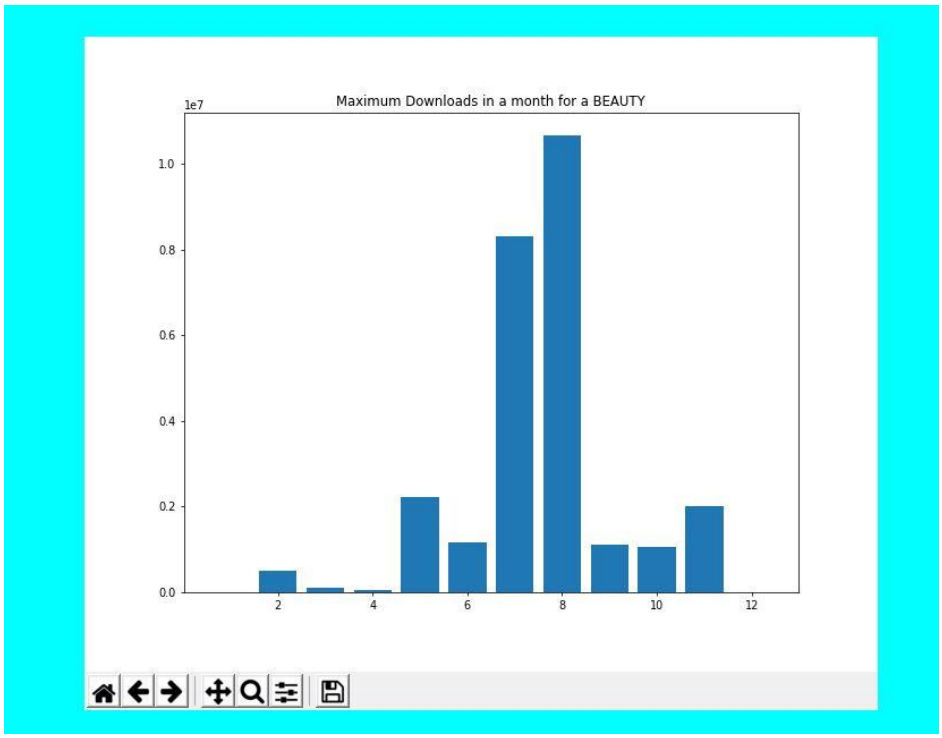
Code:

```
def mont():

    global root
    global cat
```

```
global can
root = Tk()
root.title("Insight of Google App's")
width_value=root.winfo_screenwidth()
root.configure(background='Cyan') # configuring the window
height_value=root.winfo_screenheight()
root.geometry("%dx%d+0+0"%(width_value, height_value))
mcan=Canvas(root,width=800,height=700,bg='white')

mcan.place(x=300,y=70)
data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
data=data.replace(np.nan,'Not Available')
data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
data['Installs'] = pd.to_numeric(data['Installs'])
d = pd.DatetimeIndex(data['Last Updated'])
data['year'] = d.year
data['month'] = d.month
mon={1:0,2:0,3:0,4:0,5:0,6:0,7:0,8:0,9:0,10:0,11:0,12:0}
for i in range(len(data)):
   if data['Category'][i]== cat.get():
      if data['month'][i] in mon:
         if mon[data['month'][i]]==0:
            mon[data['month'][i]]=data['Installs'][i]
         else:
            mon[data['month'][i]]+=data['Installs'][i]
x=list(mon.keys())
y=list(mon.values())
figure1 = plt.Figure(figsize=(10,8), dpi=70)
axesObject = figure1.add_subplot(111)
axesObject.bar(x,y)
axesObject.set_title(f"Maximum Downloads in a month for a {cat.get()}")
can= FigureCanvasTkAgg(figure1,mcan)
can.get_tk_widget().pack( fill=BOTH, expand=True)
toolbar = NavigationToolbar2Tk(can,mcan)
toolbar.update()
```

```
def funct10():
    global cat
    global mcanvas
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    cat=StringVar()
    choices = list(data['Category'].unique())
    Label(val, text='Select Category', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=ttk.Combobox(val, width=40,state="readonly",text=cat,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=mont)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()
```

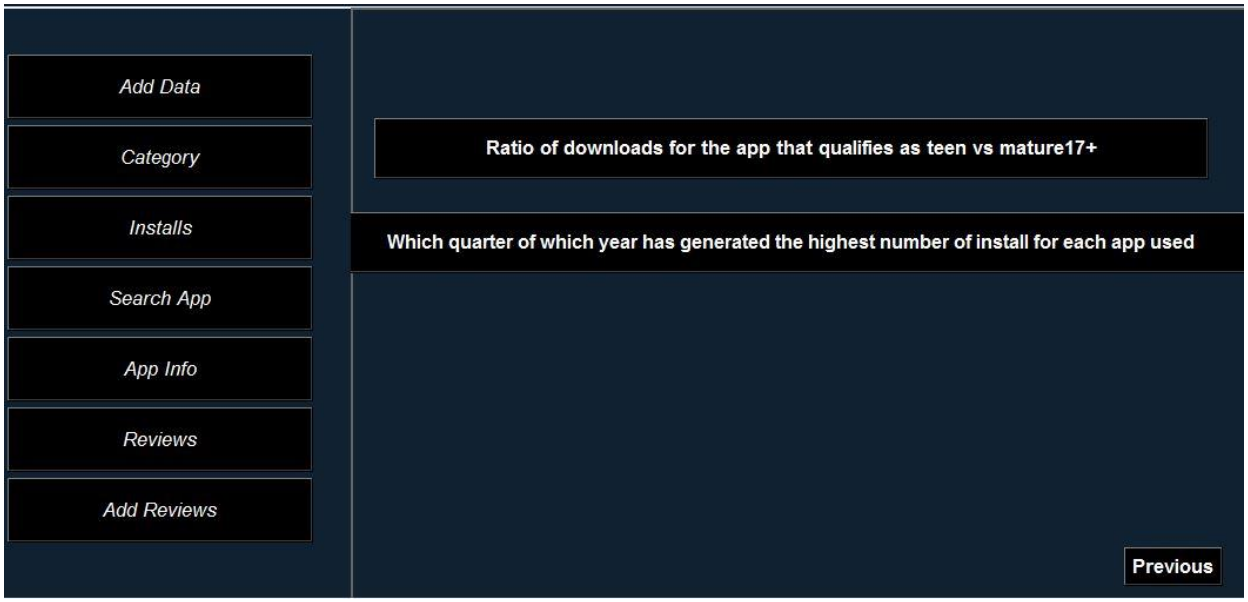


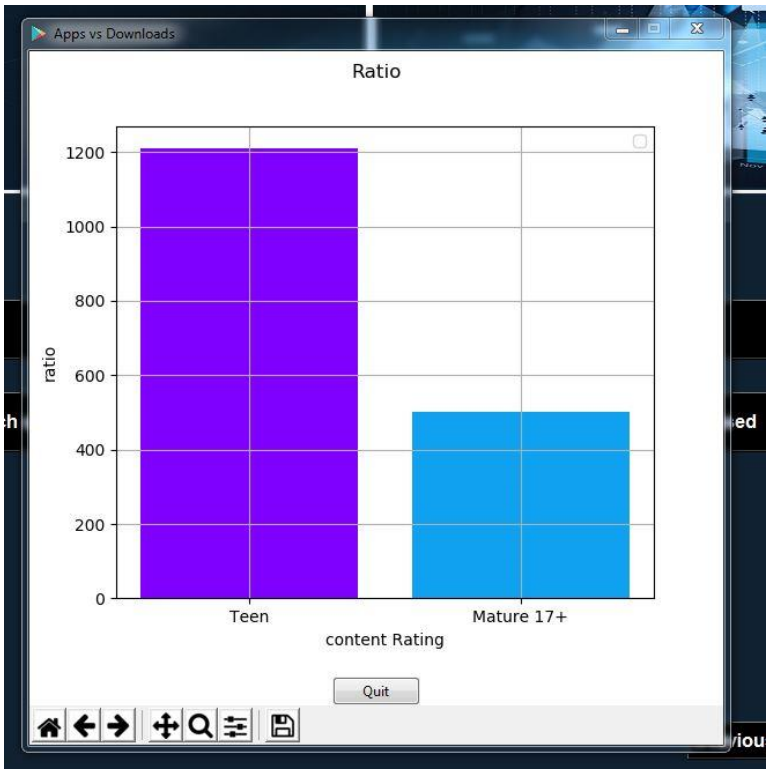



```
def functq10_2():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    df=df.replace(np.NaN,0)
    ratio={'Teen':0,'Mature 17+':0}
    for i in range(len(df)):
        if df['Content Rating'][i] in ratio:
```

```
        if ratio[df['Content Rating'][i]]==0:
            ratio[df['Content Rating'][i]]=1
        else:
            ratio[df['Content Rating'][i]]+=1
color = cm.rainbow(np.linspace(0, 2, 10))
fig=Figure(figsize=(5,4),dpi=100)
chart=fig.add_subplot(111)
chart.bar(ratio.keys(),ratio.values(),color=color)
chart.set_ylabel("ratio")
chart.set_xlabel("content Rating")
chart.grid()
fig.suptitle("Ratio")
chart.legend()
canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
canvas.draw()
canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

toolbar = NavigationToolbar2Tk(canvas, screen)
toolbar.update()

canvas.mpl_connect("key_press_event", on_key_press)
  # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate
button = Button(master=screen, text="Quit", command=_quit)
button.pack(side=BOTTOM)
```

screen.mainloop()





11) Which quarter of which year has generated the highest number of install for each app used in the study?

Code:

```
def question11():

    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")
```

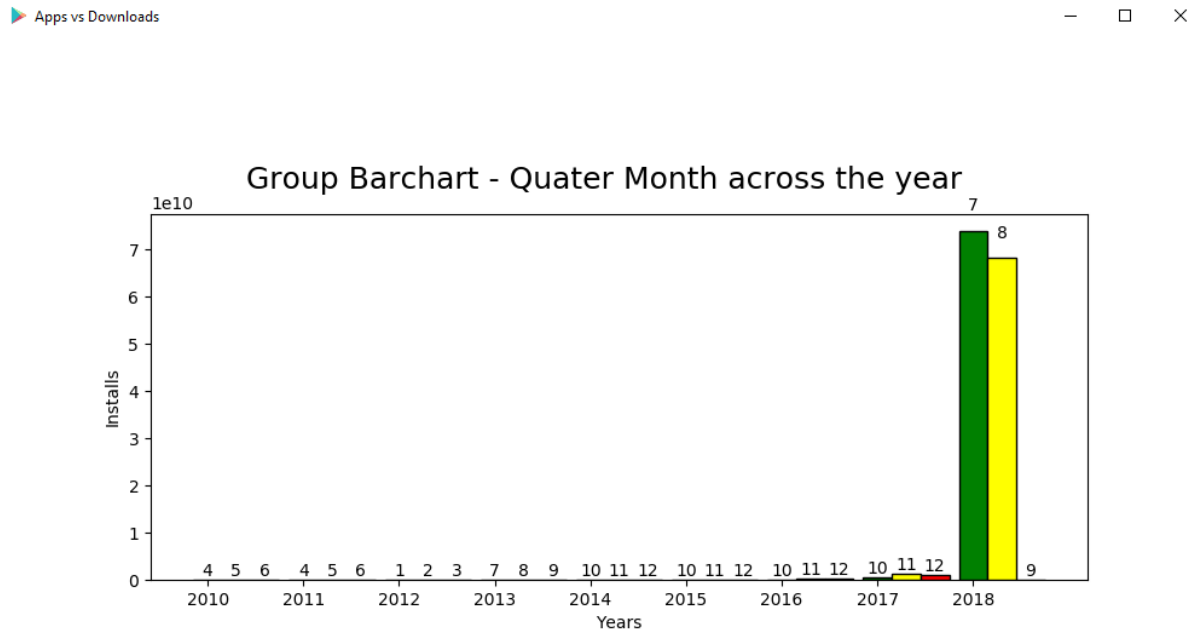
```
    w = 1000  # width for the window size
    h = 600  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.configure(background='white')  # configuring the window
    Years=[2010,2011,2012,2013,2014,2015,2016,2017,2018]
    data = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
    data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
       #print(data['Installs'].head(5))
    data['Installs'] = pd.to_numeric(data['Installs'])

    d = pd.DatetimeIndex(data['Last Updated'])
    data['year'] = d.year
    data['month'] = d.month
    list_year=[]

    for j in Years:
       quar1={1:0,2:0,3:0}
       quar2={4:0,5:0,6:0}
       quar3={7:0,8:0,9:0}
       quar4={10:0,11:0,12:0}


       for i in range(len(data)):
          if data['year'][i]== j:
             if data['month'][i] in quar1:
                   quar1[data['month'][i]]+=data['Installs'][i]
             elif data['month'][i] in quar2:
                   quar2[data['month'][i]]+=data['Installs'][i]
             elif data['month'][i] in quar3:
                   quar3[data['month'][i]]+=data['Installs'][i]
```

```
            elif data['month'][i] in quar4:
                    quar4[data['month'][i]]+=data['Installs'][i]
        if sum(quar1.values())>sum(quar2.values()) and
sum(quar1.values())>sum(quar3.values()) and
sum(quar1.values())>sum(quar4.values()):
            list_year.append(quar1)
        elif sum(quar2.values())>sum(quar3.values()) and
sum(quar2.values())>sum(quar4.values()):
            list_year.append(quar2)
        elif sum(quar3.values())>sum(quar4.values()):
            list_year.append(quar3)
        else:
            list_year.append(quar4)
    print(list_year)
    #dict1={}
    #for i in range(len(list_year)):
    #    dict1.update({Years[i]:list_year[i]})
    #print(dict1)
    list10=[]
    Month1,Month2,Month3 = [],[],[]
    for i in range(len(list_year)):
            list2=[]
            for j in (list_year[i].keys()):
                print(j)
                list2.append(j)
            list10.append(list2)
    #print(list10)
    for j in range(1):
        for i in range(len(list10)):
                Month1.append(list10[i][j])
    for j in range(1,2):
        for i in range(len(list10)):
                Month2.append(list10[i][j])
    for j in range(2,3):
        for i in range(len(list10)):
                Month3.append(list10[i][j])
```

```
    print(Month1)
    print("---------")
    print(Month2)
    print("---------")
    print(Month3)
    print("---------")

    list1=[]
    for i in range(len(list_year)):
            list2=[]
            for j in (list_year[i].values()):
                print(j)
                list2.append(j)
            list1.append(list2)
    Years = []
    for i in range(2010,2019):
        Years.append(str(i))
    Quatmonth_list=[]
    for j in range(0,3):
        list2=[]
        for i in range(len(list1)):
                list2.append(list1[i][j])
        Quatmonth_list.append(list2)

    pos = np.arange(len(Years))
    bar_width = 0.3



    figure2 = plt.Figure(figsize=(10,4), dpi=100)

    chart = figure2.add_subplot(111)

    bar1 =
chart.bar(Years,Quatmonth_list[0],bar_width,color='green',edgecolor='black')
```

```
   bar2 =
chart.bar(pos+bar_width,Quatmonth_list[1],bar_width,color='yellow',edgecolo
r='black')
   bar3 =
chart.bar(pos+bar_width*2,Quatmonth_list[2],bar_width,color='red',edgecolo
r='black')

   chart.set_ylabel("Installs")
   chart.set_xlabel('Years')
   figure2.suptitle('Group Barchart - Quater Month across the
year',fontsize=18)

   for idx,rect in enumerate(bar1):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month1[idx],ha='center', va='bottom', rotation=0)

   for idx,rect in enumerate(bar2):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month2[idx],ha='center', va='bottom', rotation=0)

   for idx,rect in enumerate(bar3):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month3[idx],ha='center', va='bottom', rotation=0)



   canvas = FigureCanvasTkAgg(figure2, master=screen)
   canvas.get_tk_widget().place(x=0,y=100)

   toolbar = NavigationToolbar2Tk(canvas, screen)
   toolbar.update()
   String="In the above Graph Quarter of each Year with their Higher Installs
are plotted From 2010 to 2018"
```

```
tk.Label(screen,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=10,y=520)
   screen.mainloop()
```



In the above Graph Quarter of each Year with their Higher Installs are plotted From 2010 to 2018

12) Which of all the apps given have managed to generate the most positive and negative sentiments.Also figure out the app which has generated approximately the same ratio for positive and negative sentiments.

