A PROJECT REPORT ON

ANALYZING SMARTPHONE USAGE OF STUDENTS

Submitted to the Osmania University

in partial fulfilment of the requirements for the award of the degree of

Bachelor of Science

By

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DECLARATION

I hereby declare that the Project Work entitled "ANALYZING SMARTPHONE USAGE OF STUDENTS" submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Science to the Osmania University through St. Mary's College, Yousufguda, Hyderabad – 45 is my original work and no part of the project has formed the basis for the award of any degree, diploma, or certificate and the project, in full or in part, has till date not been submitted to any other University or Institution, for credits or for any other recognition.

Signature of the student -

Date:
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CERTIFICATE

This is to certify that the project work entitled "ANALYZING SMARTPHONE USAGE OF STUDENTS" that is being submitted by **AKULA KRISHNA MANVITHA** in partial fulfilment of the requirements for the award of the degree of Bachelor of Science to the Osmania University through St. Mary's College, Yousufguda, Hyderabad – 45 is a record of *bonafide* work carried out by them under my guidance and supervision. The work embodied in this project report has not been submitted to any other University or Institute for the award of any degree, diploma, or certificate.

Signature of Supervisor
Ms. PANAM SRAVANI
Designation of Supervisor

Date:
Hyderabad

Approved for submission to the University.

Signature of HoD
Ms. ANU VICTOR
Head, Department of Science

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ABSTRACT

In the last few decades, mobile phones have been rapidly growing. Due to the global pandemic, the school or college curriculum must be delivered online, so the students must have mobiles. More than 95% of students own a smartphone, and 75% of those phones have internet access and apps. Students now rely on mobile phones to communicate with each other and access the ever-changing educational resources online. Mobile phones offer students a variety of benefits and challenges. This study aimed to find out the usage behavior of smartphones among college students. 100 students from various colleges were surveyed regarding this study. The survey was done among college students through a questionnaire for students from various colleges. With the collected data, the survey was analyzed using exploratory data analysis and statistical analysis using python. The purpose of the present study involves considering use patterns, the purpose of use, situation of use, learning variable measures, and overall experience with the usage of smartphones. The result indicates the frequent use and situation of use of their smartphones.

CONTENTS

CHAPTER-1

1.1 ORIGIN OF SMARTPHONES

The origin of smartphones can be traced back to the early 1990s when IBM developed a concept called "Simon," which was a mobile phone with PDA-like features such as a touch screen, calendar, and email capabilities. However, it was not until 2007 when Apple released the iPhone that smartphones really took off and became mainstream.

The iPhone revolutionized the smartphone market with its innovative touch screen interface, intuitive design, and ability to access the internet, email, and a variety of apps. Other companies quickly followed suit, and today smartphones are an essential part of modern life, providing access to a wide range of information, entertainment, and communication tools.

1.2 RESEARCH METHODOLOGY

- **Population:**

  The study population on usage of smartphones by college students comprise the sample frame of students using smartphones for various reasons.

- **Sample Method**:

  Sample method for studying the usage of smartphones by college students could involve a survey using a web survey using google forms.

- **Source Of Data**:

  The study used both primary and secondary source of data.

  a. **PRIMARY DATA:**

     Primary data collection is the process of gathering data through surveys, interviews, or experiments.

     The questionnaire consists of several questions related to their age, gender, version of smartphone, situation of use and purpose of use. This study pulled data from 106 responses of college students.

  b. **SECONDARY DATA:**

     Secondary data is data collected by someone other than the actual user. The secondary sources include various published journals and unpublished sources such as books, journals, related to usage of smartphones.

1.3 DATA ANALYSIS TOOLS

i. **t-Test:**

A t-test is one of the most commonly used inferential univariate statistics that is used to check the significant difference between the two groups, and these groups may be related in certain features. In this study, to check the significant difference of demographic variables having two groups on selected factors of the study t-Test was used.

H0 = There is no significant difference between the group means of selected factors of the study.

H1 = There is significant difference between the group means of selected factors of the study.

The formula for t-test is given below:

$$t = \frac{(\bar{x}, -\bar{x}_2) - D_0}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

ii. **Chi-square test:**

A chi-square test is a statistical test used to compare observed results with expected results. The purpose of this test is to determine if a difference between observed data and expected data is due to chance, or if it is due to a relationship between the variables, you are studying. The formula for chi square test is given below:

$$\frac{x_c^2 = \Sigma(O_i - E_i)^2}{E_i}$$

Where c=degrees of freedom, o= observed values, e= expected values.

iii. **Exploratory data analysis(EDA):**

Exploratory Data Analysis (EDA) is one of the techniques used for extracting vital features and trends used by machine learning and deep learning models in Data Science.

1.4 <u>OBJECTIVES</u>

The main objective of this project is to analyze the usage of the smartphones by college students. The following are some of the objectives of the project.

- To understand the data using descriptive statistics.
- To understand using data using visualizations.
- To study the relationship between age of the respondents and how they feel about smartphones being helpful in education.
- To study the relationship between age of the students and if they get distracted because of their smartphones.
- To study the relationship between gender and average time they are spending on their smartphones.

- To study the relationship between education and how many hours do they spend on internet.
- To study the relationship between gender and if they are using smartphones in their leisure times.

1.5 CHAPETERISATION OF RESEARCH REPORT

CHAPTER-1:

In this chapter, we discussed the origin of smartphones, research methodology, sample data, sample method, data analysis tools such as the chi square test, t-test, and exploratory data analysis, and objectives.

CHAPTER-2:

In this chapter, we discussed the introduction of communication, smartphones, and how smartphones are used in our daily lives.

CHAPTER-3:

In this chapter, we discussed the literature review, which was taken from previous papers, and a summary of smartphones.

CHAPTER-4:

In this chapter, we discussed about the data collection and the contents related to the college students.

CHAPTER-5:

In this chapter, we analyze the collected data using statistical tools such as chi square test, t-test and exploratory data analysis.

CHAPTER-6:

In this chapter, using data, we determined in this chapter that smartphones play an essential role for college students and are also beneficial for education.

CHAPTER-2

INTRODUCTION

2.1 COMMUNICATION

Communication is the process of exchanging information or messages between individuals or groups through various channels, such as verbal or nonverbal language, gestures, writing, or technology. Effective communication is essential in all aspects of life, including personal, social, and professional contexts. In today's world, communication has become easier and more accessible with the advent of technology. Mobile phones, social media, email, and other forms of digital communication have made it possible to connect with people across the globe instantly. However, it is important to use these tools responsibly and ensure that the messages conveyed are appropriate and meaningful.

2.2 SMARTPHONES

Smartphones are powerful and portable handheld devices that combine the functionality of a computer with the convenience of a phone. They are designed to provide users with access to a wide range of features and capabilities, including voice and video calls, messaging, email, internet browsing, social media, entertainment, and more. The modern smartphone is a sophisticated and multifaceted tool that enables users to capture photos and videos, track fitness goals, stream media content, and even control their home appliances. Additionally, smartphones provide users with instant access to information, which has made them an essential tool in education, healthcare, and emergencies. Despite the many benefits of smartphones, concerns have been raised about their impact on social interaction, privacy, and mental health. As with any technology, it is important to use smartphones responsibly and ensure that they do not become a distraction or detriment to one's personal well-being. The usage of smartphones has changed the way we interact with the world around us. With instant access to information, we can stay connected with friends and family, access work emails and documents, and stay informed on news and events happening worldwide. The usage of smartphones has also made it possible to shop, bank, and conduct business transactions from the comfort of our homes.

2.3 Uses of smart phones

1. Smartphones have become an essential part of our daily lives and are used for a wide range of purposes, including.
2. Communication: Smartphones allow us to easily communicate with others through phone calls, text messages, emails, and instant messaging apps.
3. Internet browsing: With a smartphone, you have access to the internet readily available, allowing you to search for information, read news articles, and shop online.
4. Social media: Smartphones are popular tools for accessing social media platforms like Facebook, Twitter, Instagram, and Snapchat, allowing us to stay connected with friends and family and share updates and photos.
5. Entertainment: Smartphones can be used to watch videos, listen to music, play games, and read books, providing a source of entertainment on the go.

6. Productivity: Smartphones come with a variety of productivity apps, including calendars, to-do lists, and note-taking apps, making it easy to stay organized and on top of tasks.
7. Navigation: Smartphones have built-in GPS technology and maps apps, allowing us to easily navigate to new places and get directions.
8. Banking and finance: Smartphones can be used to access banking and financial apps, making it easy to manage accounts, transfer money, and make payments.
9. Photography: Smartphones come equipped with high-quality cameras, making it easy to capture photos and videos on the go.
10. Education: Smartphones can be used to access educational resources, such as online courses, e-books, and educational apps, making it easier for people to learn on the go.