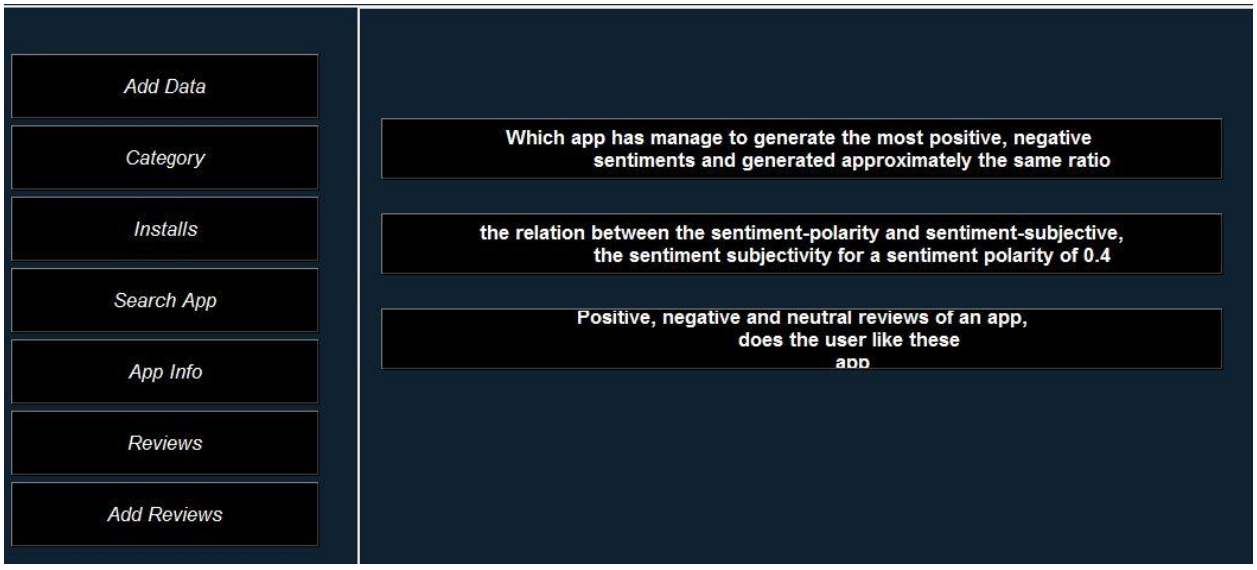
Code:

```
def sentim():
   global senti
   root = Tk()
   root.title("Insight of Google App's")
   width_value=root.winfo_screenwidth()
   height_value=root.winfo_screenheight()
   root.geometry("%dx%d+0+0"%(width_value, height_value))
   root.configure(background='Cyan')
```

```
    big_frame = Frame(root)
    big_frame.pack()
    canvas=[]
    for i in range(1):
            can=Canvas(big_frame,width=320,height=600,bg='white')
            canvas.append(can)
            can.grid(row=1,column=i)
    scroll1=Scrollbar(canvas[0])



    positive=Listbox(canvas[0],yscrollcommand =
scroll1.set,height=35,width=45,bg='light green')

    scroll1.pack(side = 'right', fill = 'both')

    positive.pack(side = 'left', fill = 'both')

    updated_app={}




    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    app={}




    if senti.get()=='--select--' :
        root.destroy()


    for i in data['App']:
        app.update({i:0})
```

```
    for i in range(len(data)):
        if (data['App'][i] in app) and data['Sentiment'][i]==senti.get():
            if app[data['App'][i]]==0:
                app[data['App'][i]]=1
            else:
                app[data['App'][i]]+=1
     for key, value in sorted(app.items(), key=lambda item:
item[1],reverse=True):
        updated_app.update({key:value})
    if senti.get()!='Same Ratio':
        for i in updated_app:
            positive.insert(END,i,updated_app[i])


    if senti.get()=='Same Ratio':
        app={}
        for i in data['App']:
          app.update({i:[0,0]})
    #       print(app)
        for i in range(len(data)):
            if (data['App'][i] in app) and data['Sentiment'][i]=='Positive':
                if (app[data['App'][i]][0]) == 0:
                    app[data['App'][i]][0]=1
                else:
                    app[data['App'][i]][0]+=1
        for i in range(len(data)):
            if (data['App'][i] in app) and data['Sentiment'][i]=='Negative':
                if (app[data['App'][i]][1])==0:
                    app[data['App'][i]][1]=1
                else:
                    app[data['App'][i]][1]+=1
        same={}
        for i in app:
```

```
            if app[i][0]==0 or app[i][1]==0:
                continue
            elif 0.75<float((app[i][0]/app[i][1]))<1.25:
                if (1-app[i][0]/app[i][1])<0:
                    a=(1-app[i][0]/app[i][1])*(-1)
                else:
                   a=(1-app[i][0]/app[i][1])
                same.update({i:a})
        for i in same:
            positive.insert(END,i)

def twelve():
    global senti
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    senti=StringVar()
    choices=['Positive','Negative','Same Ratio']
    Label(val, text='Select Sentiment', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=Combobox(val , width=40,state="readonly",text=senti,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=sentim)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()
```


Add Data
Category
Installs
Search App
App Info
Reviews
Add Reviews
Which app has manage to generate the most positive, negative sentiments and generated approximately the same ratio
the relation between the sentiment-polarity and sentiment-subjective, the sentiment subjectivity for a sentiment polarity of 0.4
Positive, negative and neutral reviews of an app, does the user like these app


Add Data
Category
Installs
Search App
App Info
Reviews
Add Reviews
Select Sentiment
Positive
Search

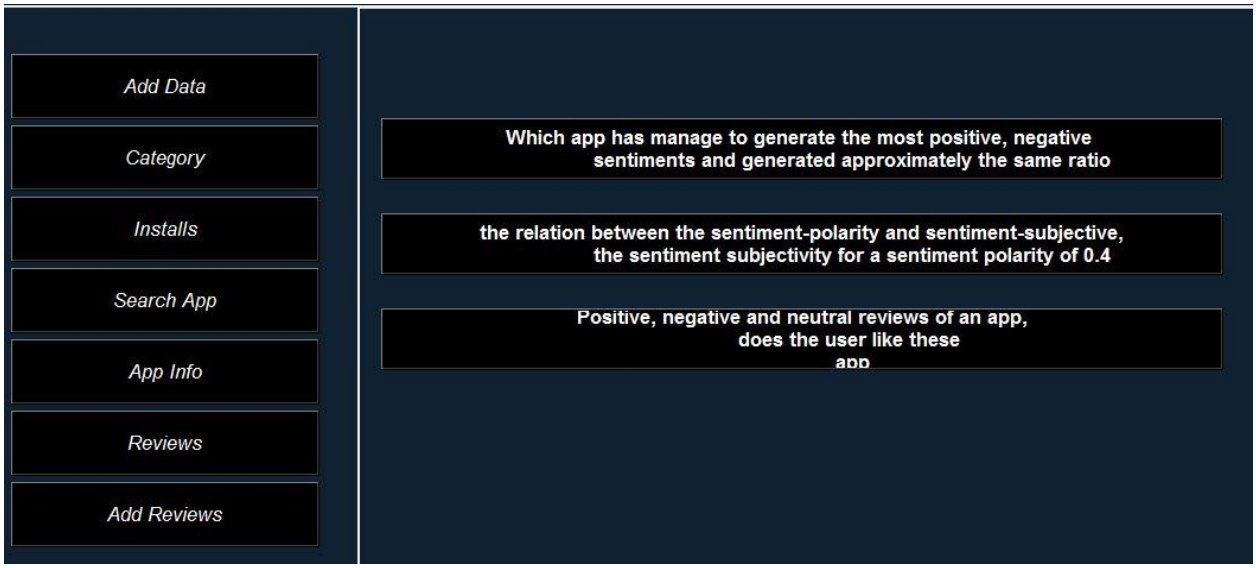
13) Study and find out the relation between the Sentiment-polarity and sentimentsubjectivity of all the apps. What is the sentiment subjectivity for a sentiment polarity of 0.4.

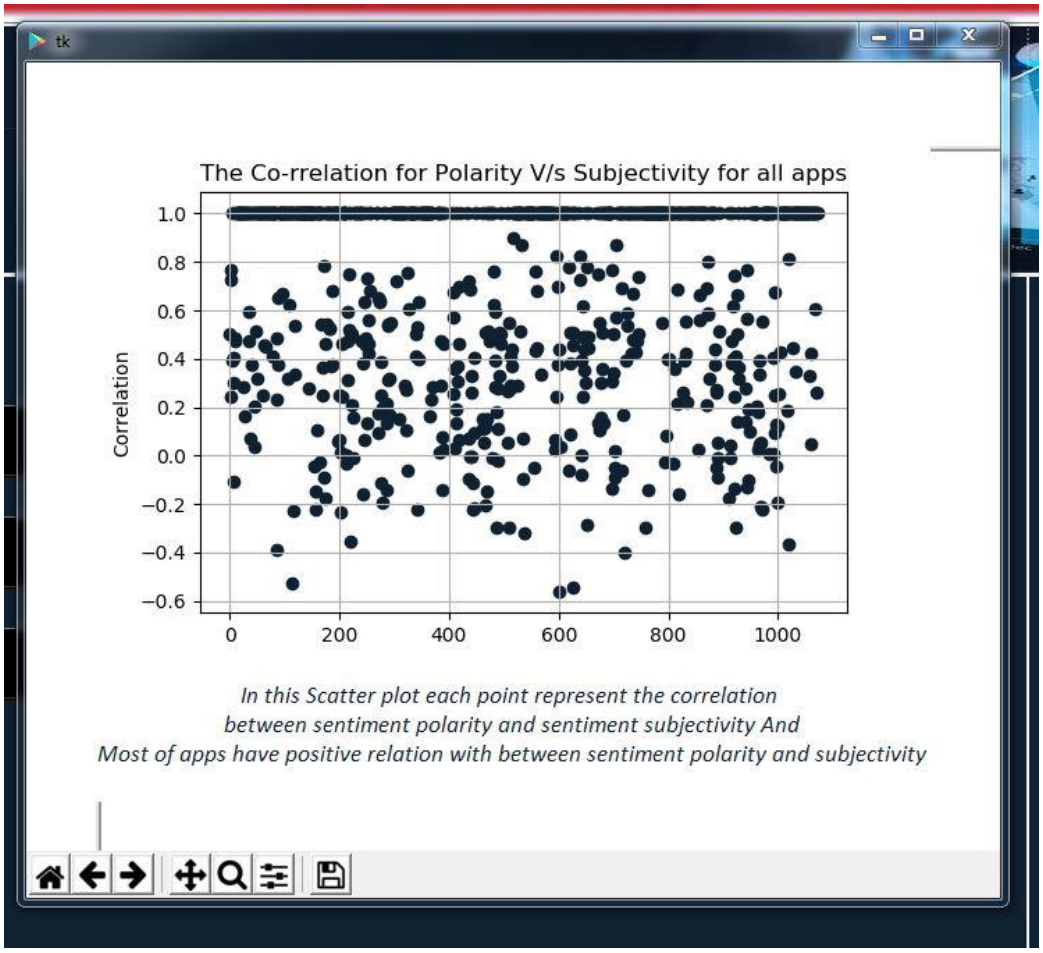
Code:

```
def function_q13():
    global screen,df,dict_app_relation
    dict_app_relation={}

    root = Tk()
    root.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    big_frame =
tk.Frame(root,bg='white',width='700',height='630',bd=4,relief=RIDGE)
    big_frame.place(x=50,y=60)
    w=700
    h=600
    ws=root.winfo_screenwidth()
    hs=root.winfo_screenheight()
```

```
x=(ws/2)-(w/2)
y=(hs/2)-(h/2)
root.geometry("%dx%d+%d+%d"%(w,h,x,y))

root.configure(background='white')



df = pd.read_csv("C:\\InternshipFinal\\user.csv")
df=df.replace(np.NaN,-999)

dict_app_index_count={}
for index in range(len(df['App'])):
    app = df['App'][index]
    if app in dict_app_index_count:
        dict_app_index_count[app][1]+=1
    else:
        dict_app_index_count[app]=[index,1]

# after this for loop dict_app_index_count will hold the app name as key and
it's first index in data set and total count in data set as item

for app in dict_app_index_count:
    index = dict_app_index_count[app][0]
    count = dict_app_index_count[app][1]
    sub,pol=[],[]

    for i in range(count):
        c = index+i
        sub.append(df['Sentiment_Subjectivity'][c])
        pol.append(df['Sentiment_Polarity'][c])

    newRelation1(app,sub,pol)

app_no = np.arange(len(dict_app_relation.keys()))

relation = []
```

```
    for i in dict_app_relation:
        relation.append(dict_app_relation[i])

    figure3 = plt.Figure(figsize=(6,4), dpi=100)
    ax3 = figure3.add_subplot(111)
    ax3.scatter(app_no,relation, color = '#102131')
    scatter3 = FigureCanvasTkAgg(figure3, root)
    scatter3.get_tk_widget().place(x=50,y=45)
    ax3.grid()
    ax3.set_xlabel("Applications in sequence")
    ax3.set_ylabel("Correlation")
    ax3.set_title("The Co-rrelation for Polarity V/s Subjectivity for all apps")
    toolbar = NavigationToolbar2Tk(scatter3,root)
    toolbar.update()
    String = """
            In this Scatter plot each point represent the correlation
            between sentiment polarity and sentiment subjectivity And
            Most of apps have positive relation with between sentiment polarity
and subjectivity
            """

tk.Label(root,text=String,font=("Calibri",13,'italic'),fg='#102131',bg='white').pla
ce(x=0,y=420)

    root.mainloop()
```





14) Generate an interface where the client can see the reviews categorized as positive.negative and neutral ,once they have selected the app from a list of apps available for the study.

15) Is it advisable to launch an app like ’10 Best foods for you’? Do the users like these apps?

(code and output for 14 and 15 is done together)

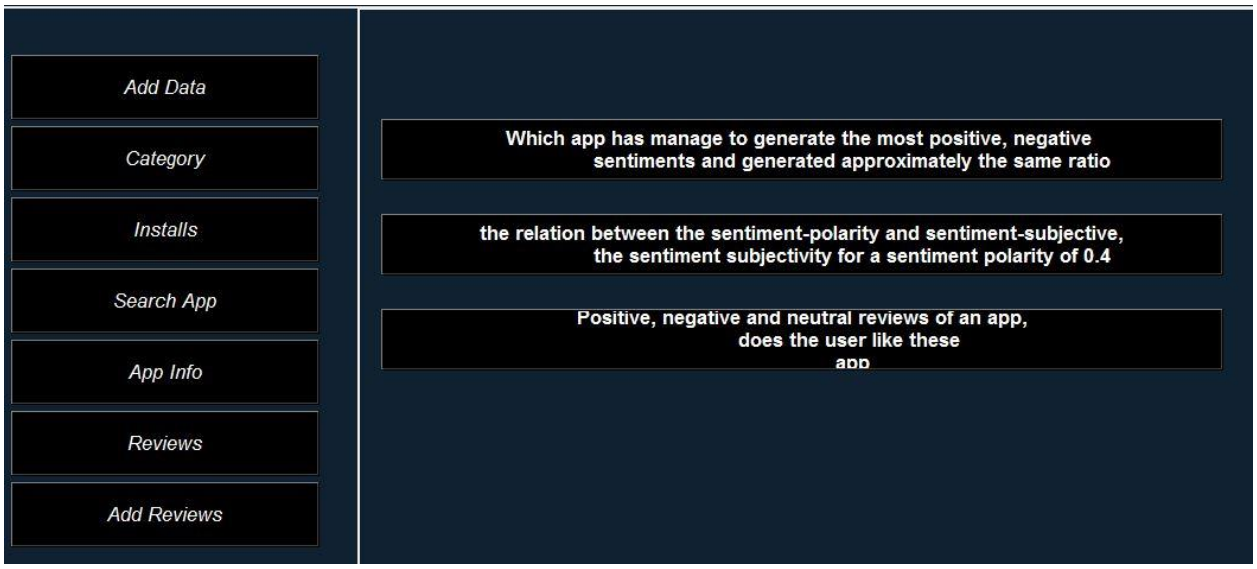
Code:

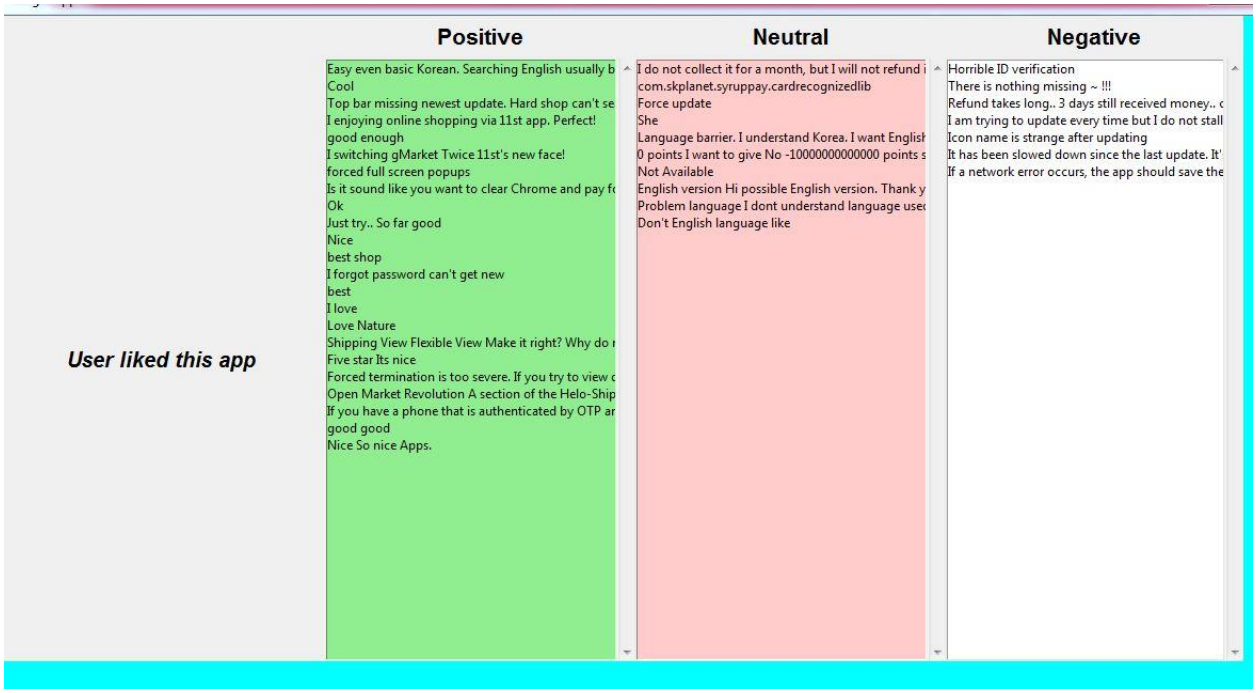
```
ef revv():
    global root
    global search
    global big_frame
    global filtered
    global appli
    global list_of_apps_most_positive_sentiments
    global list_of_apps_most_negative_sentiments
    global list_of_apps_most_average_sentiments
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(1300,700))
    root.configure(background='Cyan')
    big_frame = Frame(root)
    big_frame.pack()
    l=Label(big_frame,text='Positive',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=1 ,padx=5,pady=5)
    l=Label(big_frame,text='Neutral',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=2 ,padx=5,pady=5)
    l=Label(big_frame,text='Negative',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=3 ,padx=5,pady=5)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
#    print(data)
    data=data.replace(np.nan,'Not Available')
    x = search.get()
    print(appli[filtered.index(search.get())])
    list_of_apps_most_positive_sentiments = []
    list_of_apps_most_negative_sentiments = []
    list_of_apps_most_average_sentiments = []
    list_of_apps_most_zero_sentiments = []
```

```
    list_of_apps_most_positive_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Positive')].Translated_Review).tolist()
#     print(list_of_apps_most_positive_sentiments)
    list_of_apps_most_negative_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Negative')].Translated_Review).tolist()
#     print(list_of_apps_most_negative_sentiments)
    list_of_apps_most_average_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Neutral')].Translated_Review).tolist()
#     print(list_of_apps_most_average_sentiments )

    canvas=[]
    for i in range(4):
        can=Canvas(big_frame,width=320,height=600,bg='#003b6b')
        canvas.append(can)
        can.grid(row=1,column=i)
    scroll1=Scrollbar(canvas[1])

    scroll2=Scrollbar(canvas[3])

    scroll3=Scrollbar(canvas[2])
    positive=Listbox(canvas[1],yscrollcommand =
scroll1.set,height=35,width=45,bg='light green')
    negative=Listbox(canvas[3],yscrollcommand =
scroll2.set,height=35,width=43,bg='white')
    neutral=Listbox(canvas[2],yscrollcommand =
scroll3.set,height=35,width=45,bg='#ffcccb')
    scroll1.pack(side = 'right', fill = 'both')
    scroll2.pack(side = 'right', fill = 'both')
    scroll3.pack(side = 'right', fill = 'both')
    positive.pack(side = 'left', fill = 'both')
    negative.pack( side = 'left', fill = 'both' )
    neutral.pack( side = 'left', fill = 'both' )
```

```
    for i in list_of_apps_most_positive_sentiments:
        positive.insert(END,i)
    for i in list_of_apps_most_average_sentiments:
        neutral.insert(END,i)
    for i in list_of_apps_most_negative_sentiments:
        negative.insert(END,i)

    if
(len(list_of_apps_most_positive_sentiments)>len(list_of_apps_most_negative
_sentiments)) and
(len(list_of_apps_most_positive_sentiments)>len(list_of_apps_most_average_
sentiments)):
        Label(canvas[0],text='User liked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()
    elif
(len(list_of_apps_most_negative_sentiments)>len(list_of_apps_most_average
_sentiments)):
        Label(canvas[0],text='User disliked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()
    else:
        Label(canvas[0],text='User neither liked nor disliked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()

def fourteen():
    global search
    global mcanvas
    global filtered
    global appli
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(400,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    appli=list(OrderedDict.fromkeys(data['App']))
```

```
    filtered=[]
    for i in appli:
        filtered.append(i[0:10])
    search=StringVar()
    Label(val, text='Search apps', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=Combobox(val , width=40,state="readonly",text=search,values=filtered)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Review',width=12,command=revv)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()
```



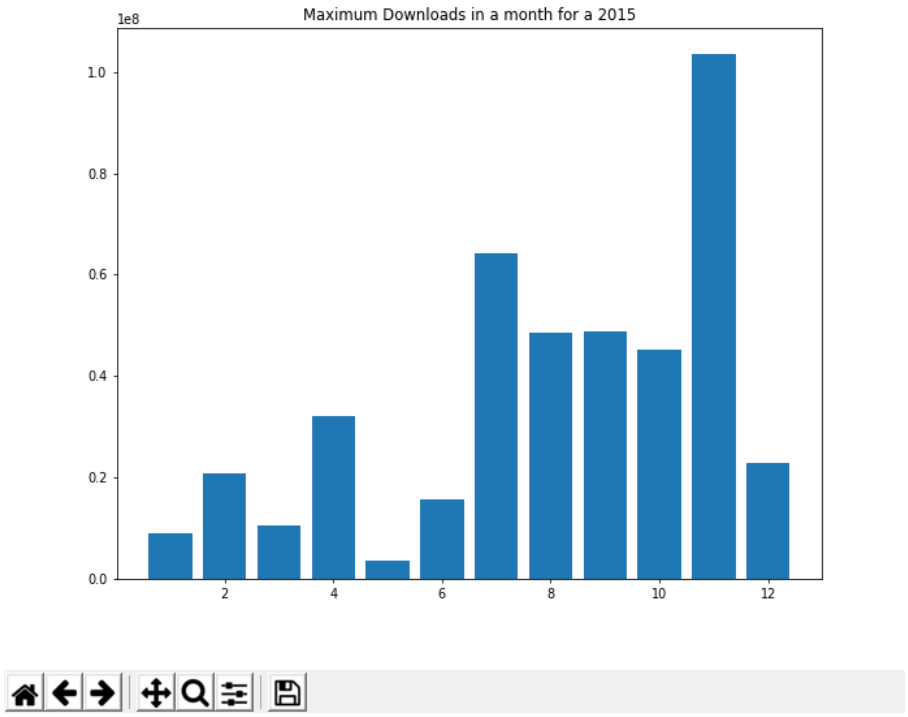


16) Which month(s) of the year , is the best indicator to the avarage downloads that an app will generate over the entire year?

Code for Question 16

```
def year():
    global root
    global cat
    global can
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    root.configure(background='Cyan') # configuring the window
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(width_value, height_value))
    mcan=Canvas(root,width=800,height=700,bg='white')

    mcan.place(x=300,y=70)

    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
    data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
    data['Installs'] = pd.to_numeric(data['Installs'])
    d = pd.DatetimeIndex(data['Last Updated'])
    data['year'] = d.year
    data['month'] = d.month
#   print(data['month'])
#   print(data['year'])
    mon={1:0,2:0,3:0,4:0,5:0,6:0,7:0,8:0,9:0,10:0,11:0,12:0}
```

```
    for i in range(len(data)):
        a=int(cat.get())
#       print(a)
#       print(data['year'][i])
        if int(data['year'][i]) == a:
            # print(data['month'][i])
            if data['month'][i] in mon:
                # print(data['month'][i])
                if mon[data['month'][i]]==0:
                    mon[data['month'][i]]=data['Installs'][i]
                    # print(data['Installs'][i])

                else:
                    mon[data['month'][i]]+=data['Installs'][i]
    x=list(mon.keys())
    y=list(mon.values())
    figure1 = plt.Figure(figsize=(10,8), dpi=70)
    axesObject = figure1.add_subplot(111)
    axesObject.bar(x,y)
    axesObject.set_title(f"Maximum Downloads in a month for a {cat.get()}")
    can= FigureCanvasTkAgg(figure1,mcan)
    can.get_tk_widget().pack( fill=BOTH, expand=True)
    toolbar = NavigationToolbar2Tk(can,mcan)
    toolbar.update()
def funct16():
    global cat
    global mcanvas
    mcanvas.delete("all")
    val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    d = pd.DatetimeIndex(data['Last Updated'])
    data['year'] = d.year
    data['month'] = d.month
    cat=StringVar()
    choices = list(data['year'].unique())
    Label(val, text='Select Year', anchor='w').grid(row=0, column=0 ,padx=5,pady=5, sticky="w")
    app=ttk.Combobox(val, width=40,state="readonly",text=cat,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=year)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()
```



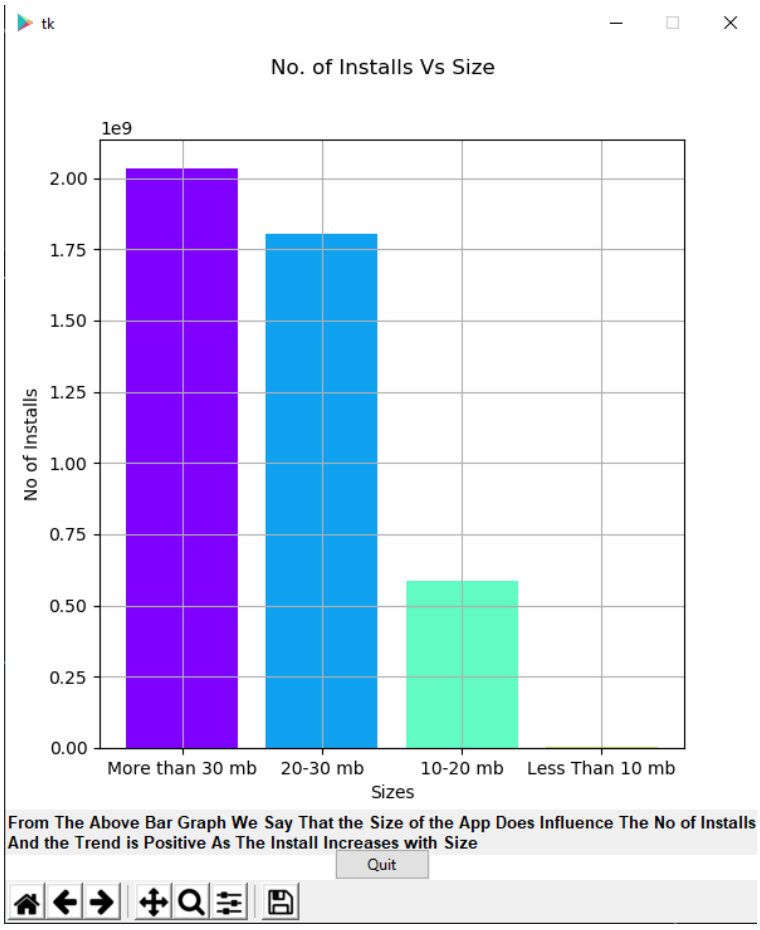
Q17) Does the size of the App influence the number of installs that it gets ? if,yes the trend is positive or negative with the increase in the app size.

Code for Question 17

```
def functq17():

    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w = 600  # width for the window size
    h = 700  # height for the window size
```

```
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the screen and where it
is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')    # configuring the window
    df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    list2=['More than 30 mb','20-30 mb','10-20 mb','Less Than 10 mb']
    df['Size'] = df['Size'].map(lambda x: x.rstrip('M'))
    df['Size'] = df['Size'].map(lambda x: str(round((float(x.rstrip('k'))/1024), 1)) if x[-1]=='k' else x)
    df['Size'] = df['Size'].map(lambda x: np.nan if x.startswith('Varies') else x)
    df['Size']=df['Size'].replace(np.NaN,-999)
    df['Size']=df['Size'].astype(float)
    #print(df['Category'].unique())

    #print(df['Size'])
    df['Installs']=df['Installs'].str.replace('+','')
    df['Installs']=df['Installs'].str.replace(',','')
    df['Installs']=df['Installs'].astype(int)
    dict1,dict2,dict3,dict4,dict5,dict6={},{},{},{},{},{}
    a,b,c,d=[],[],[],[]
    for i in range(len(df)):
        if df["Size"][i]>=30:
            a.append(df['Installs'][i])
        elif 20<=df["Size"][i]<30:
            b.append(df['Installs'][i])
        elif 10<=df["Size"][i]<20:
            c.append(df['Installs'][i])
        elif (df['Size'][i]<10):
            d.append(df['Installs'][i])
    a2=(sum(b))
    a3=(sum(c))
    a1=(sum(a))
    a4=(sum(d))


    list1=[a1,a2,a3,a4]
    print(list1)


    color = cm.rainbow(np.linspace(0, 2, 10))
    fig=Figure(figsize=(3,2),dpi=100)
    chart=fig.add_subplot(111)
    chart.bar(list2,list1,color=color)
```

```
    chart.set_ylabel("No of Installs")
    chart.set_xlabel("Sizes")
    chart.grid()
    fig.suptitle("No. of Installs Vs Size")

    canvas = FigureCanvasTkAgg(fig, screen)  # A tk.DrawingArea.

    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
    Label(screen,text="From The Above Bar Graph We Say That the Size of the App Does Influence The
No of Installs \nAnd the Trend is Positive As The Install Increases with
Size",font=("Lucida",10,'bold')).place(x=0,y=610)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()
```



Section 5: Testing

We have carried out the successful testing of our application with the main frame executing properly and all the buttons working correctly.
The graphs are displaying correctly in the canvas, we have also added a toolbar just in case a graph doesn't fit the screen.
For the Registration Form, Add Data Form and Add User Review Form are the only forms where validation has been used, where the user cannot input wrong values and the form will give an error if the user enters wrong values.
We have added validate button and save button in the Add Data Form and Add User Review Form, If the user attempted to click on the save button without clicking on the validate button there would no effect as the save button is disabled and will be enable only when the validation is correct.