CHAPTER-3

LITERATURE REVIEW

Mobile device ownership is high among higher education students. The survey results comparing the years 2012 and 2014 indicated that the percentage of smartphone use for learning substantially increased from 58 to 77 percent (Chen et al., 2015). Sheffield University conducted student mobile device survey in 2011. The results revealed that the students at Sheffield University use their smartphones on the campus for surfing the net (88%), social networking (88%), accessing academic services (78%), and e-mailing (69%). When compared to laptop, netbook, tablet/e-reader, and iPod use, smartphones are the most used mobile equipment on the campus. It was also reported that smartphones (87%) are more likely to be used than any other equipment in lectures (The University of Sheffield, 2011).

The Educause Center for Analysis and Research (ECAR) investigated information technology (IT) experiences and expectations of undergraduate students across 45 U.S. states and 15 countries. Based on the results of the ECAR's study of undergraduate students and information technology, with the increased device ownership, smartphones, tablets, and e-readers were used more by students for academic purposes in 2014 than in previous years. For instance, 86% of undergraduate students owned a smartphone while this was 76% in 2013 (Dahlstrom & Bichsel, 2014). The results of Pearson's Student Mobile Device Survey 2015 demonstrated that younger college students tend to use smartphones more. Nine in ten college students on a regular basis use laptops or smartphones. One in four students downloads content every day on their smartphones so that they can use the content later during the times they do not have an Internet connection. The majority of college students (Poll, 2015) uses learning apps on tablets or smartphones.

Texting, calling, checking social media, and Internet search are the most popular ways of smartphone use! Similar earlier studies (Hossain & Ahmed, 2016; The Mobile Ecosystem Forum, 2016; The University of Sheffield, 2011) also revealed that university students use their smartphones for different purposes, mostly for social media, searching the Internet, and texting. When it comes to normal usage of phones such as phone calls, SMS text messages, and e-mails, people aged between 18 and 24 years old, a typical age range for undergraduate students, are similar to the rest of the population. However, they tend to communicate using social networks on their smartphones, use instant messaging services, use video calls and voice calls via the Internet instead of calling through traditional phone systems, and watch more video (Deloitte, 2017). In addition, social media covers an important part in the lives of people, including university students. Through mobile computing devices and social media, students can interact with content, create content, communicate and collaborate (Gikas & Grant, 2013). It can be said that smartphones are integral tool in the everyday life of the university students with varying purposes to use.

As for hours of use per day, university students use their smartphones an average of 4.7 hours in a day and connect to the Internet through their smartphones an average of 3.6 hours in a day! That is, 76.5 % of the smartphone use time is spent for the tasks requiring an Internet connection. While mean of the daily mobile phone use time was 1. 71 hours and median duration of smartphone use per day was reported as 2.67 hours in 2012 (Hong et al., 2012; Oulasvirta et al., 2012), the mean duration was reported to be around 3 hours and more than 4 hours in a day in 2017 (Aljomaa et al., 2016; Lopez-Fernandez et al., 2017). Generally, the studies conducted in the same year provided similar numbers on smartphone use. Based on the statistics reported byprevious self-report or empirical smartphone use investigations, daily smartphone use duration follows an increasing trend regardless of the culture, and it is not wrong to say that university students' daily lives are dominated by smartphones (Montag et al., 2015). In terms of daily mobile Internet use on smartphones, studies reported incongruent results. According to Gezgin et al. (2017), most of the students use mobile Internet between 1-2 hours daily while it was more than 4 hours daily as reported by Gezgin (2017).

CHAPTER-4

DATA COLLECTION

The data collection generally involves in questionnaires, surveys, documents, and records are quantitative, while interviews, focus groups, observations, and oral histories are qualitative. The required data was collected using a questionnaire via google forms in the semester of 2022-2023 academic year. The link of the survey was posted through WhatsApp. An introductory statement informed participants that the participation was voluntary. The dataset consists of

- GENDER
- AGE
- EDUCATION
- Discipline of Study
- VERSION OF SMART PHONE
- Which year did you start using a smartphone?
- Since how long are you using your own smartphone(in years)
- What is the average time you spend on smart phones per day?(in hours) ex:3hrs
- How many hours do you spend on internet?
- No of times you check for notifications
- Purpose of use
- situation of use
- Do you agree that smart phone will help in your work or education?
- Do you admit your often distract by your smart phone
- Do you frequently change your smart phones to latest version
- Overall experience in using smart phone
- Write a review on usage of smart phone.

  The data were exported into a Microsoft Excel document. 106 participants responded to the survey. The data analysis was carried out for 106 participants.

CHAPTER-5

EXPLORATORY DATA ANALYSIS

DATA ANALYSIS:

To analyze the collected dataset and to perform exploratory data analysis, chi square test and t test, python programming was used. To perform the above, the dataset is converted into "comma separated values file (csv)" and uploaded into anaconda software jupyter notebook.

4.1 EXPLORATORY DATA ANALYSIS (EDA):

PANDAS:

Pandas it is the most powerful package for data analysis. It was built on the top of the NumPy package. Plotting functions from Matplotlib and machine learning algorithm in Scikit-learn.

```
In [1]: import pandas as pd

In [2]: dataset = pd.read_csv('usage of smartphones.csv')

In [3]: print(dataset.shape)
        (106, 45)

In [4]: df = pd.read_csv('usage of smartphones.csv')
```

Fig-1: importing pandas library

DATA TYPES:

The data types for each column as follows

```
GENDER                          object
AGE                             object
EDUCATION                       object
Discipline                      object
VERSION                         object
year of start                    int64
use in years                     int64
avg time spent                   int64
on internet                      int64
for notifications                int64
Messaging                        int64
Calling                          int64
Shopping                         int64
Checking social media            int64
Internet search                  int64
Setting alarm                    int64
Checking time                    int64
Taking photo                     int64
Checking mails                   int64
music                            int64
news                             int64
Reviewing notes                  int64
Setting memos                    int64
Playing games                    int64
Editing photos                   int64
transactions                     int64
Setting meetings                 int64
GPS Location                     int64
Reading books                    int64
When get bored                   int64
When alone                       int64

when alone                        int64
On public transportation          int64
In leisure times                  int64
Hanging out with friends          int64
In restroom                       int64
Eating something                  int64
Talking with someone face to face int64
Driving                           int64
Waiting for someone               int64
Walking                           int64
will phones help in education     int64
distract by your smart phone      int64
change of your smartphone         int64
Overall experience                int64
Review                           object
dtype: object
```

Fig-2: It shows the type of the data set

DATA DESCRIBE:

Data describe gives brief about the summary of the data.

	year of start	use in years	avg time spent	on internet	for notifications	Messaging	Calling	Shopping	Checking social media	Internet search	...	In restroom	Eating something
count	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	...	106.000000	106.000000
mean	2014.518868	6.386792	5.509434	4.801887	33.962264	0.971698	0.933962	0.603774	0.783019	0.839623	...	0.264151	0.377358
std	4.498108	3.637296	2.785149	4.540652	45.796636	0.166622	0.249528	0.491436	0.414148	0.368699	...	0.442975	0.487029
min	1999.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000
25%	2012.250000	3.250000	4.000000	2.000000	6.000000	1.000000	1.000000	0.000000	1.000000	1.000000	...	0.000000	0.000000
50%	2015.000000	6.000000	5.000000	3.000000	20.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	0.000000	0.000000
75%	2018.000000	8.000000	7.000000	6.000000	49.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	1.000000	1.000000
max	2021.000000	18.000000	16.000000	30.000000	250.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	1.000000	1.000000

8 rows × 39 columns

Eating something	Talking with someone face to face	Driving	Waiting for someone	Walking	will phones help in education	distract by your smart phone	change of your smartphone	Overall experience
106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000
0.377358	0.254717	0.160377	0.688679	0.358491	2.009434	1.160377	0.594340	3.867925
0.487029	0.437772	0.368699	0.465233	0.481835	0.899685	0.705580	0.672993	1.096101
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	1.000000
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000	0.000000	3.000000
0.000000	0.000000	0.000000	1.000000	0.000000	2.000000	1.000000	0.000000	4.000000
1.000000	0.750000	0.000000	1.000000	1.000000	3.000000	2.000000	1.000000	5.000000
1.000000	1.000000	1.000000	1.000000	1.000000	4.000000	2.000000	2.000000	5.000000

Fig-3: summary of the data

MISSING VALUES:

The below figure shows us the missing values in the data which contains null values in it.