Section 6: The Source Code

Mainscreen.py

```
# -*- coding: utf-8 -*-
"""
Created on Fri Jan  3 14:31:23 2020

@author: reube
"""
from functques import *
from tkinter import *
from matplotlib.backends.backend_tkagg import FigureCanvasTkAgg,
NavigationToolbar2Tk
from tkinter import PhotoImage
import functques as fn

from collections import OrderedDict
import tkinter as tk
#from adddata import *
import time
import os
global mcanvas
import pandas as pd
import numpy as np
import tkinter.messagebox as tm
from PIL import Image

import pymysql
from matplotlib.backend_bases import key_press_handler
from matplotlib.figure import Figure
import matplotlib.cm as cm
from collections import OrderedDict



#myimg=PhotoImage(file='C:\\Users\\GANDHI\\Desktop\\code\\python\\time
series\\banner_playsotre_algorithm.png')
```

```
#photocanvas.create_image(0,0,anchor=NW,image=myimg)


#w=Label(root,text="CATEGORY",width=1000,height=1,font=("Helvetica",15,'b
old'),fg='#2864ad',bg='#e3efff', borderwidth=2, relief="groove").pack()
#lcanvas=Canvas(width = 300,height=500,bg='#102131')
#lcanvas.place(x=0,y=180)


def on_key_press(event):
      print("you pressed {}".format(event.key))
      key_press_handler(event, canvas, toolbar)
def cancel():
   mcanvas.delete("all")
   head=Label(mcanvas,text="""Google  Play  Store  App  launch
Study""",width=30,height=4,font=("Lucida",30,'bold'),fg='black',bg='#102131')
   mcanvas.create_window(370, 150, window=head)
   mcanvas.update()
def _quit():
      global screen
      screen.quit()     # stops mainloop
      screen.destroy()




def saveing(x,y,z,p):
   global data
   connection = pymysql.connect(host="localhost", user="root", password="",
database="googleplaystore") # database connection
   cursor = connection.cursor()
   value=[]
   if z=='C:\\InternshipFinal\\App-data.csv':
      date1=p[0].get()
```

```
        month=p[1].get()
        year=p[2].get()
        date=month+' '+date1+','+' '+year
        print(date)
        dd=data.columns.tolist()
    elif z=='C:\\InternshipFinal\\user.csv':
        dd=sample.columns.tolist()

    for i in x:
        value.append(i.get())
    print(value)


    if z=='C:\\InternshipFinal\\App-data.csv':


        insert_query = "INSERT INTO appdata
(appname,category,rating,review,size,install,type,price,cont_rat,genres,last_u
pdated,current_version,android_version) VALUES('"+ value[0]+ "', '"+ value[1]+
"', '"+ value[2] + "', '"+ value[3] + "', '"+ value[4] + "', '"+ value[5]+ "', '"+
value[6]+ "', '"+ value[7]+ "', '"+ value[8]+ "', '"+ value[9]+ "', '"+ date+ "', '"+
value[10] + "', '"+ value[11] + "' );" # queries for inserting values
        cursor.execute(insert_query) # executing the
        connection.commit() # commiting the connection then closing it.
        connection.close() # closing the connection of the database
    else:

        insert_query = "INSERT INTO addreview
(app,trans_rev,sentiment,sent_polar,sent_subj) VALUES('"+ value[0]+ "', '"+
value[1]+ "', '"+ value[2] + "', '"+ value[3] + "', '"+ value[4] + "' );"
        cursor.execute(insert_query)
        print(insert_query)
        connection.commit() # commiting the connection then closing it.
        connection.close() # closing the connection of the database
```

```
    if z=='C:\\InternshipFinal\\App-data.csv':

        value.insert(10,date)
        #print(value)
        value[5]=str(value[5])+'+'
        value[7]='$'+str(value[7])
        #print(value)
        #print(dd)
        dp=pd.DataFrame([value],columns=dd)
        dat=data.append(dp)


    elif z=='C:\\InternshipFinal\\user.csv':

        dp=pd.DataFrame([value],columns=dd)
        dat=sample.append(dp)


    tk.messagebox.showinfo('Success','Data Successfully Written')
    dat.to_csv(z,index=False)
    y.config(state='disabled')




def check(x,z):
    d=[]
    for i in x:
        if i.get()=='':
```

```
            tk.messagebox.showwarning('Fields empty','Please provide all the
fields')
            return True
    for i in z:
        if i.get()=='':
            tk.messagebox.showwarning('Fields empty','Please provide all the
fields')
            return True

    try:
        if(isinstance(float(x[2].get()), float)):# code for checking the user entered a
valid rating in the entry field
            if(float(x[2].get())<=5 and float(x[2].get())>=0):
                d.append(False)
            else:
                tk.messagebox.showerror('Out of range','Rating should be between 0
to 5 only')
                return True
    except:
        tk.messagebox.showwarning('Wrong Value','Please provide a float value in
rating column')
        return True
    try:
        if(isinstance(int(x[3].get()), int)):
            d.append(False)
    except:
        tk.messagebox.showwarning('Wrong Value','Please provide a integer
value in Reviews')
        return True
    try:

        if(isinstance(float(x[4].get()[:-1]), float)):
            if(x[4].get()[-1]=='k' or x[4].get()[-1]=='M'):
                d.append(False)
            else:
                tk.messagebox.showerror('Size',"Size should end with 'k' or 'M'")
```

```
            return True
    except:
        tk.messagebox.showwarning('Wrong Value','Please provide a integer
value followed in size column')
        return True
    try:
        if(isinstance(float(x[5].get()), float)):
            d.append(False)
    except:
        tk.messagebox.showwarning('Wrong Value','Please provide a integer
value in Installs')
        return True
    try:
        if x[6].get()=='Free':
            if x[7].get()=='0':
                d.append(False)
            else:
                tk.messagebox.showwarning('Free app','Please enter 0 in price
column')
                return True
    except:
        print('hi')

    try:
        if(isinstance(float(x[7].get()), float)):
            d.append(False)
    except:
        tk.messagebox.showwarning('Wrong Value','Please provide a float value in
Price')
        return True


    if set(d)==False:

        return False
```

```
   tk.messagebox.showinfo('Validate Succesfully','Now click on the Save
Button')

def check1(x):
      d=[]

      for i in x:
         if i.get()=='':
            tk.messagebox.showwarning('Fields empty','Please provide all the
fields')
            return True

      try:
        if(isinstance(float(x[3].get()), float) and isinstance(float(x[4].get()),
float)):
           if x[2].get()=='Neutral':
              if float(x[3].get())==0 and 1>=float(x[4].get())>=0:
                 d.append(False)
              else:
                 tk.messagebox.showwarning('Neutral sentiment','Please provide
a 0 in Sentiment polarity and Sentiment Subjectivity.')
                 return True
           elif x[2].get()=='Positive':
              if float(x[3].get())>0 and 1>=float(x[4].get())>=0:
                 d.append(False)
              else:
                 tk.messagebox.showwarning('Positive sentiment','Please provide
a positive value in Sentiment polarity and Sentiment Subjectivity.')
                 return True
           elif x[2].get()=='Negative':
              if float(x[3].get())<0 and 1>=float(x[4].get())>=0:
                 d.append(False)
              else:
                 tk.messagebox.showwarning('Positive sentiment','Please provide
a negative value in Sentiment polarity and non negative value in Sentiment
Subjectivity.')
```

```
                return True
        except:
            tk.messagebox.showwarning('Wrong Value','Please provide a float value
in Sentiment polarity and Sentiment Subjectivity.')
            return True

        if set(d)==False:
            return False
        tk.messagebox.showinfo('Validate Succesfully','Now click on the Save
Button')

def validate2(x,y):
    global sample
    App=x[0].get()
    d=0
    ap=sample['App'].unique()
    for i in ap:
        if i.strip()==App.strip():
            msg='App named '+App+' is already present'
            tk.messagebox.showerror("Error",msg)
            d=1
    if(check1(x)):
        d=1
    if d==0:
        y.config(state='normal')

def add_rev():
    global screen,df,data,sample

    dates=[]
    sample=pd.read_csv('C:\\InternshipFinal\\user.csv')
    header2=sample.columns.tolist()
    global mcanvas

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
```

```
   mcanvas.create_window(300,250, window=val)
   txt=[]
   datecombo=[]
   month=['January', 'February', 'March',
'April','May','June','July','August','September', 'October',
'November','December']
   years=[]
   for i in range(1,32):
      dates.append(i)
   for i in range(2010,2020):
      years.append(i)

   mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
   mcanvas.create_window(300,250, window=val)
#

   txt2=[]
   for i in range(1,6):
      tk.Label(val,text=header2[i-
1],width=17,font=("Lucida",11,'italic'),fg='#ffffff',bg='#102131').grid(row=i,colu
mn=0,padx=5,pady=5)

   for i in range(1,6):
      if i!=3:
         txtfield=tk.Entry(val,bg="white")
         txt2.append(txtfield)
         txtfield.grid(row=i,column=2)
      elif i==3:

combo=ttk.Combobox(val,values=['Positive','Negative','Neutral'],state="readon
ly")
         txt2.append(combo)
         combo.grid(row=3,column=2)
```

```
btn_save1=tk.Button(val,text='Save',state="disabled",fg='#ffffff',width=10,com
mand=lambda:saveing(txt2,btn_save1,'C:\\InternshipFinal\\user.csv',''))

btn_validate1=tk.Button(val,text='Validate',width=10,fg='#ffffff',bg="#102131"
,command=lambda:validate2(txt2,btn_save1))
   btn_validate1.grid(row=7,column=2)
   btn_save1.grid(row=7,column=3)
   root.mainloop()



def validate(x,y,z):
   App=x[0].get()
   d=0
   ap=data['App']
   for i in ap:
      if i.strip()==App.strip():
         msg='App named '+App+' is already present'
         tk.messagebox.showerror("Error",msg)
         d=1
         break

   if check(x,z):

      d=1

   if d==0:
      y.config(state='normal')


def add_app_data():
   global mcanvas,screen,df,data
   dates=[]
```

```
   month=['January', 'February', 'March',
'April','May','June','July','August','September', 'October',
'November','December']
   years=[]
   for i in range(1,32):
      dates.append(i)
   for i in range(2010,2020):
      years.append(i)

   data=pd.read_csv("C:\\InternshipFinal\\App-data.csv")
   mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
   mcanvas.create_window(300,250, window=val)

   header=data.columns.tolist()
   category= list(OrderedDict.fromkeys(data['Category']))
   content=list(OrderedDict.fromkeys(data['Content Rating']))
   genre=list(OrderedDict.fromkeys(data['Genres']))



   txt=[]
   datecombo=[]
   for i in range(1,14):
      Label(val,text=header[i-
1],width=11,font=("Lucida",11,'italic'),fg='#ab3059',bg='#102131').grid(row=i,c
olumn=0,padx=2,pady=2)

   for i in range(1,14):
      if i!=2 and i!=10 and i!=9 and i!=7 and i!=11 and i!=13:
         txtfield=tk.Entry(val,bg="white")
         txt.append(txtfield)
         txtfield.grid(row=i,column=1,padx=2,pady=2)
      elif i==2:
         combo=ttk.Combobox(val,values=category)
```

```
            txt.append(combo)
            combo.grid(row=2,column=1,padx=2,pady=2)
        elif i==9:
            combo=ttk.Combobox(val,values=content,state="readonly")
            txt.append(combo)
            combo.grid(row=9,column=1,padx=2,pady=2)
        elif i==10:
            combo=ttk.Combobox(val,values=genre,state="readonly")
            txt.append(combo)
            combo.grid(row=10,column=1,padx=2,pady=2)
        elif i==7:
            combo=ttk.Combobox(val,values=['Free','Paid'],state="readonly")
            txt.append(combo)
            combo.grid(row=7,column=1,padx=2,pady=2)
        elif i==11:


combo=ttk.Combobox(val,values=dates,width=2,state="readonly").place(x=11
0,y=273)
            datecombo.append(combo)



combo=ttk.Combobox(val,values=month,width=10,state="readonly").place(x=
150,y=273)
            datecombo.append(combo)



combo=ttk.Combobox(val,values=years,width=6,state="readonly").place(x=24
0,y=273)
            datecombo.append(combo)


        elif i==13:
```

```
        combo=ttk.Combobox(val,values=list(data['Android
Ver'].unique()),state="readonly")
        txt.append(combo)

        combo.grid(row=13,column=1,padx=2,pady=2)


btn_save=tk.Button(val,text='Save',state="disabled",width=10,bg="#102131",c
ommand=lambda:saveing(txt,btn_save,'C:\\InternshipFinal\\App-
data.csv',datecombo))

btn_validate=tk.Button(val,text='Validate',width=10,bg="#102131",command=
lambda:validate(txt,btn_save,datecombo))
   btn_validate.grid(row=14,column=1)
   btn_save.grid(row=14,column=2)
   mcanvas.create_window()
   mcanvas.update()

def login_verify():
   global username_verify
   global password_verify
   connection = pymysql.connect(host="localhost", user="root", password="",
database="googleplaystore") # database connection
   cursor = connection.cursor()
   select_query =  "SELECT * FROM details where empid = '" +
username_verify.get() + "' AND password = '" + password_verify.get() + "';" #
queries for retrieving values
   print(select_query)
   cursor.execute(select_query) # executing the queries
   student_info = cursor.fetchall()
   print(student_info)
   connection.commit() # commiting the connection then closing it.
   connection.close() # closing the connection of the database
   if student_info:
      messagebox.showinfo("Congratulation", "Login Succesfull") # displaying
message for successful login
```

```
        add_app_data()# opening welcome window
    else:
        messagebox.showerror("Error", "Invalid Username or Password") #

def login():
    global mcanvas
    global username_verify
    global password_verify
    mcanvas.delete("all")

val=Label(mcanvas,width=400,height=8,font=("Lucida",30,'bold'),fg='black',bg='#102131')
    mcanvas.create_window(400,250, window=val)
    # df=
pd.read_csv("C:\\Users\\Harsh\\Desktop\\internship\\googleplaystore-App-data.csv")
    username_verify = StringVar()
    password_verify = StringVar()
    Label(val, text="Employee Login", width="400", height="2", font=("Lucida", 22, 'bold'), fg='white', bg='#102131').pack()

    Label(val, text="", bg='#102131',width='100', height='17').place(x=45, y=120) # blue background in middle of window
    Label(val, text="Please enter details below to login", bg='#102131', fg='white').pack()
    Label(val, text="", bg='#102131').pack() # for leaving a space in between
    Label(val, text="Employee ID * ", font=("Open Sans", 10, 'bold'), bg='#102131', fg='white').pack()
    Entry(val, textvar=username_verify).pack()
    Label(val, text="", bg='#102131').pack() # for leaving a space in between
    Label(val, text="Password * ", font=("Open Sans", 10, 'bold'), bg='#102131', fg='white').pack()
    Entry(val, textvar=password_verify, show="*").pack()
    Label(val, text="", bg='#102131').pack() # for leaving a space in between
    Button(val, text="LOGIN", bg="black", width=15, height=1, font=("Open Sans", 13, 'bold'), fg='white',command=login_verify).pack()
```

```
   Label(val, text="", bg='#102131').pack() # for leaving a space in between
   Button(val, text="New User? Register Here", height="2", width="30",
bg='black', font=("Open Sans", 10, 'bold'), fg='white',command=register).pack()

   mcanvas.update()


#displaying message for invalid details

def register_user():

   global mcanvas
   global fullname
   global email
   global password
   global repassword
   global phone
   global gender
   global tnc


   if fullname.get() and email.get() and password.get() and repassword.get()
and gender.get(): # checking for all empty values in entry field
      if (len(phone.get())!=10) and int(phone.get()): # checking for selection of
university
         ph_no=Label(mcanvas, text="Enter the Valid Phone Number",
fg="red",font=("Lucida", 11), width='30', anchor=W, bg='white')
         mcanvas.create_window(200,480,window=ph_no)
         return
      else:
         if tnc.get(): # checking for acceptance of agreement
            if re.match("^.+@(\[?)[a-zA-Z0-9-.]+.([a-zA-Z]{2,3}|[0-9]{1,3})(]?)$",
email.get()): # validating the email
               if password.get() == repassword.get(): # checking both password
match or not
```

```
                # if u enter in this block everything is fine just enter the values in
database
                gender_value = 'male'
                if gender.get() == 2:
                   gender_value = 'female'
                connection = pymysql.connect(host="localhost", user="root",
password="", database="googleplaystore") # database connection
                cursor = connection.cursor()
                insert_query = "INSERT INTO details (empid,fullname,email,
password, gender) VALUES('"+ phone.get() + "', '"+ fullname.get() + "', '"+
email.get() + "', '"+password.get() + "', '"+gender_value  + "' );" # queries for
inserting values
                cursor.execute(insert_query) # executing the queries
                connection.commit() # commiting the connection then closing it.
                connection.close() # closing the connection of the database
                rs=Label(mcanvas, text="Registration Sucess", fg="green",
font=("Lucida", 11), width='30', anchor=W, bg='white')

                mcanvas.create_window(200,480,window=rs)# printing
successful registration message
                pl=Button(mcanvas, text='Proceed to Login ->', width=20,
font=("Open Sans", 9, 'bold'), bg='brown', fg='white',command=login)
                mcanvas.create_window(500,480,window=pl) # button to
navigate back to login page
            else:
                ps=Label(mcanvas, text="Password does not match", fg="red",
font=("Lucida", 11), width='30', anchor=W, bg='white')
                mcanvas.create_window(200,480,window=ps)
                return
        else:
            pvi=Label(mcanvas, text="Please enter valid email id", fg="red",
font=("Lucida", 11), width='30', anchor=W, bg='white')
            mcanvas.create_window(200,480,window=pvi)
            return
    else:
```

```
            pat=Label(mcanvas, text="Please accept the agreement", fg="red",
font=("Lucida", 11), width='30', anchor=W, bg='white')
            mcanvas.create_window(200,480,window=pat)
            return
    else:
        pfi=Label(mcanvas, text="Please fill all the details",
fg="red",font=("Lucida", 11), width='30', anchor=W, bg='white')
        mcanvas.create_window(200,480,window=pfi)
        return
    mcanvas.update()

def register():

    global mcanvas
    global fullname
    global email
    global password
    global repassword
    global phone
    global gender
    global tnc
    global mcanvas




    mcanvas.delete("all")

val=Label(mcanvas,width=400,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(400,250, window=val)
    fullname = StringVar()
    email = StringVar()
    password = StringVar()
    repassword = StringVar()
    phone= StringVar()
```

```
    gender = IntVar()
    tnc = IntVar()
     # configuring the window
    Label(val, text="Registration Form", width='32', height="2", font=("Lucida",
22, 'bold'), fg='white', bg='#102131').pack()
    Label(val, text="", bg='#102131', width='100', height='20').place(x=45,
y=120)
    Label(val, text="Full Name:", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    Entry(val, textvar=fullname).pack()
    Label(val, text="Email ID:", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    Entry(val, textvar=email).pack()
    Label(val, text="Gender:", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    Radiobutton(val, text="Male", variable=gender, value=1,
bg='#102131').pack()
    Radiobutton(val, text="Female", variable=gender, value=2,
bg='#102131').pack()
    Label(val, text="Employee ID :", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    Entry(val, textvar=phone).pack()
    phone.set('Enter Phone Number')
    # droplist = OptionMenu(val, university, *list1)
    # droplist.config(width=17)
    # university.set('--select your university--')
    # droplist.pack()
    Label(val, text="Password:", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    Entry(val, textvar=password, show="*").pack()
    Label(val, text="Re-Password:", font=("Open Sans", 11, 'bold'), fg='white',
bg='#102131', anchor=W).pack()
    entry_4 = Entry(val, textvar=repassword, show="*")
    entry_4.pack()
    Checkbutton(val, text="I accept all terms and conditions", variable=tnc,
bg='#102131', font=("Open Sans", 9, 'bold'), fg='brown').pack()
```

```
   Button(val, text='Submit', width=20, font=("Open Sans", 13, 'bold'),
bg='black', fg='white',command=register_user).pack()
   mcanvas.update()
"""THE END OF ADDING DATA FORMS AND LOGIN AND REGISTRATION FORM
"""

""" QUESTION 16 CODE"""
def year():
   global root
   global cat
   global can
   root = Tk()
   root.title("Insight of Google App's")
   width_value=root.winfo_screenwidth()
   root.configure(background='Cyan') # configuring the window
   height_value=root.winfo_screenheight()
   root.geometry("%dx%d+0+0"%(width_value, height_value))
   mcan=Canvas(root,width=800,height=700,bg='white')

   mcan.place(x=300,y=70)

   data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
   data=data.replace(np.nan,'Not Available')
   data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
   data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
   data['Installs'] = pd.to_numeric(data['Installs'])
   d = pd.DatetimeIndex(data['Last Updated'])
   data['year'] = d.year
   data['month'] = d.month
#    print(data['month'])
#    print(data['year'])
   mon={1:0,2:0,3:0,4:0,5:0,6:0,7:0,8:0,9:0,10:0,11:0,12:0}
   for i in range(len(data)):
      a=int(cat.get())
#       print(a)
#       print(data['year'][i])
```

```
        if int(data['year'][i]) == a:
            # print(data['month'][i])
            if data['month'][i] in mon:
                # print(data['month'][i])
                if mon[data['month'][i]]==0:
                    mon[data['month'][i]]=data['Installs'][i]
                    # print(data['Installs'][i])

                else:
                    mon[data['month'][i]]+=data['Installs'][i]
    x=list(mon.keys())
    y=list(mon.values())
    figure1 = plt.Figure(figsize=(10,8), dpi=70)
    axesObject = figure1.add_subplot(111)
    axesObject.bar(x,y)
    axesObject.set_title(f"Maximum Downloads in a month for a {cat.get()}")
    can= FigureCanvasTkAgg(figure1,mcan)
    can.get_tk_widget().pack( fill=BOTH, expand=True)
    toolbar = NavigationToolbar2Tk(can,mcan)
    toolbar.update()
def funct16():
    global cat
    global mcanvas
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    d = pd.DatetimeIndex(data['Last Updated'])
    data['year'] = d.year
    data['month'] = d.month
    cat=StringVar()
    choices = list(data['year'].unique())
```

```
    Label(val, text='Select Year', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=ttk.Combobox(val, width=40,state="readonly",text=cat,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=year)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()


""" QUESTION 10 CODE"""
def mont():

    global root
    global cat
    global can
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    root.configure(background='Cyan') # configuring the window
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(width_value, height_value))
    mcan=Canvas(root,width=800,height=700,bg='white')

    mcan.place(x=300,y=70)
    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
    data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
    data['Installs'] = pd.to_numeric(data['Installs'])
    d = pd.DatetimeIndex(data['Last Updated'])
    data['year'] = d.year
    data['month'] = d.month
    mon={1:0,2:0,3:0,4:0,5:0,6:0,7:0,8:0,9:0,10:0,11:0,12:0}
    for i in range(len(data)):
```

```
        if data['Category'][i]== cat.get():
            if data['month'][i] in mon:
                if mon[data['month'][i]]==0:
                    mon[data['month'][i]]=data['Installs'][i]
                else:
                    mon[data['month'][i]]+=data['Installs'][i]
    x=list(mon.keys())
    y=list(mon.values())
    figure1 = plt.Figure(figsize=(10,8), dpi=70)
    axesObject = figure1.add_subplot(111)
    axesObject.bar(x,y)
    axesObject.set_title(f"Maximum Downloads in a month for a {cat.get()}")
    can= FigureCanvasTkAgg(figure1,mcan)
    can.get_tk_widget().pack( fill=BOTH, expand=True)
    toolbar = NavigationToolbar2Tk(can,mcan)
    toolbar.update()

def funct10():
    global cat
    global mcanvas
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\App-data.csv')
    data=data.replace(np.nan,'Not Available')
    cat=StringVar()
    choices = list(data['Category'].unique())
    Label(val, text='Select Category', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=ttk.Combobox(val, width=40,state="readonly",text=cat,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=mont)
    r.grid(row=0, column=3 ,padx=5,pady=5)
```

```
    mcanvas.create_window()
    mcanvas.update()

"""Question 12"""

def sentim():
    global senti
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(width_value, height_value))
    root.configure(background='Cyan')
    big_frame = Frame(root)
    big_frame.pack()
    canvas=[]
    for i in range(1):
        can=Canvas(big_frame,width=320,height=600,bg='white')
        canvas.append(can)
        can.grid(row=1,column=i)
    scroll1=Scrollbar(canvas[0])



    positive=Listbox(canvas[0],yscrollcommand =
scroll1.set,height=35,width=45,bg='light green')

    scroll1.pack(side = 'right', fill = 'both')

    positive.pack(side = 'left', fill = 'both')

    updated_app={}
```

```
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    app={}




    if senti.get()=='--select--' :
        root.destroy()


    for i in data['App']:
        app.update({i:0})



    for i in range(len(data)):
        if (data['App'][i] in app) and data['Sentiment'][i]==senti.get():
            if app[data['App'][i]]==0:
                app[data['App'][i]]=1
            else:
                app[data['App'][i]]+=1




    for key, value in sorted(app.items(), key=lambda item:
item[1],reverse=True):
        updated_app.update({key:value})
    if senti.get()!='Same Ratio':
        for i in updated_app:
            positive.insert(END,i,updated_app[i])
```

```
    if senti.get()=='Same Ratio':
        app={}
        for i in data['App']:
            app.update({i:[0,0]})
    #       print(app)
        for i in range(len(data)):
            if (data['App'][i] in app) and data['Sentiment'][i]=='Positive':
                if (app[data['App'][i]][0]) == 0:
                    app[data['App'][i]][0]=1
                else:
                    app[data['App'][i]][0]+=1
        for i in range(len(data)):
            if (data['App'][i] in app) and data['Sentiment'][i]=='Negative':
                if (app[data['App'][i]][1])==0:
                    app[data['App'][i]][1]=1
                else:
                    app[data['App'][i]][1]+=1
        same={}
        for i in app:
                if app[i][0]==0 or app[i][1]==0:
                    continue
                elif 0.75<float((app[i][0]/app[i][1]))<1.25:
                    if (1-app[i][0]/app[i][1])<0:
                        a=(1-app[i][0]/app[i][1])*(-1)
                    else:
                        a=(1-app[i][0]/app[i][1])
                    same.update({i:a})
        for i in same:
            positive.insert(END,i)

def twelve():
    global senti
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
```

```
    mcanvas.create_window(300,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    senti=StringVar()
    choices=['Positive','Negative','Same Ratio']
    Label(val, text='Select Sentiment', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=Combobox(val , width=40,state="readonly",text=senti,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Search',width=12,command=sentim)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()

"""Question 14 And Question 15"""
def revv():
    global root
    global search
    global big_frame
    global filtered
    global appli
    global list_of_apps_most_positive_sentiments
    global list_of_apps_most_negative_sentiments
    global list_of_apps_most_average_sentiments
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(1300,700))
    root.configure(background='Cyan')
    big_frame = Frame(root)
    big_frame.pack()
    l=Label(big_frame,text='Positive',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=1 ,padx=5,pady=5)
```

```
    l=Label(big_frame,text='Neutral',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=2 ,padx=5,pady=5)
    l=Label(big_frame,text='Negative',width=15,anchor=CENTER)
    l.config(font=("Lucida", 16,'bold'))
    l.grid(row=0, column=3 ,padx=5,pady=5)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
#     print(data)
    data=data.replace(np.nan,'Not Available')
    x = search.get()
    print(appli[filtered.index(search.get())])
    list_of_apps_most_positive_sentiments = []
    list_of_apps_most_negative_sentiments = []
    list_of_apps_most_average_sentiments = []
    list_of_apps_most_zero_sentiments = []


    list_of_apps_most_positive_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Positive')].Translated_Review).tolist()
#     print(list_of_apps_most_positive_sentiments)
    list_of_apps_most_negative_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Negative')].Translated_Review).tolist()
#     print(list_of_apps_most_negative_sentiments)
    list_of_apps_most_average_sentiments = (data[(data.App ==
appli[filtered.index(search.get())]) & (data.Sentiment ==
'Neutral')].Translated_Review).tolist()
#     print(list_of_apps_most_average_sentiments )

    canvas=[]
    for i in range(4):
        can=Canvas(big_frame,width=320,height=600,bg='#003b6b')
        canvas.append(can)
        can.grid(row=1,column=i)
    scroll1=Scrollbar(canvas[1])
```

```
    scroll2=Scrollbar(canvas[3])

    scroll3=Scrollbar(canvas[2])
    positive=Listbox(canvas[1],yscrollcommand =
scroll1.set,height=35,width=45,bg='light green')
    negative=Listbox(canvas[3],yscrollcommand =
scroll2.set,height=35,width=43,bg='white')
    neutral=Listbox(canvas[2],yscrollcommand =
scroll3.set,height=35,width=45,bg='#ffcccb')
    scroll1.pack(side = 'right', fill = 'both')
    scroll2.pack(side = 'right', fill = 'both')
    scroll3.pack(side = 'right', fill = 'both')
    positive.pack(side = 'left', fill = 'both')
    negative.pack( side = 'left', fill = 'both' )
    neutral.pack( side = 'left', fill = 'both' )
    for i in list_of_apps_most_positive_sentiments:
        positive.insert(END,i)
    for i in list_of_apps_most_average_sentiments:
        neutral.insert(END,i)
    for i in list_of_apps_most_negative_sentiments:
        negative.insert(END,i)

    if
(len(list_of_apps_most_positive_sentiments)>len(list_of_apps_most_negative
_sentiments)) and
(len(list_of_apps_most_positive_sentiments)>len(list_of_apps_most_average_
sentiments)):
        Label(canvas[0],text='User liked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()
    elif
(len(list_of_apps_most_negative_sentiments)>len(list_of_apps_most_average
_sentiments)):
        Label(canvas[0],text='User disliked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()
    else:
```

```
        Label(canvas[0],text='User neither liked nor disliked this
app',width=25,anchor=CENTER,font=("Helvetica",15,'bold','italic')).pack()

def fourteen():
    global search
    global mcanvas
    global filtered
    global appli
    mcanvas.delete("all")

val=Label(mcanvas,width=600,height=8,font=("Lucida",30,'bold'),fg='black',bg=
'#102131')
    mcanvas.create_window(400,250, window=val)
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    appli=list(OrderedDict.fromkeys(data['App']))



    filtered=[]
    for i in appli:
        filtered.append(i[0:10])
#     print(canvas)
    search=StringVar()
    Label(val, text='Search apps', anchor='w').grid(row=0, column=0
,padx=5,pady=5, sticky="w")