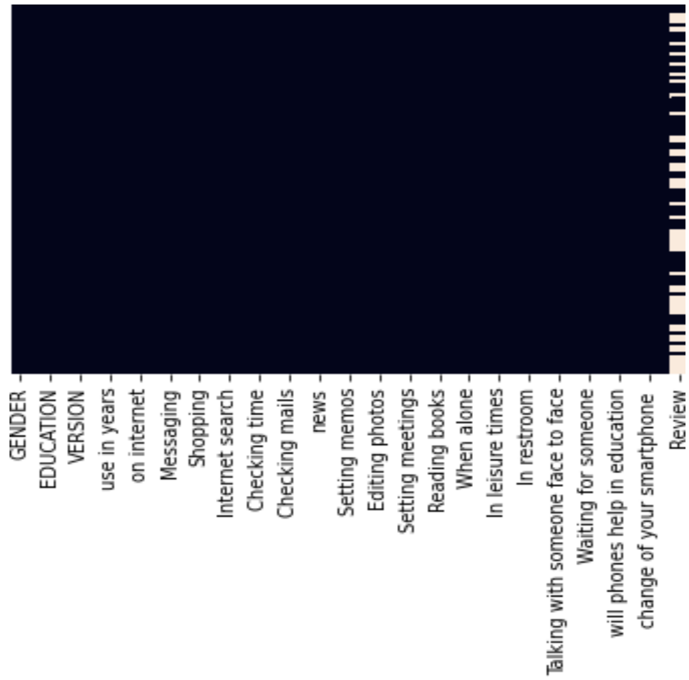


Fig-4: missing values

DATA UNDERSTANDING:

To understand the relation between continuous variables, we will perform correlation test.

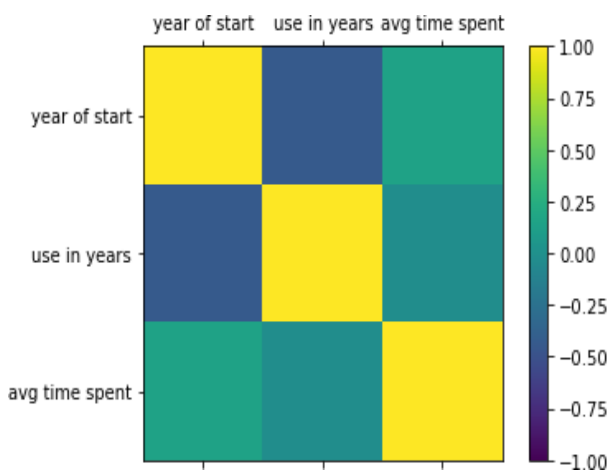


Fig-5 correlation test

From the above figure, we observed that year of start and use in years are highly negatively correlated to each other.

UNIVARIATE PLOTS OF CATEGORICAL VARIABLES:

The following figures are univariate plots of categorical variables.

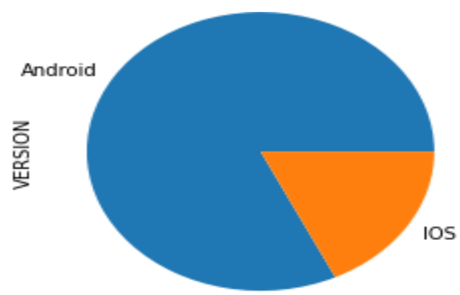
a) GENDER:

```
Male      53
Female    53
Name: GENDER, dtype: int64
```

Fig -6

The above figure represents the "Gender" of the respondents. There are 50% of males and 50% of females responded to the questionnaire.

b) VERSION:

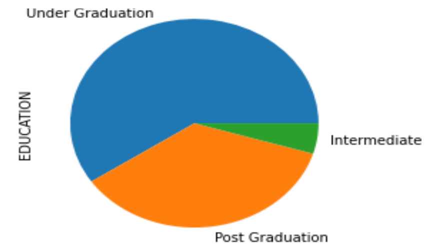



```
Android    87
IOS        19
Name: VERSION, dtype: int64
```

Fig-7

The above pie chart shows us the output of univariate plots of the categorical variable "Version". Most college students are interested in using Android phones rather than iOS phones, as Android phones are more affordable than iOS. Around 82.07% of respondents are using the Android version, and 17.92% are using the iOS version.

c) EDUCATION:




```
Under Graduation    63
Post Graduation     38
Intermediate         5
Name: EDUCATION, dtype: int64
```

Fig- 8

The above pie chart shows us the output of univariate plots of the categorical variable "Education" of the respondents. Undergraduate students are using smartphones more than anyone else. The usage of smartphones by intermediate students is very low. About 59.43% of respondents are in under-graduation, 35.84% are in post-graduation, and 4.71% are in intermediate.

d) HISTOGRAM:

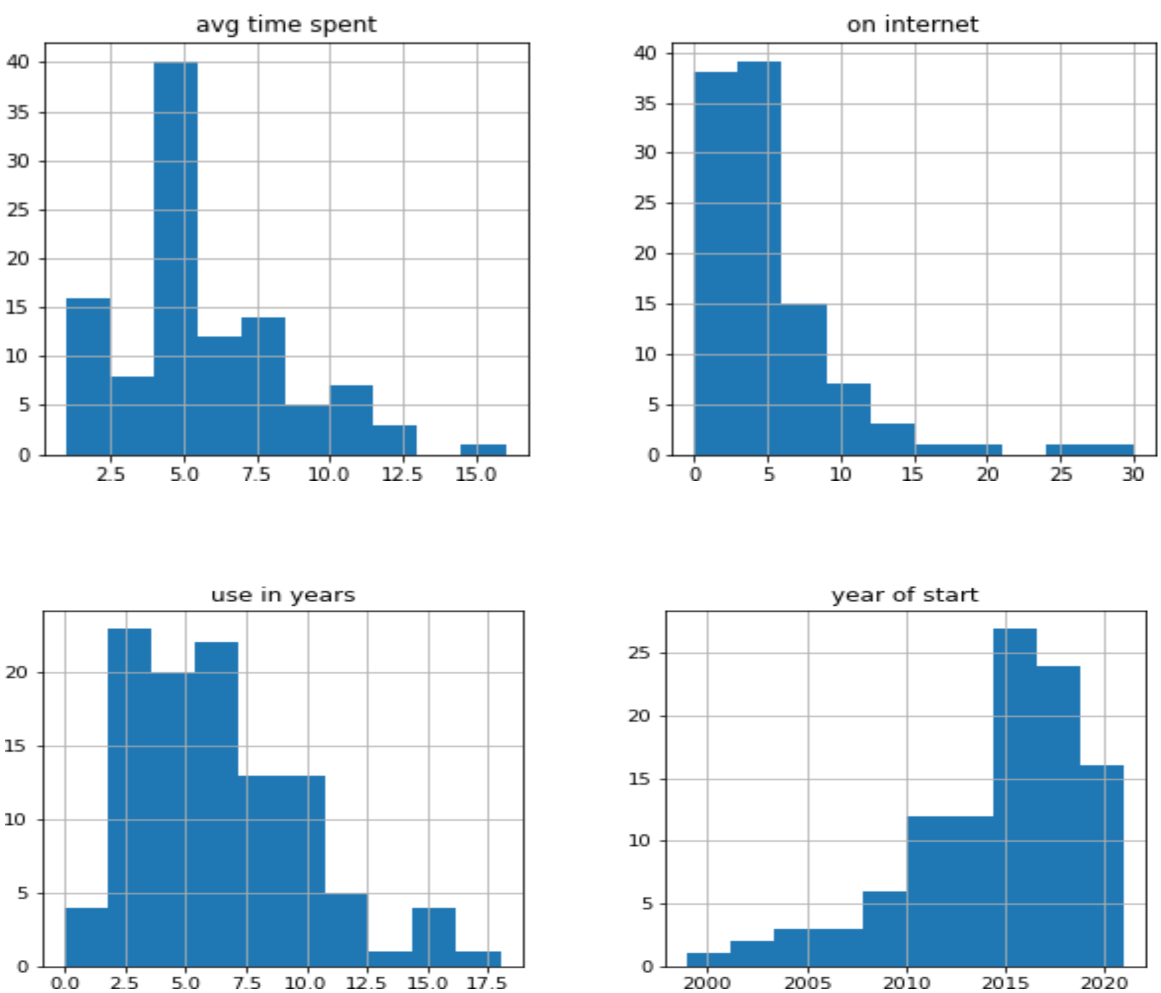


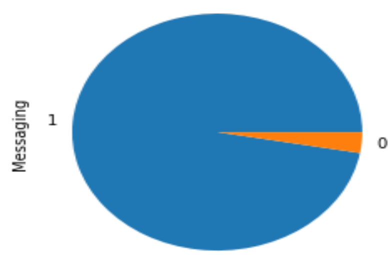
Fig-11

The above histogram represents the output of univariate plots of the categorical variables average time spent on smartphones, hours spent on the internet, how many years of using smartphones, and the year of using smartphones. Many people are spending their most of the time on smartphones. Most of the college students started using smartphones form 2015. From almost 3 years smartphones playing an important role.