    app=Combobox(val , width=40,state="readonly",text=search,values=filtered)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(val,text='Review',width=12,command=revv)
    r.grid(row=0, column=3 ,padx=5,pady=5)
    mcanvas.create_window()
    mcanvas.update()

"""TO UPDATE CATEGORIES INSTALL Q8 part 2"""
def Update_cat():
```

```
    df = pd.DataFrame()
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    # dict1={}
    # dict1=pd.value_counts(df['Category'])


    list1={}
    print(list1)


    df['Installs']=df['Installs'].str.replace('+','')
    df['Installs']=df['Installs'].str.replace(',','')
    df['Installs']=df['Installs'].astype(int)
    # print(sum(df['Installs']))
    category ={}
    sum1=[]
    for i in df['Category']:
        category.update({i:0})


    for i in category.keys():
            t2 = (df[i==(df.Category)].Installs).tolist()
            sum1.append(sum(t2))
            category.update({i:sum(t2)})
#    print(category)
    list1=list(category.values())
    print(list1)
    list2=list(category.keys())
    print(list2)
    connection = pymysql.connect(host="localhost", user="root", password="",
database="googleplaystore") # database connection
    cursor = connection.cursor()
    cursor.execute("TRUNCATE TABLE catupdate")
```

```
    for i in range(len(list2)):
        insert_query = "INSERT INTO catupdate (Categories,Downloads)
VALUES('"+ list2[i] + "', '"+ str(list1[i]) + "' );" # queries for inserting values
        cursor.execute(insert_query) # executing the queries
    connection.commit() # commiting the connection then closing it.
    connection.close()
    tk.messagebox.showinfo('Updated',"The Number Of Installs Have Been
Updated")

"""Question 12th"""

def sent():
    global root
    global can
    global senti
    global updated_app
    global scroll1
    global positive
    canvas=[]
    for i in range(1):
            can=tk.Canvas(big_frame,width=320,height=600,bg='white')
            canvas.append(can)
            can.grid(row=1,column=i)
    scroll1=Scrollbar(canvas[0])



    positive=Listbox(canvas[0],yscrollcommand =
scroll1.set,height=35,width=45,bg='light green')

    scroll1.pack(side = 'right', fill = 'both')

    positive.pack(side = 'left', fill = 'both')

    updated_app={}
```

```
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    app={}




    if senti.get()=='--select--' :
        root.destroy()


    for i in data['App']:
        app.update({i:0})



    for i in range(len(data)):
        if (data['App'][i] in app) and data['Sentiment'][i]==senti.get():
            if app[data['App'][i]]==0:
                app[data['App'][i]]=1
            else:
                app[data['App'][i]]+=1




    for key, value in sorted(app.items(), key=lambda item:
item[1],reverse=True):
        updated_app.update({key:value})
    if senti.get()!='Same Ratio':
        for i in updated_app:
            positive.insert(END,i,updated_app[i])
```

```
if senti.get()=='Same Ratio':
    app={}
    for i in data['App']:
      app.update({i:[0,0]})
#       print(app)
    for i in range(len(data)):
        if (data['App'][i] in app) and data['Sentiment'][i]=='Positive':
            if (app[data['App'][i]][0]) == 0:
                app[data['App'][i]][0]=1
            else:
                app[data['App'][i]][0]+=1
    for i in range(len(data)):
        if (data['App'][i] in app) and data['Sentiment'][i]=='Negative':
            if (app[data['App'][i]][1])==0:
                app[data['App'][i]][1]=1
            else:
                app[data['App'][i]][1]+=1
    same={}
    for i in app:
            if app[i][0]==0 or app[i][1]==0:
                continue
            elif 0.75<float((app[i][0]/app[i][1]))<1.25:
                if (1-app[i][0]/app[i][1])<0:
                    a=(1-app[i][0]/app[i][1])*(-1)
                else:
                   a=(1-app[i][0]/app[i][1])
                same.update({i:a})
    for i in same:
        positive.insert(END,i)
```

```
def Question12():
    global root
    global senti
    global big_frame
    global updated_app
    global can
    global scroll1
    global positive
    root = Tk()
    root.title("Insight of Google App's")
    width_value=root.winfo_screenwidth()
    root.configure(background='Cyan') # configuring the window
    height_value=root.winfo_screenheight()
    root.geometry("%dx%d+0+0"%(900,900))
    mainframe = Frame(root)
    mainframe.pack()
    big_frame = Frame(root)
    big_frame.pack()
    data=pd.read_csv('C:\\InternshipFinal\\user.csv')
    data=data.replace(np.nan,'Not Available')
    senti=StringVar()
    choices=['Positive','Negative','Same Ratio']
    Label(mainframe, text='Select Sentiment', anchor='w').grid(row=0,
column=0 ,padx=5,pady=5, sticky="w")
    app=Combobox(mainframe ,
width=40,state="readonly",text=senti,values=choices)
    app.grid(row=0, column=1 ,padx=5,pady=5, sticky="w")
    app.set("--select--")
    r=Button(mainframe,text='Search',width=12,command=sent)
    r.grid(row=0, column=3 ,padx=5,pady=5)
```

```
    # negative=Listbox(canvas[0],yscrollcommand =
scroll1.set,height=35,width=43,bg='white')
    # neutral=Listbox(canvas[0],yscrollcommand =
scroll1.set,height=35,width=45,bg='#ffcccb')



    root.mainloop()

"""THE MAIN SCREEN GUI  """
def category():
   global mcanvas

   mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q1 = Button(mcanvas,text = "The percentage download in each category in
the
playstore.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',c
ommand=fn.functq1)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 120, window=q1)

   q3 = Button(mcanvas,text = """Which category of apps have managed to get
the most,
            least and an average of 2,50,000 downloads
atleast.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',co
mmand=fn.functq3)
#    q4.bind("<Button-1>", function_q4)
#    q4.place(x=40,y=120)
   mcanvas.create_window(375,200, window=q3)



   q0 = Button(mcanvas,text = "The percentage of Apps in  each category in the
playstore
.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=
fn.functq0)
```

```
#    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,280, window=q0)

   q6 = Button(mcanvas,text = """For the years 2016,2017,2018 what are the
category of apps that have got the
            most and the least
downloads""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black
',command=fn.functq6)
   #    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,380, window=q6)

   b=Button(mcanvas,
text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nextc1)
   mcanvas.create_window(700,475, window=b)
   mcanvas.update()
def nextc1():
   global mcanvas

   mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q8 = Button(mcanvas,text = """Amongst Sports,
Entertainment,social,News,Events,Travel and Game,
            which is the category of app that is most likely to be
downloaded""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='bla
ck',command=fn.functq8)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 120, window=q8)
   b=Button(mcanvas,
text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=categ
ory)
   mcanvas.create_window(700,475, window=b)

   mcanvas.update()

def install():
```

```
   global mcanvas
   mcanvas.delete("all")
   #    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q2 = Button(mcanvas,text = """Number of apps that have managed to get
the following number of downloads
a) Between 10,000 and 50,000
b) Between 50,000 and 150000
c) Between 150000 and 500000
d) Between 500000 and 5000000
e) More than
5000000""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black',c
ommand=fn.functq2)
   #    q3.bind("<Button-1>", function_q3)
#    q3.place(x=40,y=120)
   mcanvas.create_window(375,120, window=q2)

   q5 = Button(mcanvas,text = """What is the number of installs for the
following app sizes.
a) Size between 10 and 20 mb
b) Size between 20 and 30 mb
c) More than 30
mb""",width=90,height=6,font=("Lucida",10,'bold'),fg='#ffffff',bg='black',comm
and=fn.functq5)
   #    q4.bind("<Button-1>", function_q4)
#    q4.place(x=40,y=200)
   mcanvas.create_window(375,240, window=q5)


   q10_1 = Button(mcanvas,text = "Month with maximum downloads for each
of the
category.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',co
mmand=funct10)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 420, window=q10_1)
   b=Button(mcanvas,
text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nexti1)
```

```
    mcanvas.create_window(700,475, window=b)



    mcanvas.update()
def nexti1():
    global mcanvas

    mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
    q10_2 = Button(mcanvas,text = "Ratio of downloads for the app that
qualifies as teen vs
mature17+",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',
command=fn.functq10_2)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 120, window=q10_2)

    q11 = Button(mcanvas,text = "Which quarter of which year has generated
the highest number of install for each app
used",width=78,height=2,font=("Lucida",12,'bold'),fg='#ffffff',bg='black',comm
and=fn.question11)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 200, window=q11)
    b=Button(mcanvas,
text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=instal
l)
    mcanvas.create_window(700,475, window=b)



    mcanvas.update()
def rrev():
    global mcanvas

    mcanvas.delete("all")
    q12 = Button(mcanvas,text = """Which app has manage to generate the
most positive, negative
```

```
            sentiments and generated approximately the same
ratio""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',com
mand=twelve)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 120, window=q12)

   q13 = Button(mcanvas,text = """the relation between the sentiment-polarity
and sentiment-subjective,
            the sentiment subjectivity for a sentiment polarity of
0.4""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',comm
and=fn.function_q13)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 200, window=q13)
#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q14_15 = Button(mcanvas,text = """Positive, negative and neutral reviews of
an app,
            does the user like these

app""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',com
mand=fourteen)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 280, window=q14_15)

   mcanvas.update()
def app():
   global mcanvas

   mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
   q7 = Button(mcanvas,text = """All those apps,whose android version is not
an issue and can
            work with varying
devices.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',c
ommand=fn.functq7)
#    q3.bind("<Button-1>", function_q3)
```

```
   mcanvas.create_window(375, 100, window=q7)

   q7_2 = Button(mcanvas,text = "What is the percentage increase or decrease
in the
downloads.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',
command=fn.functq7_2)
#    q3.bind("<Button-1>", function_q3)
   mcanvas.create_window(375, 180, window=q7_2)

   q4 = Button(mcanvas,text = "The apps that managed to get the highest
maximum rating from the
user.",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',comm
and=fn.functq4)
#    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,260, window=q4)
   q9 = Button(mcanvas,text = """App managed to get get over 1,00,000
downloads,
            and managed to get an average rating of 4.1 and
above.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',co
mmand=fn.functq9)
#    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,340, window=q9)
   q16 = Button(mcanvas,text = """Which month of the year, is the best
indicator to the average
             downloads that an app will generate over the entire year
.""",width=70,height=2,font=("Lucida",13,'bold'),fg='#ffffff',bg='black',comman
d=funct16)
#    q5.bind("<Button-1>", function_q5)
   mcanvas.create_window(375,420, window=q16)
   b=Button(mcanvas,
text="Next",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=nexta1)
   mcanvas.create_window(700,475, window=b)

   mcanvas.update()
def nexta1():
   global mcanvas
```

```
    mcanvas.delete("all")

#    q=mcanvas.create_rectangle(40,40,500,80,fill='black')
    q17 = Button(mcanvas,text = "Does the size of the app influence the number
of install that it
get?",width=78,height=2,font=("Lucida",12,'bold'),fg='#ffffff',bg='black',comma
nd=fn.functq17)
#    q3.bind("<Button-1>", function_q3)
    mcanvas.create_window(375, 200, window=q17)
    b=Button(mcanvas,
text="Previous",font=("Lucida",13,'bold'),fg='#ffffff',bg='black',command=app)
    mcanvas.create_window(700,475, window=b)


    mcanvas.update()


#=============================================main
screen=====================================================
root=Tk()
root.title("Insight of Google App's")
width_value=root.winfo_screenwidth()
height_value=root.winfo_screenheight()
root.geometry("%dx%d+250+100"%(1360,720))
root.configure(background='#102131')
root.iconbitmap(r"C:\\InternshipFinal\\google.ico")
#================================top
canvas=============================================================
========
photocanvas=Canvas(root,width =1355,height=177,bg='#102131')
photocanvas.place(x=0,y=0)
myimg=PhotoImage(file="C:\\InternshipFinal\\predictive_analytics_banner.pn
g")
photocanvas.create_image(0,0,anchor=NW,image=myimg)
photocanvas.image =myimg
```

```
#==============================================main canvas
============================
mcanvas=Canvas(width = 760,height=500,bg='#102131',bd='0')
mcanvas.place(x=300,y=180)
head=Label(mcanvas,text="Google \nPlayStore \n App launch
\nStudy",width=30,font=("Lucida",50,'bold'),fg='#ffffff',bg='#102131')
mcanvas.create_window(400, 200, window=head)
#=================================================options====
==========================================
lbl_over = Button(root,text = "Add
Data",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',com
mand=add_app_data)
#lbl_over.bind("<Button-1>")
lbl_over.place(x=8,y=220)

lbl_category = Button(root,text =
"Category",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',
command=category)
#lbl_category.bind("<Button-1>")
lbl_category.place(x=8,y=220+60)

lbl_Installs = Button(root,text =
"Installs",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',co
mmand=install)
#lbl_Installs.bind("<Button-1>")
lbl_Installs.place(x=8,y=220+60+60)

lbl_searchapp = Button(root,text = "Search
App",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',comm
and=fn.searchapp)
#lbl_searchapp.bind("<Button-1>")
lbl_searchapp.place(x=8,y=220+60+120)
```

```
lbl_machine = Button(root,text = "App
Info",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',comm
and=app)
lbl_machine.bind("<Button-1>")
lbl_machine.place(x=8,y=220+60+120+60)

lbl_review = Button(root,text =
"Reviews",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',c
ommand=rrev)
#lbl_review.bind("<Button-1>")
lbl_review.place(x=8,y=220+60+120+120)

lbl_lastupdate = Button(root,text = "Add
Reviews",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',co
mmand=add_rev)
lbl_lastupdate.bind("<Button-1>")
lbl_lastupdate.place(x=8,y=220+60+120+180)
#====================================right
canvas============================
rcanvas=Canvas(width = 295,height=500,bg='#102131')
rcanvas.place(x=1060,y=180)
Button(rcanvas,text = "Update The Installs\n Per
Category",width=25,height='2',font=("Lucida",13,'italic'),fg='#ffffff',bg='black',c
ommand=Update_cat).place(x=35,y=220)
#====================================bottom
canvas============================
bottom=Canvas(width = 1190,height=500,bg='#102131')
bottom.place(x=0,y=682)
ball=bottom.create_oval(4,4,30,30,fill='#ffffff')

#================================================group
name=========================================
name=Label(root,text="Ctrl+Alt+Del",width=15,height=1,font=("Helvetica",15,'
bold','italic'),fg='#ffffff',bg='#102131')
name.place(x=1190,y=682)
```

```
root.mainloop()
```