PURPOSE OF USE:

The following figures show the number of students using smartphones on smartphones on purpose. The legend shows 1 for yes and 0 for no.

a) MESSAGING:

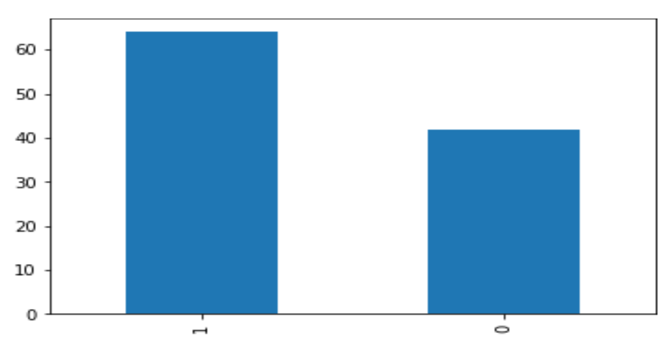



```
1    103
0      3
Name: Messaging, dtype: int64
```

Fig -10

The pie chart gives us information about the output of univariate plots of the categorical variable of respondents who use their smartphones for messaging. Many people prefer to communicate via text message rather than phone call. 97.16% of respondents responded yes, and 2.83% of them responded no.

b) SHOPPING:

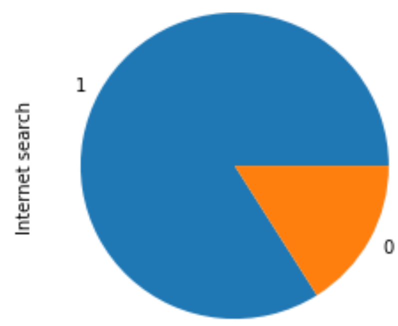



```
1    64
0    42
Name: Shopping, dtype: int64
```

Fig-11

The bar graph gives us information about the output of univariate plots of the categorical variable "shopping". Half of those polled prefer internet shopping to shopping in stores. 60.37% of respondents use smartphones for shopping, and 39.62% of respondents do not use smartphones for shopping.

c) INTERNET SEARCH:

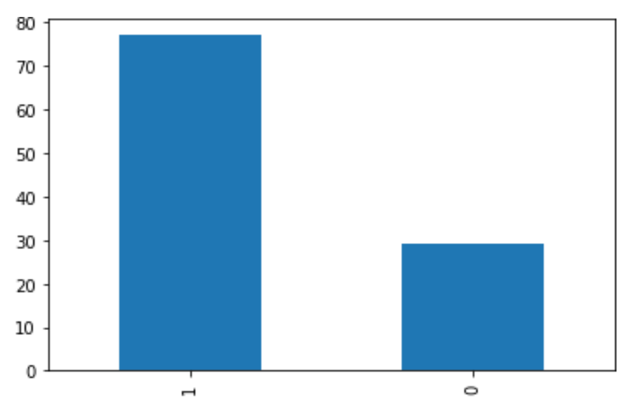



```
1    89
0    17
Name: Internet search, dtype: int64
```

Fig-12

The pie chart tells us about the univariate plots of the categorical variable "internet search" done by the students. College students rely heavily on the internet. Many people use far too much time exploring the internet. There are 83.96% of students who responded yes and 16.03% who responded no.

d) SETTING ALARM:

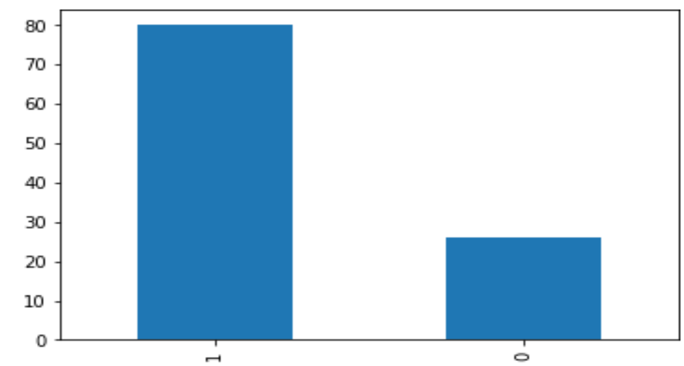



```
1    77
0    29
Name: Setting alarm, dtype: int64
```

Fig-13

The bar graph shows us the univariate plots of the categorical variable "setting of alarms" in smartphones. Students are setting alarms in their smartphones. 72.64% of respondents responded yes, and 27.35% responded no.

e) CHECKING TIME:

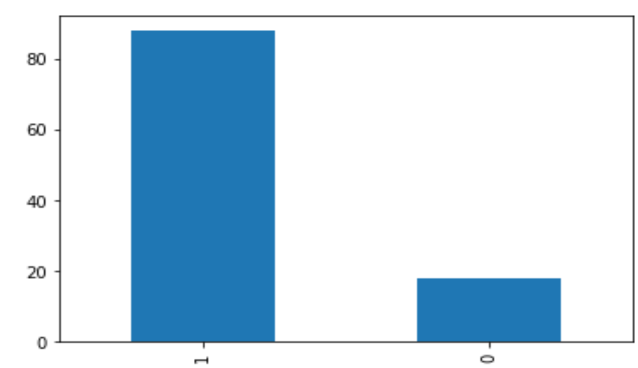



```
1    80
0    26
Name: Checking time, dtype: int64
```

Fig-14

The above bar graph gives us information about the univariate plots of the categorical variable “checking time”. As smartphones are always with them, many people use them to check the time. 75.47% of respondents are checking on smartphones, and 24.52% responded no.

e) TAKING PHOTO:

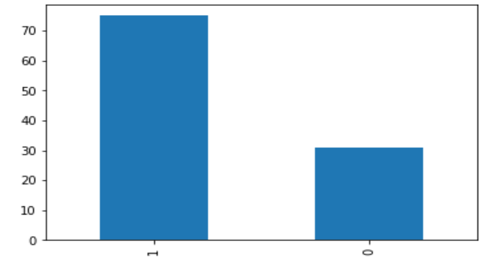



```
1    88
0    18
Name: Taking photo, dtype: int64
```

Fig-16

The above bar graph gives us information about the univariate plots of the categorical variable "taking photos". Students nowadays take pictures using smartphones rather than cameras. Even smartphones offer high-quality cameras for capturing pictures. 83.01% of respondents responded yes, and 16.98% responded no.

f) CHECKING MAILS:

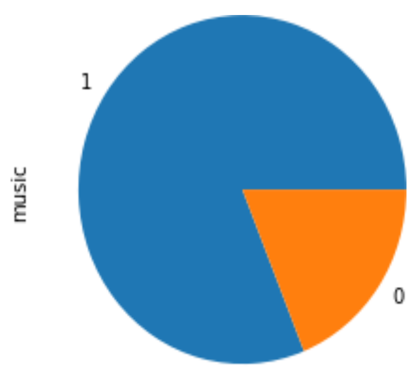



```
1    75
0    31
Name: Checking mails, dtype: int64
```

Fig-17

The above bar graph gives us information about the univariate plots of the categorical variable "checking mails". It become routine to check mails as they play a primary role in a college student's life on a daily basis. Almost everyone of them checks their smartphones frequently. 70.75% of respondents responded yes, and 29.24 responded no.

g) Music:

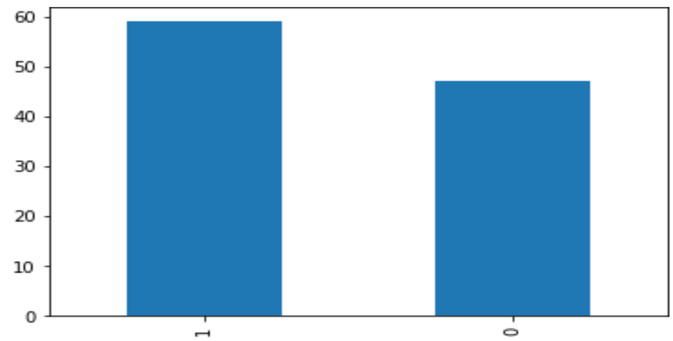



```
1    86
0    20
Name: music, dtype: int64
```

Fig-18

The pie chart tells us about the univariate plots of the categorical variable of using music on smartphones. For many college students, listening to music is an essential part of their daily routine. It is also a beloved pastime for many college students There are 81.13% of students responded yes and 18.86% said no.

h) News:

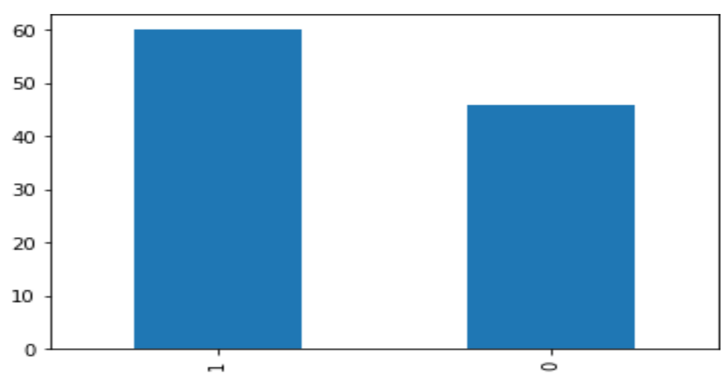



```
1    59
0    47
Name: news, dtype: int64
```

Fig-19

The above bar graph gives us information about the univariate plots of the categorical variable "news". Listening to news is a valuable and important part of college students lives. It can help them stay connected , informed and engaged around the world. 55.66% of respondents responded as yes and 44.33% responded no.

i) REVIEWING NOTES:

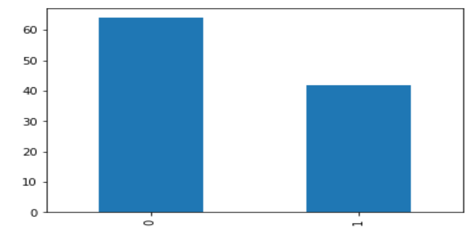



```
1    60
0    46
Name: Reviewing notes, dtype: int64
```

Fig-20

The above bar graph gives us information about the univariate plots of the categorical variable "reviewing notes". Students often take notes during class or while studying, either on paper or on a smartphone. Reviewing notes can help college students better understand and retain the information they have learned. 55.6% of respondents responded yes and 43.39% of responded as no.

j) SETTING MEMOS:

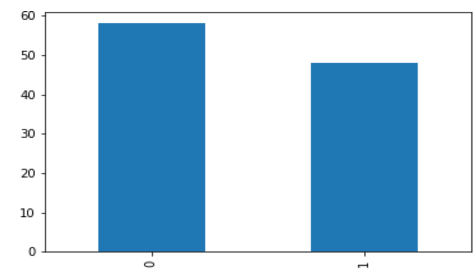



```
0    64
1    42
Name: Setting memos, dtype: int64
```

Fig-21

The above bar graph gives us information about the univariate plots of the categorical variable "setting memos". Setting memos, is an important way for college students to stay on top of their schedules and deadlines. Almost 60.37% of respondents responded yes and 39.62% responded no.

k) PLAYING GAMES:

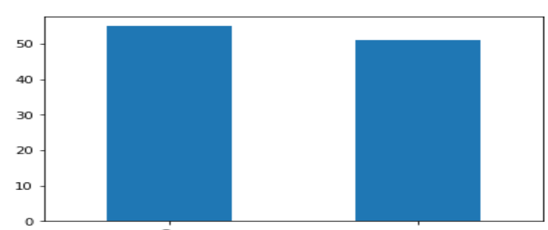



```
0    58
1    48
Name: Playing games, dtype: int64
```

Fig-22

The above bar graph gives us information about the univariate plots of the categorical variable "playing games" on their smartphones. Playing games on smartphones is a popular pastime for many college students. It can provide a quick and easy source of entertainment. 54.71% of respondents responded that they use their smartphones for playing games, and 45.28% responded that they won't.

l) EDITING PHOTOS:

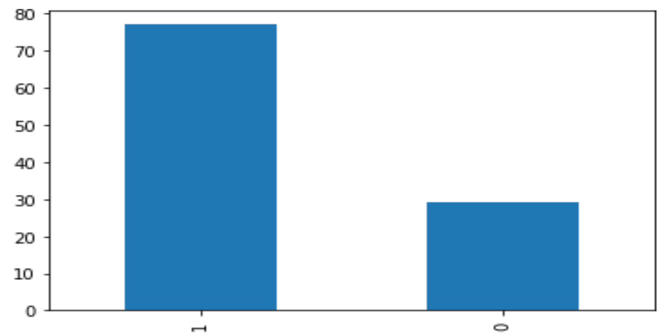



```
0    55
1    51
Name: Editing photos, dtype: int64
```

Fig-23

The above bar graph gives us information about the univariate plots of the categorical variable “editing photos” on their smartphones. 51.88% of respondents responded yes and 48% responded no.

m) TRANSACTIONS:

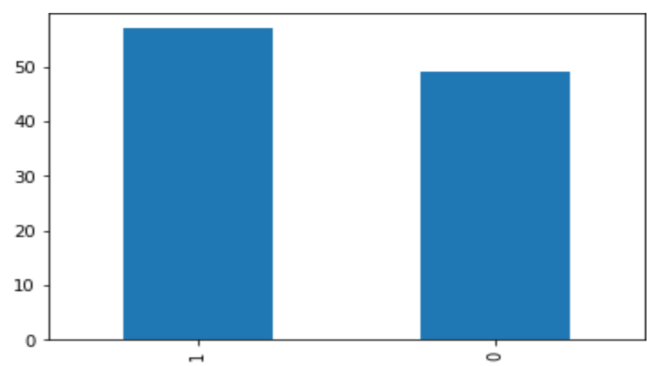



```
1    77
0    29
Name: transactions, dtype: int64
```

Fig-24

The above bar graph gives us information about the univariate plots of the categorical variable “transactions” on their smartphones. Many college sudents nowadays prefer online transactions instead of money because they make their lives easier. 72.64% of respondents responded yes and 27.35% responded no.

n) SETTING MEETINGS:

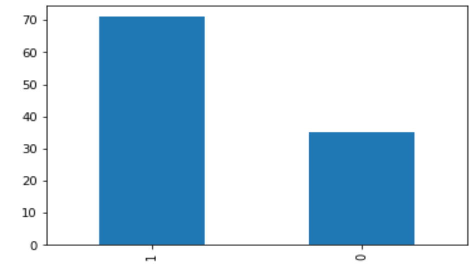



```
1    57
0    49
Name: Setting meetings, dtype: int64
```

Fig-25

The above bar graph gives us information about the univariate plots of the categorical variable “setting meetings”. 53.77% of respondents responded yes and 46.22% responded no.

o) GPS LOCATION:

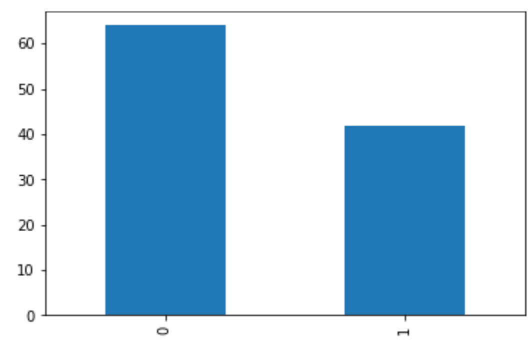



```
1    71
0    35
Name: GPS Location, dtype: int64
```

Fig-26

The above bar graph gives us information about the univariate plots of the categorical variable using “GPS location” on their smartphones. Smartphones are quite useful for GPS location. 66.98% of respondents responded yes and 33.01% responded no.

p) READING BOOKS:



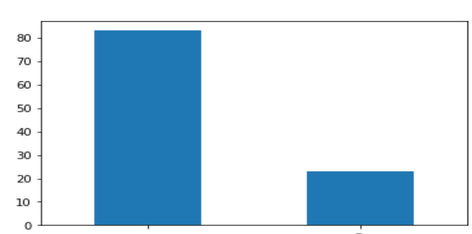

```
0    64
1    42
Name: Reading books, dtype: int64
```

Fig-27

The above bar graph gives us information about the univariate plots of the categorical variable of “reading books”. 60.37% of respondents responded yes and 39.62% responded as no.

<u>SITUATION OF USE:</u>

a) WHEN GET BORED:

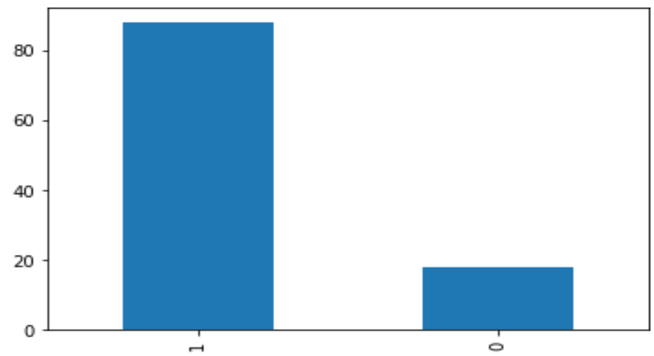



```
1    83
0    23
Name: When get bored, dtype: int64
```

Fig-28

The above bar graph gives us information about the univariate plots of the categorical variable of when they get bored. When they get bored smartphones are a popular pastime for college students. 78.30% of respondents responded yes and 43.39% responded no.

b) WHEN ALONE:

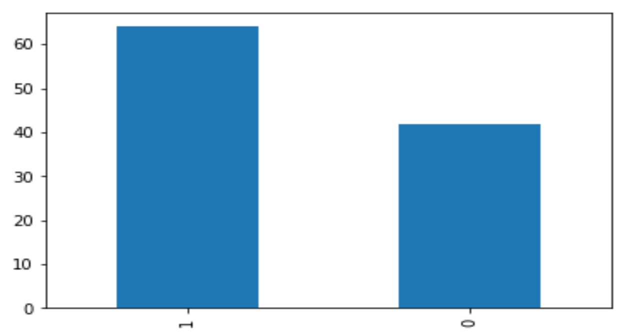



```
1    88
0    18
Name: When alone, dtype: int64
```