Funcques.py

```
# -*- coding: utf-8 -*-
"""
Created on Fri Jan  3 14:34:15 2020

@author: reube
"""

# -*- coding: utf-8 -*-
"""
Created on Mon Dec 23 19:39:12 2019

@author: GANDHI
"""

import tkinter as tk
from tkinter import *
from tkinter.ttk import *
import pandas as pd
import operator
import matplotlib.pyplot as plt
import numpy as np
from matplotlib.backends.backend_tkagg import (FigureCanvasTkAgg,
NavigationToolbar2Tk)
from matplotlib.backend_bases import key_press_handler
from matplotlib.figure import Figure
import matplotlib.cm as cm
from collections import OrderedDict
```

```
global screen
def adjustWindow(window):
    w = 600  # width for the window size
    h = 600  # height for the window size
    ws = window.winfo_screenwidth()  # width of the screen
    hs = window.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    window.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of
the screen and where it is placed
    window.resizable(False, False)    # disabling the resize option for the window
    window.configure(background='white')    # making the background white of
the window
def _quit():
        global screen
        screen.quit()     # stops mainloop
        screen.destroy()
def on_key_press(event):
        print("you pressed {}".format(event.key))
        key_press_handler(event, canvas, toolbar)




def functq0():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
#    big_frame = Frame(screen,bg='white',width='1010',height=450,bd=4)
#    big_frame.place(x=10,y=60)
    screen.title("percentage of category")  # mentioning title of the window
    w = 1000 # width for the window size
```

```
    h = 700  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')   # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,-1)
    catcount={}
    for index in range(len(df)):
        if df['Category'][index]==-1:
            continue

        if df['Category'][index] in catcount:
            catcount[df['Category'][index]]+=1
        else:
            catcount[df['Category'][index]]=1

    figure1 = plt.Figure(figsize=(14,9), dpi=70)

    # color = cm.rainbow(np.linspace(0, 1, len(x_label)))
    #fig1, ax1 = plt.subplots()
    axesObject = figure1.add_subplot(111)
    labels = ['{0} '.format(i,j) for i,j in zip(catcount.keys(),catcount.values())]

    theme = plt.get_cmap('hsv')
    axesObject.set_prop_cycle("color", [theme(1. * i / len(catcount))for i in
range(len(catcount))])
    axesObject.pie(catcount.values(),autopct='%1.2f ',startangle=90)
    axesObject.set_title("Percentage Download in Each Category")
    #ax3.xlim(0,3.0)
    figure1.legend(labels,bbox_to_anchor=(0.3,1))
```

```
    canvas = FigureCanvasTkAgg(figure1, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()
def functq1():

    global screen
    screen = Tk()

    big_frame = Frame(screen,width='1010',height=750)
    big_frame.place(x=10,y=60)
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")

    w=1000
    h=900
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    screen.configure(background='white')


    df = pd.DataFrame()
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    # dict1={}
    # dict1=pd.value_counts(df['Category'])
```

```
list1={}
print(list1)


df['Installs']=df['Installs'].str.replace('+','')
df['Installs']=df['Installs'].str.replace(',','')
df['Installs']=df['Installs'].astype(int)
# print(sum(df['Installs']))
category ={}
sum1=[]
for i in df['Category']:
   category.update({i:0})


for i in category.keys():
      t2 = (df[i==(df.Category)].Installs).tolist()
      sum1.append(sum(t2))
      category.update({i:float(((sum(t2))/(sum(df['Installs'])))*100)})
print(category)
list1=list(category.values())
# print(list1)

figure1 = plt.Figure(figsize=(14,9), dpi=70)

# color = cm.rainbow(np.linspace(0, 1, len(x_label)))
#fig1, ax1 = plt.subplots()
axesObject = figure1.add_subplot(111)
labels = ['{0} = {1:1.2f} % '.format(i,j) for i,j in
zip(category.keys(),category.values())]

theme = plt.get_cmap('hsv')
axesObject.set_prop_cycle("color", [theme(1. * i / len(list1))for i in
range(len(list1))])
axesObject.pie(list1,autopct='%1.2f ',startangle=90)
```

```
    axesObject.set_title("Percentage Apps in Each Category")
    #ax3.xlim(0,3.0)


    canvas = FigureCanvasTkAgg(figure1,big_frame)
    canvas.draw()
    canvas.get_tk_widget().pack( fill=BOTH, expand=True)
    toolbar = NavigationToolbar2Tk(canvas,big_frame)
    toolbar.update()
    canvas._tkcanvas.pack( fill=BOTH, expand=True)
    figure1.legend(labels,bbox_to_anchor=(0.3,1))
    string="""From The Above Pie Chart,
     We get the percentage Apps in Each Category """

Label(screen,text=string,font=("Calibri",13,'italic'),fg='#102131',bg='white').pla
ce(x=500,y=560)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    # figureObject, axesObject = plt.subplots(figsize=(10,10))

     # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    screen.mainloop()
def functq2():
     # initializing the tkinter window
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,-1)
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    df['Installs'] = pd.to_numeric(df['Installs'])
    list2=["More than 5M","500k-5M","150k-500k","50k-150k","10k-50k"]
```

```
    dict1,dict2,dict3,dict4,dict5={},{},{},{},{}
#   dict6={}
    dict1=(pd.value_counts(df['Installs']>=5000000))
    a1=len(df)-dict1.values[0]
    dict2=(pd.value_counts((df["Installs"]>=500000) & (df["Installs"]<5000000)))
    a2=len(df)-dict2.values[0]
    dict3=(pd.value_counts((df["Installs"]>=150000) & (df["Installs"]<500000)))
    a3=len(df)-dict3.values[0]
    dict4=(pd.value_counts((df["Installs"]>=50000) & (df["Installs"]<150000)))
    a4=len(df)-dict4.values[0]
    dict5=(pd.value_counts((df["Installs"]>=10000) & (df["Installs"]<50000)))
    a5=len(df)-dict5.values[0]
#   dict6=pd.value_counts(df["Installs"]<10000)
#   a6=len(df)-dict6.values[0]
    list1=[a1,a2,a3,a4,a5]
    color = cm.rainbow(np.linspace(0, 2, 10))
    fig=Figure(figsize=(5,4),dpi=100)
    chart=fig.add_subplot(111)
    chart.bar(list2,list1,color=color)
    chart.set_ylabel("Frequency")
    chart.set_xlabel("Installs")
    chart.grid()
    fig.suptitle("Count-plot for Installs")
    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate

    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
```

```
    screen.mainloop()
#def on_key_press(event):
#    print("you pressed {}".format(event.key))
#    key_press_handler(event, canvas, toolbar)
#
#canvas.mpl_connect("key_press_event", on_key_press)
def functq3():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")
    w = 600  # width for the window size
    h = 600  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    df['Installs'] = pd.to_numeric(df['Installs'])
    category=df['Category'].unique()
    list1=df['Installs']
    ans=[]
    count = []

    for i in category:
        total=0
        c=0
        for j in range(len(df['Category'])):
            if df['Category'][j]==i:
```

```
                total=total+list1[j]
                c+=1
    #   print(total)
        ans.append(total)
        count.append(c)
    #print(ans)
#    print(count)
    cat,avg = [],[]
    for index in range(len(ans)):
        cat.append(category[index])
        avg.append(round(ans[index]/count[index]))
  # print(avg)
  #  print(cat)
    lowest = []
    for index in range(len(avg)):
        if avg[index]<250000:
            lowest.append(category[index])

#    print(lowest)
    label = category
#    print(label)
    val = avg
    color = cm.rainbow(np.linspace(0, 1, len(label)))
    fig=Figure(figsize=(8,5),dpi=60)
    chart=fig.add_subplot(111)
    chart.barh(label,val,color=color)
    chart.set_ylabel("Category")
    chart.set_xlabel("Average Installs")
    chart.grid()
    fig.suptitle("Category with Their Average Download")

    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
```

```
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()


def functq4():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Rating Vs Category ")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    category ={}
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
    catreview = {}
    for index in range(len(df)):

        if df['Category'][index] in catreview:
            catreview[df['Category'][index]][0]+=df['Rating'][index]
            catreview[df['Category'][index]][1]+=1
#           rating+=df['Rating'][index]
        else:
            catreview[df['Category'][index]]=[df['Rating'][index],1]
#           rating+=df['Rating'][index]
    total=0
    count=0
    for i in df['Rating']:
            total+=i
            count+=1
    avg= total/count
    y=[]
```

```
    x=[]
    for i in catreview:
        if catreview[i][0]/catreview[i][1]>=avg:
            avgcat = (catreview[i][0]/catreview[i][1])
            x.append(i)
            y.append(float(avgcat))
#    print(y)
#    print(x)
    color = cm.rainbow(np.linspace(0, 2, 15))
    figure3 = plt.Figure(figsize=(5,4), dpi=80)
    ax3 = figure3.add_subplot(111)
    ax3.scatter(y,x,color=color)
    scatter3 = FigureCanvasTkAgg(figure3, screen)
    scatter3.get_tk_widget().place(x=10,y=0)
    ax3.grid()
    ax3.set_xlabel("RATING")
    ax3.set_ylabel("CATEGORY")
    ax3.set_title('CATEGORIES WITH HIGHEST MAXIMUM AVERAGE RATING')
    canvas = FigureCanvasTkAgg(figure3, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)
    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()
#    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()

def functq5():


    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
```

```
    w = 600  # width for the window size
    h = 600  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')    # configuring the window
    df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    list2=['More than 30 mb','20-30 mb','10-20 mb']
    df['Size'] = df['Size'].map(lambda x: x.rstrip('M'))
    df['Size'] = df['Size'].map(lambda x: str(round((float(x.rstrip('k'))/1024), 1)) if
x[-1]=='k' else x)
    df['Size'] = df['Size'].map(lambda x: np.nan if x.startswith('Varies') else x)
    df['Size']=df['Size'].replace(np.NaN,-999)
    df['Size']=df['Size'].astype(float)
    #print(df['Category'].unique())

    #print(df['Size'])
    df['Installs']=df['Installs'].str.replace('+','')
    df['Installs']=df['Installs'].str.replace(',','')
    df['Installs']=df['Installs'].astype(int)
    dict1,dict2,dict3,dict4,dict5,dict6={},{},{},{},{},{}
    a,b,c=[],[],[]
    for i in range(len(df)):
        if df["Size"][i]>=30:
            a.append(df['Installs'][i])
        elif 20<=df["Size"][i]<30:
            b.append(df['Installs'][i])
        elif 10<=df["Size"][i]<20:
            c.append(df['Installs'][i])
    a2=(sum(b))
    a3=(sum(c))
    a1=(sum(a))
```

```
#    dict1=(pd.value_counts(df["Size"]>=30))
#    a1=len(df)-dict1.values[0]
#    print(a1)
#    dict2=(pd.value_counts((df["Size"]>=20) & (df["Size"]<30)))
#    a2=len(df)-dict2.values[0]
#    print(a2)
#    dict3=(pd.value_counts((df["Size"]>=10) & (df["Size"]<20)))
#    a3=len(df)-dict3.values[0]
#    print(a3)
   #dict4=(pd.value_counts((df["Size"]<10)))
   #a4=len(df)-dict4.values[0]
   #print(a4)
list1=[a1,a2,a3]
print(list1)
#    plt.bar(list2,list1 , color='green')
#    plt.title("mb vs app")
#    plt.xlabel("Downloads")
#    plt.ylabel("App")
#    plt.xticks(rotation=90)
color = cm.rainbow(np.linspace(0, 2, 10))
fig=Figure(figsize=(5,4),dpi=100)
chart=fig.add_subplot(111)
chart.bar(list2,list1,color=color)
chart.set_ylabel("No of Installs")
chart.set_xlabel("Sizes")
chart.grid()
fig.suptitle("No. of Installs Vs Size")

canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
canvas.draw()
canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

toolbar = NavigationToolbar2Tk(canvas, screen)
toolbar.update()
```

```
    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()


def functq6():
    global screen
    screen=Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w=700
    h=600
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    screen.configure(background='white')

#    big_frame =
tk.Frame(root,bg='white',width='700',height=550,bd=4,relief=RIDGE)
#    big_frame.place(x=10,y=60)

#    adjustWindow(root)  # configuring the window

#    Label(screen,text="").pack()



#
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    #print(df.head(5))

    #df.drop(9148,axis=0, inplace=True)
```

```
#df.drop(10472,axis=0,inplace=True)

# Data cleaning for "Installs" column
#print(df['Installs'].head(5))
df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
#print(df['Installs'].head(5))


df['Installs'] = pd.to_numeric(df['Installs'])

d = pd.DatetimeIndex(df['Last Updated'])
df['year'] = d.year
df['month'] = d.month
#print((df['year'][5]))
#6) For the years 2016,2017,2018 what are the category of apps that have got the most and the least downloads. What is the percentage increase or decrease that the
dict_2016 = {}
dict_2017 = {}
dict_2018 = {}

Category = []
for cat in df['Category'].unique():
    Category.append(cat)
    dict_2016[cat]=0
    dict_2017[cat]=0
    dict_2018[cat]=0
#print(Category)
for index in range(len(df)):
    if df['year'][index]==2016:
        dict_2016[df['Category'][index]] += df['Installs'][index]
    if df['year'][index]==2017:
        dict_2017[df['Category'][index]] += df['Installs'][index]
    if df['year'][index]==2018:
        dict_2018[df['Category'][index]] += df['Installs'][index]
```

```
#print(len(dict_2016))
#print(len(dict_2017))
#print(len(dict_2018))
#print(dict_2016)
#print(dict_2017)
#print(dict_2018)
max_2016_install = ["",0]
max_2017_install = ["",0]
max_2018_install = ["",0]


min_2016_install = ["",99999999999]
min_2017_install = ["",99999999999]
min_2018_install = ["",99999999999]

for cat in dict_2016:
   if max_2016_install[1] < dict_2016[cat]:
      max_2016_install[1] = dict_2016[cat]
      max_2016_install[0] = cat
   if max_2017_install[1] < dict_2017[cat]:
      max_2017_install[1] = dict_2017[cat]
      max_2017_install[0] = cat
   if max_2018_install[1] < dict_2018[cat]:
      max_2018_install[1] = dict_2018[cat]
      max_2018_install[0] = cat

   if min_2016_install[1] > dict_2016[cat]:
      min_2016_install[1] = dict_2016[cat]
      min_2016_install[0] = cat
   if min_2017_install[1] > dict_2017[cat]:
      min_2017_install[1] = dict_2017[cat]
      min_2017_install[0] = cat
   if min_2018_install[1] > dict_2018[cat]:
      min_2018_install[1] = dict_2018[cat]
      min_2018_install[0] = cat
```

```
    #print(max_2016_install)
    #print(max_2017_install)
    #print(max_2018_install)
    #print(min_2016_install)
    #print(min_2017_install)
    #print(min_2018_install)
    max_install =
[max_2016_install[1],max_2017_install[1],max_2018_install[1]]
    min_install = [min_2016_install[1],min_2017_install[1],min_2018_install[1]]
    Years = ['2016','2017','2018']

    pos = np.arange(len(Years))
    bar_width = 0.3

    figure2 = plt.Figure(figsize=(8,4), dpi=85)

    chart = figure2.add_subplot(111)

    Max_bar =
chart.bar(Years,max_install,bar_width,color='blue',edgecolor='blue')
    Min_bar =
chart.bar(pos+bar_width,min_install,bar_width,color='red',edgecolor='red')
    chart.grid()
    chart.set_ylabel("Download")
    chart.set_xlabel('Years')
    figure2.suptitle('Max and Min download across 2016-17-18 years for a
category',fontsize=18)
    plt.legend(['max','min'],loc=10)

    max_month =
[max_2016_install[0],max_2017_install[0],max_2018_install[0]]
    min_month = [min_2016_install[0],min_2017_install[0],min_2018_install[0]]

    for idx,rect in enumerate(Max_bar):
            height = rect.get_height()
```

```
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,max_month[idx],ha='center', va='bottom', rotation=0)

    for idx,rect in enumerate(Min_bar):
            height = rect.get_height()
            chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,min_month[idx],ha='center', va='bottom', rotation=0)
    canvas = FigureCanvasTkAgg(figure2, master=screen)
    canvas.get_tk_widget().pack()
    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
     # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    Label(screen,text="The Downloads in the Last Three
Years",font=("Helvetica",11,'bold') ,borderwidth=2).place(x=200,y=500)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)



    screen.mainloop()



def functq7():
    global screen
    screen=Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w=720
    h=600
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
```

```
screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
screen.configure(background='white')
df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
df=df.replace(np.NaN,0)
df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
df['Installs'] = pd.to_numeric(df['Installs'])

varwith=[]
novar=[]
varcategory={}
nocat={}
for i in range(len(df['App'])):
    if df['Android Ver'][i]=='Varies with device':
        varwith.append(df['Installs'][i])
        if df['Category'][i] in varcategory:
            varcategory[df['Category'][i]]+=df['Installs'][i]
        else:
            varcategory[df['Category'][i]]=df['Installs'][i]
    else:
        novar.append(df['Installs'][i])
        if df['Category'][i] in nocat:
            nocat[df['Category'][i]]+=df['Installs'][i]
        else:
            nocat[df['Category'][i]]=df['Installs'][i]

#     print(varwith)
#     print(novar)
#     print(varcategory)
#     print(nocat)
sumvarcategory=sum(varwith)
sumnocat=sum(novar)
#     print(sumvarcategory)
#     print(sumnocat)
x=(len(varwith),len(novar))
#     print(x)
```

```
    androidver = ['Varying', 'Not varying']
    figure1 = plt.Figure(figsize=(10,7), dpi=70)

    color = cm.rainbow(np.linspace(0, 1, len(x)))
   #fig1, ax1 = plt.subplots()
    axesObject = figure1.add_subplot(111)
   #     labels = ['{0} '.format(i,j) for i,j in zip(catcount.keys(),catcount.values())]

    theme = plt.get_cmap('hsv')
   #     axesObject.set_prop_cycle("color", [theme(1. * i / len(catcount))for i in
range(len(catcount))])

axesObject.pie(x,labels=androidver,autopct='%1.2f',startangle=90,colors=color
,shadow=True,explode=[0.1,0])
    axesObject.set_title("Frequency of Varying Apps in Android version vs Apps
in Non-varying Android Version in dataset")
   #ax3.xlim(0,3.0)
   #     figure1.legend(labels,bbox_to_anchor=(0.3,1))
    canvas = FigureCanvasTkAgg(figure1, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                # Fatal Python Error: PyEval_RestoreThread: NULL tstate

    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()

def functq7_2():
   global screen
```

```
    screen = tk.Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")

    big_frame =
tk.Frame(screen,bg='white',width='700',height=450,bd=4,relief=RIDGE)
    big_frame.place(x=10,y=60)

    w=720
    h=550
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))

    screen.configure(background='white')

    tk.Label(screen,text="",bg='white').pack()

    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    #print(df.head(5))

    #df.drop(9148,axis=0, inplace=True)
    #df.drop(10472,axis=0,inplace=True)

    # Data cleaning for "Installs" column
    #print(df['Installs'].head(5))
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    #print(df['Installs'].head(5))



    df['Installs'] = pd.to_numeric(df['Installs'])

    d = pd.DatetimeIndex(df['Last Updated'])
```

```
df['year'] = d.year
df['month'] = d.month

#print((df['year'][5]))
```

#6) For the years 2016,2017,2018 what are the category of apps that have got the most and the least downloads. What is the percentage increase or decrease that the

```
dict_years = {}

for year in df['year'].unique():
    dict_years[year]=0

for index in range(len(df)):
    dict_years[df['year'][index]] += df['Installs'][index]



Years = []
list_install  = []



#    for year in dict_years:
#        if year==2016 or year==2017 or year==2018:
#            Years.append(str(year))
#            list_install.append(dict_years[year])
for year in dict_years:
    Years.append((year))
    list_install.append(dict_years[year])

# print(Years)

# print(list_install)
new_dict={}
for i in range(0,9):
    new_dict.update({Years[i]:list_install[i]})
```

```
    new_dict1=dict(sorted(new_dict.items(),
key=operator.itemgetter(0),reverse=True))
    keys=list(new_dict1.keys())
    values=list(new_dict1.values())
    print(keys)
    print(values)
    # for i in
    #    print(dict_years)

    x = dict_years[2016]
    y = dict_years[2017]
    z=dict_years[2018]

    per2016=1
    per2017=((y-x)/(x+y))*100
    per2018=((z-y)/(y+z))*100
    # print(per2016,per2017,per2018)


    Years.reverse()
    list_install.reverse()

    figure2 = plt.Figure(figsize=(8,4), dpi=85)

    chart = figure2.add_subplot(111)

    chart.plot(keys,values,color='blue')
    #Min_bar =
chart.bar(pos+bar_width,min_install,bar_width,color='pink',edgecolor='black')

    chart.set_ylabel("Years")
    chart.set_xlabel('Installs')
    figure2.suptitle('Barchart on Installs on each Year ',fontsize=18)
    chart.grid()

    canvas = FigureCanvasTkAgg(figure2, master=big_frame)
```

```
    canvas.get_tk_widget().place(x=5,y=10)

    String = """
            % increase in 2016-17 is {:.1f}% and % increase in 2017-18 is {:.1f}%
            """.format(per2017,per2018)

tk.Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='whit
e').place(x=40,y=360)
    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()



    screen.mainloop()
#x axis in order 2014




def functq8():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps to be most likely downloaded in the Upcoming Years")  #
mentioning title of the window
    w = 600  # width for the window size
    h = 500  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)      # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    df=df.replace(np.NaN,0)
```

```
cat={'SPORTS':0,'ENTERTAINMENT':0,'SOCIAL':0,'NEWS_AND_MAGAZINES':0,'E
VENTS':0,'TRAVEL_AND_LOCAL':0,'GAME':0}

    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))
    #print(df['Installs'].head(5))
    df['Installs'] = pd.to_numeric(df['Installs'])
    d = pd.DatetimeIndex(df['Last Updated'])
    df['year'] = d.year
    df['month'] = d.month

#    dict_2018={}

    for i in range(len(df)):
        if (df['year'][i]==2018):
            if df['Category'][i] in cat:
                if cat[df['Category'][i]]==0:
                    cat[df['Category'][i]]=1
                else:
                    cat[df['Category'][i]]+=1
#    print(cat)
    color = cm.rainbow(np.linspace(0, 2, 15))
    fig=Figure(figsize=(5,4),dpi=100)
    chart=fig.add_subplot(111)
    k=list(cat.keys())
    v=list(cat.values())
    l=v.index(max(v))
    print(k[l])
    chart.barh(k,v,color=color)

    chart.set_ylabel("No of Installs")
    chart.set_xlabel("Categories")
    chart.grid()
    fig.suptitle("Count-plot for Installs")
```

```
    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    String = (f""" The Most Likely App to be downloaded in the
       upcoming Years is {k[l]}""")

Label(screen,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').pla
ce(x=400,y=690)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()

def functq9():

    global screen

    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    screen = tk.Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    big_frame = tk.Frame(screen,bg='white',width='600',height='630',bd=4)
    big_frame.place(x=50,y=60)
    w=700
    h=700
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
```

```
    screen.configure(background='white')
    rating = 4.1
    installs = 100000

    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")



    print(df['Rating'])
    temp = []
    for index in range(len(df['Rating'])):
        if df['Rating'][index] >= rating:
            temp.append(1)
        else:
            temp.append(0)

    cat_rating=
pd.DataFrame(zip(temp,temp),columns=["cat_Ratings","ignore"])

    df = pd.concat([df,cat_rating],axis=1)

    df.drop("ignore",axis=1,inplace=True)

    df.drop(df.index[9148], inplace=True)

    # Data cleaning for "Installs" column
    df['Installs'] = df['Installs'].map(lambda x: x.rstrip('+'))
    df['Installs'] = df['Installs'].map(lambda x: ''.join(x.split(',')))

    df['Installs'] = pd.to_numeric(df['Installs'])

    rating_sum = 0

    rate=[]
    #1169
    """ """
    counter=0
```

```
for index in range(len(df)):
    try:
        if df['Installs'][index]>=installs:
            #if df['Rating'][index]>=rating:""" """
                rate.append(1)
                rating_sum+=df['Rating'][index]
                counter+=1
                """ """
        else:
                rate.append(0)

    except:
        #print(index)
        continue



#print(len(rate))
avg_rating = (rating_sum/counter)
""" """
#print(df['Installs'].corr(df['Rating']))

""" """
val = "Yes" if (rating_sum/counter)>=rating else "No"
rel = "Greater than" if val == "Yes" else "Lesser than"

fig, ax = plt.subplots(figsize=(10, 10))

l1 ='{}>='.format(installs)
l2 ='<{}'.format(installs)

size=[rate.count(1),rate.count(0)]
label = [l1,l2]
title = 'Count of {}'.format(rating)

figure1 = plt.Figure(figsize=(8,8), dpi=70)
labels1 = ['{0} = {1:1.2f} % '.format(i,j) for i,j in zip(label,size)]
```

```
    #color = cm.rainbow(np.linspace(0, 1, 10))
    #fig1, ax1 = plt.subplots()
    ax3 = figure1.add_subplot(111)
    ax3.pie(size, labels=label,colors = ['green','cyan'], autopct='%1.1f%%',
startangle=200)
    ax3.set_title(title)
    ax3.legend(labels1,bbox_to_anchor=(1,1))
    #ax3.xlim(0,3.0)
    pie_plot = FigureCanvasTkAgg(figure1, big_frame)
    pie_plot.get_tk_widget().place(x=-50,y=-70)


    Label(big_frame,text="--Results--
",font=("Calibri",13,'italic'),fg='#ad023e',bg='white').place(x=220,y=470)


    String = "Average rating of all the apps who managed to get over {}
download is {:.1f}".format(installs,avg_rating)


Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=0,y=500)

    String ="""{}! All those apps who have managed to get over {} downloads ,
          they have to get an average rating of {:.1f} which is {} than {}
""".format(val,installs,avg_rating,rel,rating)


Label(big_frame,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=0,y=530)


    #ax3.legend(loc=0)

    toolbar = NavigationToolbar2Tk(pie_plot, screen)
    toolbar.update()
```

```
    pie_plot.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)


    screen.mainloop()


def functq10_2():
    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")  # mentioning title of the window
    adjustWindow(screen)  # configuring the window
    df = pd.read_csv("C:\\InternshipFinal\\App-data.csv")

    df=df.replace(np.NaN,0)
    ratio={'Teen':0,'Mature 17+':0}
    for i in range(len(df)):
        if df['Content Rating'][i] in ratio:
            if ratio[df['Content Rating'][i]]==0:
                ratio[df['Content Rating'][i]]=1
            else:
                ratio[df['Content Rating'][i]]+=1
    color = cm.rainbow(np.linspace(0, 2, 10))
    fig=Figure(figsize=(5,4),dpi=100)
    chart=fig.add_subplot(111)
    chart.bar(ratio.keys(),ratio.values(),color=color)
    chart.set_ylabel("ratio")
    chart.set_xlabel("content Rating")
    chart.grid()
    fig.suptitle("Ratio")
    chart.legend()
```

```
    canvas = FigureCanvasTkAgg(fig, master=screen)  # A tk.DrawingArea.
    canvas.draw()
    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
     # this is necessary on Windows to prevent
                    # Fatal Python Error: PyEval_RestoreThread: NULL tstate
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()


#def _2018():
#   Years=[2010,2011,2012,2013,2014,2015,2016,2017,2018]
#   listyear=[]
#
#   for j in Years:
#       quar1={1:0,2:0,3:0}
#       quar2={4:0,5:0,6:0}
#       quar3={7:0,8:0,9:0}
#       quar4={10:0,11:0,12:0}
#
#
#       for i in range(len(data)):
#           if data['year'][i]== j:
#               if data['month'][i] in quar1:
#                       quar1[data['month'][i]]+=data['Installs'][i]
#               elif data['month'][i] in quar2:
#                       quar2[data['month'][i]]+=data['Installs'][i]
#               elif data['month'][i] in quar3:
#                       quar3[data['month'][i]]+=data['Installs'][i]
#               elif data['month'][i] in quar4:
#                       quar4[data['month'][i]]+=data['Installs'][i]
```

```
#       if sum(quar1.values())>sum(quar2.values()) and
sum(quar1.values())>sum(quar3.values()) and
sum(quar1.values())>sum(quar4.values()):
#           listyear.append(quar1)
#       elif sum(quar2.values())>sum(quar3.values()) and
sum(quar2.values())>sum(quar4.values()):
#           listyear.append(quar2)
#       elif sum(quar3.values())>sum(quar4.values()):
#           listyear.append(quar3)
#       else:
#           listyear.append(quar4)
#   return listyear
#

def question11():

    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    screen.title("Apps vs Downloads")
    w = 1000  # width for the window size
    h = 600  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.configure(background='white')  # configuring the window
    Years=[2010,2011,2012,2013,2014,2015,2016,2017,2018]
    data = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    data['Installs'] = data['Installs'].map(lambda x: x.rstrip('+'))
    data['Installs'] = data['Installs'].map(lambda x: ''.join(x.split(',')))
       #print(data['Installs'].head(5))
    data['Installs'] = pd.to_numeric(data['Installs'])

    d = pd.DatetimeIndex(data['Last Updated'])
```

```
    data['year'] = d.year
    data['month'] = d.month
    list_year=[]

    for j in Years:
        quar1={1:0,2:0,3:0}
        quar2={4:0,5:0,6:0}
        quar3={7:0,8:0,9:0}
        quar4={10:0,11:0,12:0}


        for i in range(len(data)):
            if data['year'][i]== j:
                if data['month'][i] in quar1:
                        quar1[data['month'][i]]+=data['Installs'][i]
                elif data['month'][i] in quar2:
                        quar2[data['month'][i]]+=data['Installs'][i]
                elif data['month'][i] in quar3:
                        quar3[data['month'][i]]+=data['Installs'][i]
                elif data['month'][i] in quar4:
                        quar4[data['month'][i]]+=data['Installs'][i]
        if sum(quar1.values())>sum(quar2.values()) and
sum(quar1.values())>sum(quar3.values()) and
sum(quar1.values())>sum(quar4.values()):
            list_year.append(quar1)
        elif sum(quar2.values())>sum(quar3.values()) and
sum(quar2.values())>sum(quar4.values()):
            list_year.append(quar2)
        elif sum(quar3.values())>sum(quar4.values()):
            list_year.append(quar3)
        else:
            list_year.append(quar4)
    print(list_year)
    #dict1={}
    #for i in range(len(list_year)):
    #    dict1.update({Years[i]:list_year[i]})
```

```
#print(dict1)
list10=[]
Month1,Month2,Month3 = [],[],[]
for i in range(len(list_year)):
      list2=[]
      for j in (list_year[i].keys()):
         print(j)
         list2.append(j)
      list10.append(list2)
#print(list10)
for j in range(1):
   for i in range(len(list10)):
         Month1.append(list10[i][j])
for j in range(1,2):
   for i in range(len(list10)):
         Month2.append(list10[i][j])
for j in range(2,3):
   for i in range(len(list10)):
         Month3.append(list10[i][j])

print(Month1)
print("---------")
print(Month2)
print("---------")
print(Month3)
print("---------")

list1=[]
for i in range(len(list_year)):
      list2=[]
      for j in (list_year[i].values()):
         print(j)
         list2.append(j)
      list1.append(list2)
Years = []
for i in range(2010,2019):
```

```
    Years.append(str(i))
  Quatmonth_list=[]
  for j in range(0,3):
    list2=[]
    for i in range(len(list1)):
        list2.append(list1[i][j])
    Quatmonth_list.append(list2)

  pos = np.arange(len(Years))
  bar_width = 0.3



  figure2 = plt.Figure(figsize=(10,4), dpi=100)

  chart = figure2.add_subplot(111)

  bar1 =
chart.bar(Years,Quatmonth_list[0],bar_width,color='green',edgecolor='black')
  bar2 =
chart.bar(pos+bar_width,Quatmonth_list[1],bar_width,color='yellow',edgecolo
r='black')
  bar3 =
chart.bar(pos+bar_width*2,Quatmonth_list[2],bar_width,color='red',edgecolo
r='black')

  chart.set_ylabel("Installs")
  chart.set_xlabel('Years')
  figure2.suptitle('Group Barchart - Quater Month across the
year',fontsize=18)

  for idx,rect in enumerate(bar1):
        height = rect.get_height()
        chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month1[idx],ha='center', va='bottom', rotation=0)
```

```
   for idx,rect in enumerate(bar2):
                height = rect.get_height()
                chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month2[idx],ha='center', va='bottom', rotation=0)

   for idx,rect in enumerate(bar3):
                height = rect.get_height()
                chart.text(rect.get_x() + rect.get_width()/2.,
1.05*height,Month3[idx],ha='center', va='bottom', rotation=0)



   canvas = FigureCanvasTkAgg(figure2, master=screen)
   canvas.get_tk_widget().place(x=0,y=100)

   toolbar = NavigationToolbar2Tk(canvas, screen)
   toolbar.update()
   String="In the above Graph Quarter of each Year with their Higher Installs
are plotted From 2010 to 2018"

tk.Label(screen,text=String,font=("Calibri",13,'italic'),fg='#ad023e',bg='white').
place(x=10,y=520)
   screen.mainloop()




def newRelation1(app,x,y):
   global dict_app_relation

   for i in x:
      if i==-999:
         x.remove(i)
         y.remove(i)

   if x==[] or y==[]:
```

```
        return

    data = pd.DataFrame({'Sentiment_pol':y , 'Sentiment_sub': x})
    val = data['Sentiment_pol'].corr(data['Sentiment_sub'])

    dict_app_relation[app] = val

def function_q13():
    global screen,df,dict_app_relation
    dict_app_relation={}

    root = Tk()
    root.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    big_frame =
tk.Frame(root,bg='white',width='700',height='630',bd=4,relief=RIDGE)
    big_frame.place(x=50,y=60)
    w=700
    h=600
    ws=root.winfo_screenwidth()
    hs=root.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    root.geometry("%dx%d+%d+%d"%(w,h,x,y))

    root.configure(background='white')


    df = pd.read_csv("C:\\InternshipFinal\\user.csv")
    df=df.replace(np.NaN,-999)

    dict_app_index_count={}
    for index in range(len(df['App'])):
        app = df['App'][index]
        if app in dict_app_index_count:
            dict_app_index_count[app][1]+=1
        else:
```

```
            dict_app_index_count[app]=[index,1]

    # after this for loop dict_app_index_count will hold the app name as key and
it's first index in data set and total count in data set as item

    for app in dict_app_index_count:
        index = dict_app_index_count[app][0]
        count = dict_app_index_count[app][1]
        sub,pol=[],[]

        for i in range(count):
            c = index+i
            sub.append(df['Sentiment_Subjectivity'][c])
            pol.append(df['Sentiment_Polarity'][c])

        newRelation1(app,sub,pol)

    app_no = np.arange(len(dict_app_relation.keys()))

    relation = []

    for i in dict_app_relation:
        relation.append(dict_app_relation[i])

    figure3 = plt.Figure(figsize=(6,4), dpi=100)
    ax3 = figure3.add_subplot(111)
    ax3.scatter(app_no,relation, color = '#102131')
    scatter3 = FigureCanvasTkAgg(figure3, root)
    scatter3.get_tk_widget().place(x=50,y=45)
    ax3.grid()
    ax3.set_xlabel("Applications in sequence")
    ax3.set_ylabel("Correlation")
    ax3.set_title("The Co-rrelation for Polarity V/s Subjectivity for all apps")
    toolbar = NavigationToolbar2Tk(scatter3,root)
    toolbar.update()
    String = """
```

```
        In this Scatter plot each point represent the correlation
        between sentiment polarity and sentiment subjectivity And
        Most of apps have positive relation with between sentiment polarity
and subjectivity
        """

tk.Label(root,text=String,font=("Calibri",13,'italic'),fg='#102131',bg='white').pla
ce(x=0,y=420)

    root.mainloop()




def functq17():


    global screen
    screen = Tk()
    screen.iconbitmap(r"C:\\InternshipFinal\\google.ico")
    w = 600  # width for the window size
    h = 700  # height for the window size
    ws = screen.winfo_screenwidth()  # width of the screen
    hs = screen.winfo_screenheight()  # height of the screen
    x = (ws/2) - (w/2)  # calculate x and y coordinates for the Tk window
    y = (hs/2) - (h/2)
    screen.geometry('%dx%d+%d+%d' % (w, h, x, y))  # set the dimensions of the
screen and where it is placed
    screen.resizable(False, False)    # disabling the resize option for the window
    screen.configure(background='white')    # configuring the window
    df= pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    list2=['More than 30 mb','20-30 mb','10-20 mb','Less Than 10 mb']
    df['Size'] = df['Size'].map(lambda x: x.rstrip('M'))
```

```
df['Size'] = df['Size'].map(lambda x: str(round((float(x.rstrip('k'))/1024), 1)) if
x[-1]=='k' else x)
df['Size'] = df['Size'].map(lambda x: np.nan if x.startswith('Varies') else x)
df['Size']=df['Size'].replace(np.NaN,-999)
df['Size']=df['Size'].astype(float)
#print(df['Category'].unique())

#print(df['Size'])
df['Installs']=df['Installs'].str.replace('+','')
df['Installs']=df['Installs'].str.replace(',','')
df['Installs']=df['Installs'].astype(int)
dict1,dict2,dict3,dict4,dict5,dict6={},{},{},{},{},{}
a,b,c,d=[],[],[],[]
for i in range(len(df)):
    if df["Size"][i]>=30:
        a.append(df['Installs'][i])
    elif 20<=df["Size"][i]<30:
        b.append(df['Installs'][i])
    elif 10<=df["Size"][i]<20:
        c.append(df['Installs'][i])
    elif (df['Size'][i]<10):
       d.append(df['Installs'][i])
a2=(sum(b))
a3=(sum(c))
a1=(sum(a))
a4=(sum(d))


list1=[a1,a2,a3,a4]
print(list1)


color = cm.rainbow(np.linspace(0, 2, 10))
fig=Figure(figsize=(3,2),dpi=100)
chart=fig.add_subplot(111)
chart.bar(list2,list1,color=color)
```

```
    chart.set_ylabel("No of Installs")
    chart.set_xlabel("Sizes")
    chart.grid()
    fig.suptitle("No. of Installs Vs Size")

    canvas = FigureCanvasTkAgg(fig, screen)  # A tk.DrawingArea.

    canvas.get_tk_widget().pack(side=TOP, fill=BOTH, expand=1)

    toolbar = NavigationToolbar2Tk(canvas, screen)
    toolbar.update()

    canvas.mpl_connect("key_press_event", on_key_press)
    Label(screen,text="From The Above Bar Graph We Say That the Size of the
App Does Influence The No of Installs \nAnd the Trend is Positive As The Install
Increases with Size",font=("Lucida",10,'bold')).place(x=0,y=610)
    button = Button(master=screen, text="Quit", command=_quit)
    button.pack(side=BOTTOM)
    screen.mainloop()



def month(x):
    if x[0:3]=='Jan':
        return 1
    elif x[0:3]=='Feb':
        return 2
    elif x[0:3]=='Mar':
        return 3
    elif x[0:3]=='Apr':
        return 4
    elif x[0:3]=='Ma' or x[0:3]=='May':
        return 5
    elif x[0:3]=='Jun':
        return 6
    elif x[0:3]=='Jul':
```

```
        return 7
    elif x[0:3]=='Aug':
        return 8
    elif x[0:3]=='Sep':
        return 9
    elif x[0:3]=='Oct':
        return 10
    elif x[0:3]=='Nov':
        return 11
    elif x[0:3]=='Dec':
        return 12

def install():
    global sample
    Installs=[]
    for i in sample['Installs']:  #converting string based installs into integer based
        if i=='Free':
            Installs.append(0)
        else:
            Installs.append(int(i.replace('+','').replace(',','')))
    return Installs

def dates_str_to_int():
    global sample
    dates=sample['Last Updated']
    year=[]
    counter=0
    for i in dates:
        year.append([int(i[-8:-6]),month(i[:-9]),int(i[-4:])])
        counter=counter+1
    return year

def display(x,y,z):
    for i in x:
        for j in set(i):
            y.insert('end',j)
```

```
def filtering(value,canvas_listbox):
    global sample
    installs=install()
    year=dates_str_to_int()
    rating=sample['Rating']

    category=sample['Category'].unique()
    ans=[]
    for i in category:
        ans.append([])

    for i in range(len(installs)):
        if i!=10472 and installs[i]==value[0]:
            if rating[i]>=value[1]:
                if year[i][2]==value[2]:
                    for j in range(len(category)):
                        if category[j]==sample['Category'][i] :
                            ans[j].append(sample['App'][i])
    canvas_listbox.delete(0,'end')
    display(ans,canvas_listbox,category)


def getting(install,rating,year,category,canvas_listbox):
    if install.get().strip()!='' and rating.get().strip()!='' and year.get().strip()!=''
and category.get().strip()!='':

value=[int(install.get().replace(',','').replace('+','')),float(rating.get()),int(year.ge
t()),str(category.get())]
        filtering(value,canvas_listbox)
    else:
        tk.messagebox.showerror('Error','Please select values')
```

```
def searchapp():
    global screen,sample


    sample = pd.read_csv("C:\\InternshipFinal\\App-data.csv")
    screen = tk.Tk()
    w=1300
    h=730
    ws=screen.winfo_screenwidth()
    hs=screen.winfo_screenheight()
    x=(ws/2)-(w/2)
    y=(hs/2)-(h/2)
    screen.geometry("%dx%d+%d+%d"%(w,h,x,y))
    category=list(sample['Category'].unique())


    big_frame = tk.Frame(screen,bg='#102131',width='1300',height='730')
    big_frame.place(x=0,y=0)

    sample.drop(index=[10472],inplace=True)
    sample=sample.replace(np.NaN,0)


    year=[2010,2011,2012,2013,2014,2015,2016,2017,2018]
    rating=[]
    for i in range(5):
        for j in range(10):
            rating.append(i+(j/10))
    rating.append(5.0)


tk.Label(big_frame,text='Installs',width=10,height=1,font=("Helvetica",15,'bold
'),fg='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=550,y=60)
```

```
tk.Label(big_frame,text='Rating',width=10,height=1,font=("Helvetica",15,'bold'
),fg='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=350,y=60)

tk.Label(big_frame,text='Year',width=10,height=1,font=("Helvetica",15,'bold'),f
g='#ffffff',bg='#000000', borderwidth=2, relief="groove").place(x=150,y=60)

tk.Label(big_frame,text='Category',width=10,height=1,font=("Helvetica",15,'bo
ld'),fg='#ffffff',bg='#000000', borderwidth=2,
relief="groove").place(x=750,y=60)

combo_category=ttk.Combobox(big_frame,width=17,values=category,state="r
eadonly")
   combo_category.place(x=750,y=110)

combo_install=ttk.Combobox(big_frame,width=17,values=['0','10+','100+','1,0
00+','10,000+','1,00,000+','10,00,000+','1,00,00,000+'],state="readonly")
   combo_install.place(x=550,y=110)

combo_rating=ttk.Combobox(big_frame,width=17,values=rating,state="readon
nly")
   combo_rating.place(x=350,y=110)

combo_year=ttk.Combobox(big_frame,width=17,values=year,state="readonly"
)
   combo_year.place(x=150,y=110)

   canvas=tk.Canvas(big_frame,width=970,height=450,bg='pink')
   canvas.place(x=150,y=150)
   scroll1=tk.Scrollbar(canvas)
   canvas_listbox=tk.Listbox(canvas,yscrollcommand =
scroll1.set,height=20,width=96,bg='#A9D0F5',font=('Calibri',14,'bold'))
   canvas_listbox.pack( side = 'left', fill = 'both' )
   scroll1.pack(side='right', fill='y' )
   scroll1.config( command = canvas_listbox.yview )
```

```
btn_search=tk.Button(big_frame,text='Search',height=1,font=("Helvetica",15,'
bold'),fg="white",width=15,bg="black",command=lambda:getting(combo_inst
all,combo_rating,combo_year,combo_category,canvas_listbox))
    btn_search.place(x=1020,y=85)


    screen.mainloop()
```