Fig-29

The above bar graph gives us information about the univariate plots of the categorical variable when they are alone. When alone, many individuals turn to their smartphones for entertainment or distraction. 83.01% of respondents responded yes and 16.98% responded no.

c) ON PUBLIC TRANSPORTATION:

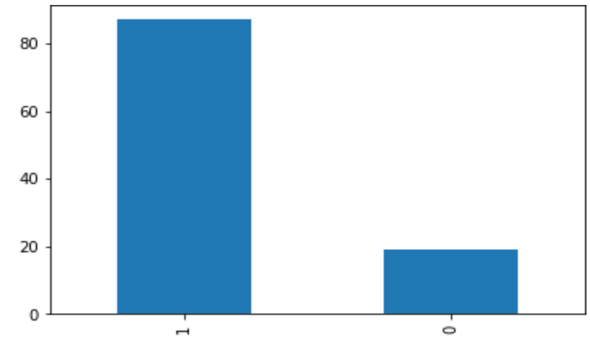



```
1    64
0    42
Name: On public transportation, dtype: int64
```

Fig-30

The above bar graph gives us information about the univariate plots of the categorical variable they are using smartphones on public transportation. 60.37% of respondents responded yes and 39.62% responded no.

d) IN LEISURE TIMES:

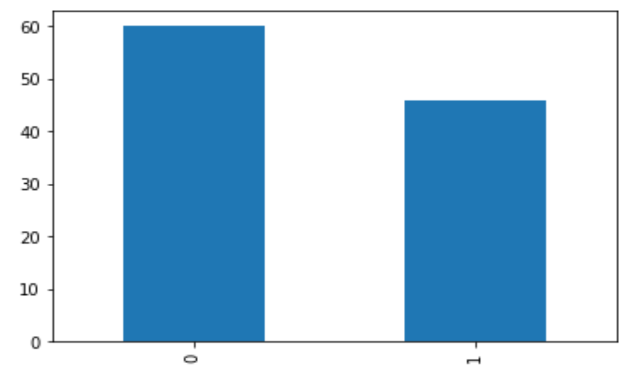



```
1    87
0    19
Name: In leisure times, dtype: int64
```

Fig-31

The above bar graph gives us information about the univariate plots of the categorical variable using smartphones in leisure times. 82.07% of respondents responded yes and 17.92% responded no.

e) HANGING OUT WITH FRIENDS:

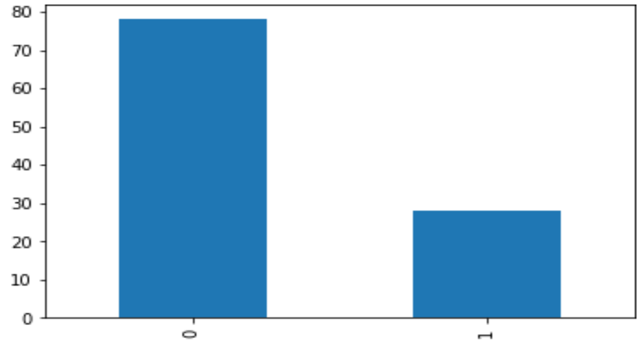



```
0    60
1    46
Name: Hanging out with friends, dtype: int64
```

Fig-32

The above bar graph gives us information about the univariate plots of the categorical variable using smartphones while hanging out with friends. 56.60% of respondents responded yes and 43.39% responded no.

f) IN RESTROOM:

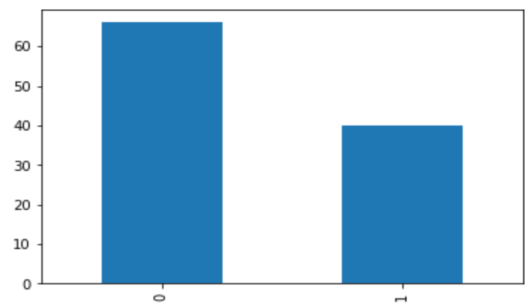



```
0    78
1    28
Name: In restroom, dtype: int64
```

Fig-33

The above bar graph gives us information about the univariate plots of the categorical variable using smartphones in restroom. 73.58% of respondents responded yes and 26.41% responded no.

g) EATING SOMETHING:

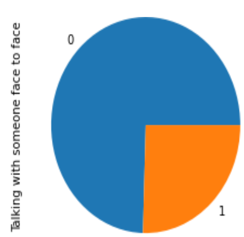



```
0    66
1    40
Name: Eating something, dtype: int64
```

Fig-34

The above bar graph gives us information about the univariate plots of the categorical variable using smartphone while eating something. 62.26% of respondents responded yes and 37.73 responded no.

h) TALKING WITH SOMEONE FACE TO FACE:

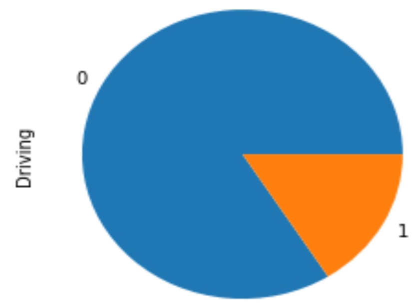



```
0    79
1    27
Name: Talking with someone face to face, dtype: int64
```

Fig-35

The above pie chart gives us information about the univariate plots of the categorical variable using smartphone while talking with someone. 74.52% of respondents responded yes and 25.47% responded no.

i) DRIVING:

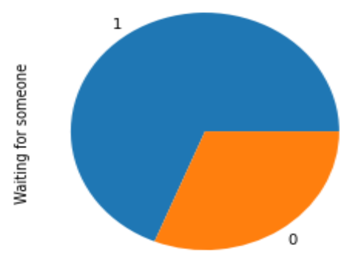



```
0    89
1    17
Name: Driving, dtype: int64
```

Fig-36

The above pie chart gives us information about the univariate plots of the categorical variable using smartphone while driving. 83.96% respondents responded yes and 16.03% responded no.

j) WAITING FOR SOMEONE:

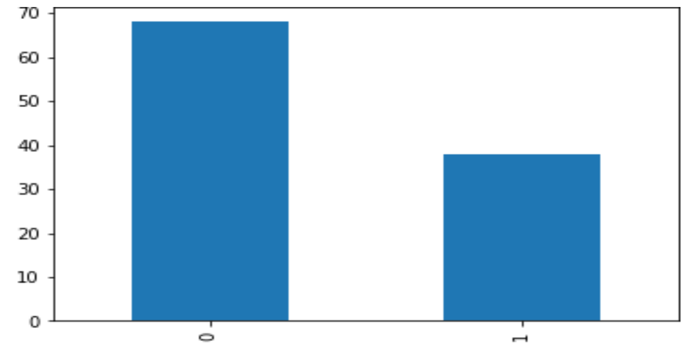



```
1    73
0    33
Name: Waiting for someone, dtype: int64
```

Fig-37

The above pie chart gives us information about the univariate plots of the categorical variable using smartphone while waiting for someone. 68.86% of respondents responded yes and 31.13% responded no.

k) WALKING:



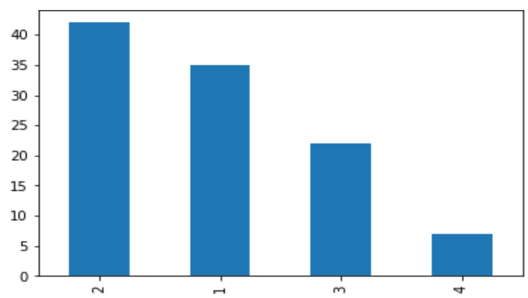

```
0    68
1    38
Name: Walking, dtype: int64
```

Fig-38

The above bar graph gives us information about the univariate plots of the categorical variable using smartphones while walking. 64.15% of respondents responded yes and 35.84% responded no.

WILL PHONES HELP IN EDUCATION:

The following figure shows the number of students using smartphones for education. The legend shows 1 for strongly agree, 2 for agree, 3 for neutral, 4 for disagree and 5 for strongly disagree.



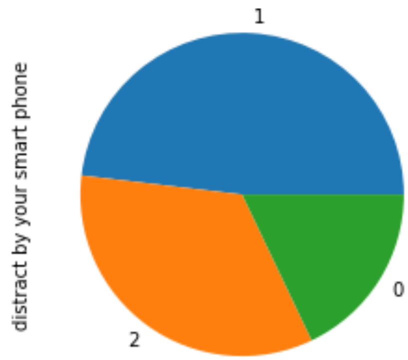

```
2    42
1    35
3    22
4     7
Name: will phones help in education, dtype: int64
```

Fig-39

The above bar graph shows us how many respondents agree that smartphones will help in their work or education. 33.01% of respondents responded strongly agree, 39.62% responded as agree, 20.75% responded as neutral, and 6.6% responded as disagree.

DISTRACT BY YOUR SMART PHONE

The following figure shows the number of students who are distracted by using smartphones. The legend shows 1 for yes, 2 for maybe, and 0 for no.



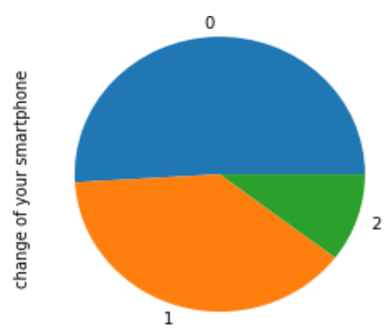

```
1    51
2    36
0    19
Name: distract by your smart phone, dtype: int64
```

Fig-40

The above pie chart shows us how often do they distracted by using smart phone. 48.11% of respondents responded yes, 33.96% responded maybe, 17.92% responded no.

CHANGE OF YOUR SMARTPHONE

The following figure shows the number of students who are changing their smartphones to new versions. The legend shows 1 for yes, 2 for maybe, and 0 for no.



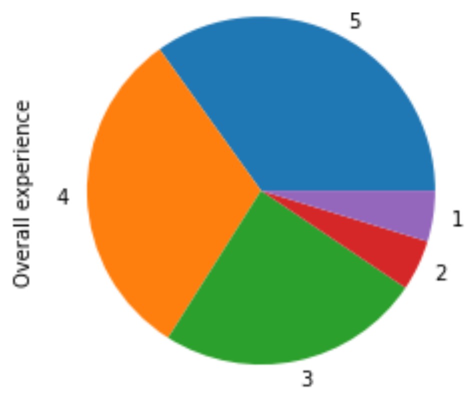

```
0    54
1    41
2    11
Name: change of your smartphone , dtype: int64
```

Fig-41

The above pie chart shows us how frequently you are changing your smartphones. 50.94% of respondents responded no, 10.37% responded maybe and 38.67% responded yes.

<u>OVERALL EXPERIENCE:</u>

The following figure shows the overall experience of college students using smartphones. The legend shows worst to best.



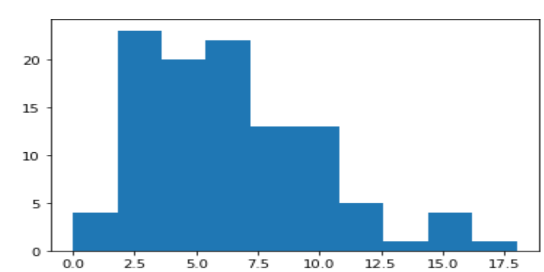

```
5    37
4    33
3    26
2     5
1     5
Name: Overall experience, dtype: int64
```

Fig-42

The above pie chart shows our overall experience of using smartphones. 34.9% of respondents responded with five stars, 31.13% with four stars, 24.52% with three stars, 4.71% with two stars, and 4.71% with one star.

<u>SKWENESS & KURTOSIS</u>:

1) USE IN YEARS:




```
Skewness: 0.726379
Kurtosis: 0.595636
```

Fig-43

From the above figure, we see that "use in years" is positively skewed with 0.726379 and it is playtkurtic kurtosis with 0.595636 as the value is less than 3.

2) Avg Time Spent:

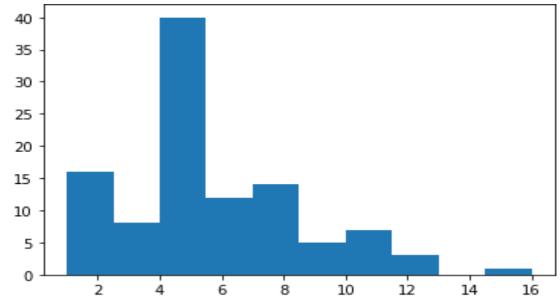


Fig-44

From the above figure, we see that "use in years" is positively skewed with 0.900939 and it is playtkurtic kurtosis with 1.168428 as the value is less than 3

3) On Internet:

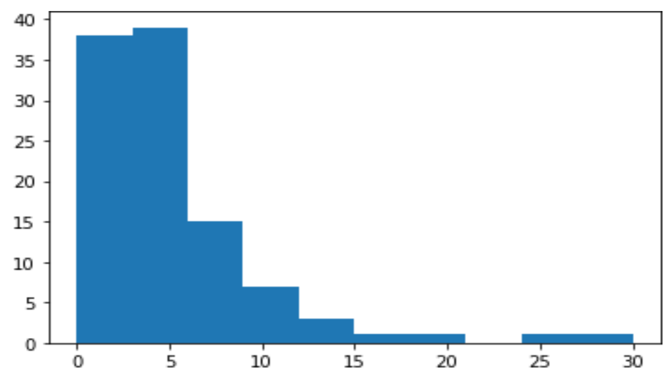


Fig-45

From the above figure, we see that "use in years" is positively skewed with 2.808336 and it is leptokurtic kurtosis with 11.110384 as the value is more than 3

CATEGORICAL VS CATEGORICAL:

- Chi square test for independence of attributes between "will phones help in education" and "AGE".

Ho: "will phones help in education" and "AGE" are independent to each other.

H1: "will phones help in education" and "AGE" are dependent to each other.

Level of Significance: 5%

```
  6.60377358e-02 6.60377358e-02 6.60377358e-02 6.60377358e-02
  7.00000000e+00]
 [1.00000000e+00 6.00000000e+00 1.20000000e+01 1.00000000e+00
  2.10000000e+01 1.00000000e+01 8.00000000e+00 8.00000000e+00
  5.00000000e+00 5.00000000e+00 1.00000000e+00 4.00000000e+00
  4.00000000e+00 1.00000000e+00 1.00000000e+00 1.00000000e+00
  3.00000000e+00 1.00000000e+00 1.00000000e+00 2.00000000e+00
  1.00000000e+00 2.00000000e+00 1.00000000e+00 2.00000000e+00
  1.00000000e+00 1.00000000e+00 1.00000000e+00 1.00000000e+00
  1.06000000e+02]]
59.02250876108018
0.9999908834755894
p value is0.9999908834755894
Independent(H0 holds true
```

Fig-46

Conclusion: “will phones help in education” and “AGE” are independent to each other.

- Chi square test for independence of attributes between “distract by your smart phone” and “AGE”.

Ho: “distract by your smart phone” and “AGE” are independent to each other.

H1: “distract by your smart phone” and “AGE” are dependent to each other.

Level of Significance: 5%

```
    0.33962264   1.35849057   1.35849057   0.33962264   0.33962264
    0.33962264   1.01886792   0.33962264   0.33962264   0.67924528
    0.33962264   0.67924528   0.33962264   0.67924528   0.33962264
    0.33962264   0.33962264   0.33962264  36.          ]
 [  1.           6.          12.           1.          21.
   10.           8.           8.           5.           5.
    1.           4.           4.           1.           1.
    1.           3.           1.           1.           2.
    1.           2.           1.           2.           1.
    1.           1.           1.         106.          ]]
56.81455968352254
0.9899957700513657
p value is0.9899957700513657
Independent(H0 holds true
```

Fig-47

Conclusion: “distract by your smart phone” and “AGE” are independent to each other.

<u>CONTIONOUS VS CATEGORICAL:</u>

i. T-test between "avg time spent" and "GENDER".

Ho: "avg time spent" and "GENDER" are independent to each other.

H1: "avg time spent" and "GENDER" are dependent to each other.

Level of significance: 5%

```
Ttest_indResult(statistic=0.27776129196051186, pvalue=0.7817470266114159)
```

Conclusion: avg time spent and GENDER are independent to each other.

ii. T-test between "on internet" and "EDUCATION".

Ho: "on internet" and "EDUCATION" are independent to each other.

H1: "on internet" and "EDUCATION" are dependent to each other.

Level of significance: 5%

```
Ttest_indResult(statistic=-1.6015419562535969, pvalue=0.1140328773961044)
```

Conclusion: on internet and EDUCATION are independent to each other.

iii. T-test between "In leisure times" and "GENDER".

Ho: "In leisure times" and "GENDER" are independent to each other.

H1: "In leisure times" and "GENDER" are dependent to each other.

Level of significance: 5%

```
Ttest_indResult(statistic=-1.2637450680622242, pvalue=0.20914691241138886)
```

Conclusion: In leisure times and GENDER are independent to each other.

CHAPTER-6

CONCLUSION:

Smartphones are essential in the life of college students. They make extensive use of smartphones. Therefore, this study attempted to analyze and enhance understanding of usage of smartphones by college students. From the above figures, the study concluded the some important points that are summarized and discussed below:

- Most of the students are using Android version rather than iOS. They started using smartphones in 2015. College students are using smartphones for an average of 3 years. They spend almost 6 hours a day on smartphones.
- Messaging, internet research, taking photos, listening to music and checking time are the most popular ways of using smartphones.
- The situations in which they are using smartphones most are while they are driving, when they are alone, in leisure time, and when they get bored.
- The majority of college students agreed that smartphones would help in their education. Yet half of the college students agreed that they are distracted by smartphones.
- Many of them are refusing to upgrade to the new version of their smartphones. This shows that they are satisfied with their current version of smartphones.
- There is no relationship between respondent gender and average time spent on smartphones. And also there is no relation between gender and the time spent on smartphones in their leisure times.
- The education status of the respondent has no relationship between the time they are spending on internet.
- There is no relation between age of the respondent and how they distracted from their smartphones. There is no relation between age and the smartphones help in education.

We inferred that overall experience for college students is great. Smartphones are of good use for college students. Smartphones are widely used by college students for a variety of purposes. They serve as a convenient tool for communication, entertainment, education, organization, social media, and online shopping. Overall, smartphones are an integral part of college students' lives, providing a range of benefits that enhance academic performance and personal wellbeing.

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   Amine Hatun Ataş [1], Berkan Çelik [2][1] aminehatunatas@gmail.com,Middle East Technical University,Turkey [2] berkancx@gmail.com, Middle East Technical University and Van Yüzüncü Yıl University, Turkey.
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APPENDIX-1

QUESTIONNARIE

USAGE OF SMART PHONES BY COLLEGE STUDENTS

Form description

GENDER *

- Male
- Female

AGE *

Short answer text

EDUCATION *

- Intermediate
- Under Graduation
- Post Graduation

Discipline of Study *

- General Sciences
- Social Sciences and Humanities
- Business and Commerce
- Computer Science
- Other

VERSION OF SMART PHONE *

- IOS
- Android

Which year did you start using a smartphone? *

Short answer text

Since how long are you using your own smartphone(in years) *

Short answer text

What is the average time you spend on smart phones per day?(in hours) ex:3hrs *

How many hours do you spend on internet? *

Short answer text

No of times you check for notifications *

Short answer text

Purpose of use *

	Yes	No
Messaging (SMS, WhatsApp, and...	○	○
Calling (Phone call, Skype, Viber, ...	○	○

Shopping
Checking social media accounts
Internet search
Setting alarm
Checking time
Taking photo/Recording video
Checking e-mails
Listening to music
Checking news
Reviewing lecture notes

Setting memos
Playing games
Editing photos
Doing bank transactions
Setting meetings or activities
GPS Location
Reading e-books

Situation of use *

	Yes	No

When get bored	○	○
When alone	○	○
On public transportation	○	○
In leisure times	○	○
Hanging out with friends	○	○
In a restroom	○	○
Eating something	○	○
Talking with someone face to face	○	○
Driving	○	○
Waiting for someone/something	○	○
Walking	○	○

Do you agree that smart phone will help in your work or education *

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree

Do you admit your often distract by your smart phone *

- ○ Yes

○ No

○ Maybe

Do you frequently change your smart phones to latest version *

○ Yes

○ No

○ Maybe

Overall experience in using smart phone *

	1	2	3	4	5	
worst	○	○	○	○	○	best

Write a review on usage of smart phone

Short answer text

APPENDIX-2

DATASET

1	GENDER	AGE	EDUCATIO	Discipline	VERSION (	Which yea	Since how	What is th	How many	No of time	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpose o	Purpo
2	Female	19	Under Gra	Computer	Android	2015	7	12	6	50	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
3	Female	24	Post Grad	Computer	Android	2013	2	7	3	50	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Female	45	Post Grad	Other	Android	2005	18	4	2	25	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Female	20	Under Gra	Computer	Android	2018	2	3	2	12	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No
6	Male	21	Post Grad	Other	Android	2015	10	8	10	13	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	No	No
7	Female	24	Post Grad	General S	IOS	2013	10	2	2	12	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Male	31	Under Gra	Other	Android	2015	7	6	3	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Male	20	Under Gra	Computer	Android	2019	4	4	4	100	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
10	Male	25	Under Gra	Computer	IOS	2014	10	5	2	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Male	39	Post Grad	Other	Android	2010	12	5	5	20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
12	Female	22	Under Gra	Other	Android	2018	5	3	2	5	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No
13	Male	29	Post Grad	Computer	Android	2017	4	7	5	10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	Male	48	Post Grad	Other	Android	2015	7	2	1	6	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	Yes
15	Female	25	Under Gra	Computer	Android	2016	8	5	5	25	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	Male	29	Post Grad	Computer	Android	2018	5	12	12	35	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	Male	32	Under Gra	Business a	Android	2014	5	5	5	0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
18	Female	28	Post Grad	Computer	IOS	2018	5	6	10	12	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19	Male	28	Post Grad	General S	Android	2010	10	6	24	5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20	Female	24	Post Grad	Social Scie	Android	2016	7	2	7	0	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
21	Male	19	Under Gra	Computer	Android	2018	3	9	2	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
22	Male	20	Under Gra	Computer	Android	2015	2	3	2	15	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
23	Female	20	Under Gra	Computer	Android	2020	2	2	2	9	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No

APPENDIX-3

Code

```
In [1]: import pandas as pd

In [2]: dataset = pd.read_csv('usage of smartphones.csv')

In [3]: print(dataset.shape)

        (106, 45)

In [4]: df = pd.read_csv('usage of smartphones.csv')

In [5]: dataset.dtypes

Out[5]: GENDER                                 object
        AGE                                    object
        EDUCATION                              object
        Discipline                             object
        VERSION                                object
        year of start                           int64
        use in years                            int64
        avg time spent                          int64
        on internet                             int64
        for notifications                       int64
        Messaging                               int64
        Calling                                 int64
        Shopping                                int64
        Checking social media                   int64
        Internet search                         int64
        Setting alarm                           int64
        Checking time                           int64
        Taking photo                            int64
        Checking mails                          int64
        music                                   int64
        news                                    int64
        Reviewing notes                         int64
        Setting memos                           int64
        Playing games                           int64
        Editing photos                          int64
        transactions                            int64
        Setting meetings                        int64
        GPS Location                            int64
        Reading books                           int64
        When get bored                          int64
        When alone                              int64
        On public transportation                int64
        In leisure times                        int64
        Hanging out with friends                int64
        In restroom                             int64
        Eating something                        int64
        Talking with someone face to face       int64
        Driving                                 int64
        Waiting for someone                     int64
        Walking                                 int64
        will phones help in education           int64
        distract by your smart phone            int64
        change of your smartphone               int64
        Overall experience                      int64
        Review                                 object
        dtype: object

In [6]: df.head()
```

Out[6]:

	GENDER	AGE	EDUCATION	Discipline	VERSION	year of start	use in years	avg time spent	on internet	for notifications	...	Eating something	Talking with someone face to face	Driving	Waiting for someone	Walking	w phone help educatio
0	Female	19	Under Graduation	Computer Science	Android	2015	7	12	6	50	...	1	0	0	1	1	
1	Female	24	Post Graduation	Computer Science	Android	2013	2	7	3	50	...	1	0	0	1	1	
2	Female	45	Post Graduation	Other	Android	2005	18	4	2	25	...	1	0	0	1	0	
3	Female	20	Under Graduation	Computer Science	Android	2018	2	3	2	12	...	0	0	0	1	1	
4	Male	21	Post Graduation	Other	Android	2015	10	8	10	13	...	1	0	1	0	1	

5 rows × 45 columns

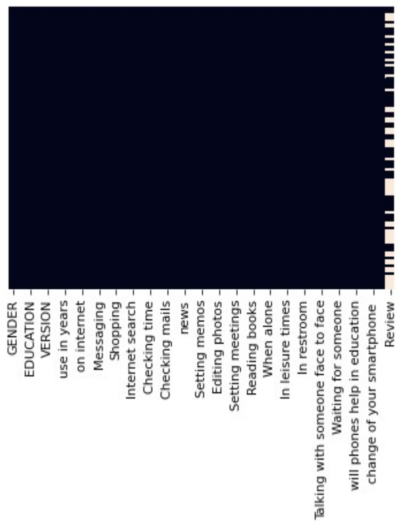
In [7]:
```
dataset.isnull().sum()
```

Out[7]:
```
GENDER                                0
AGE                                   0
EDUCATION                             0
Discipline                            0
VERSION                               0
year of start                         0
use in years                          0
avg time spent                        0
on internet                           0
for notifications                     0
Messaging                             0
Calling                               0
Shopping                              0
Checking social media                 0
Internet search                       0
Setting alarm                         0
Checking time                         0
Taking photo                          0
Checking mails                        0
music                                 0
news                                  0
Reviewing notes                       0
Setting memos                         0
Playing games                         0
Editing photos                        0
transactions                          0
Setting meetings                      0
GPS Location                          0
Reading books                         0

When get bored                        0
When alone                            0
On public transportation              0
In leisure times                      0
Hanging out with friends              0
In restroom                           0
Eating something                      0
Talking with someone face to face     0
Driving                               0
Waiting for someone                   0
Walking                               0
will phones help in education         0
distract by your smart phone          0
change of your smartphone             0
Overall experience                    0
Review                               47
dtype: int64
```

In [8]:
```
import seaborn as sns
sns.heatmap(dataset.isnull(),yticklabels=False,cbar=False)
```

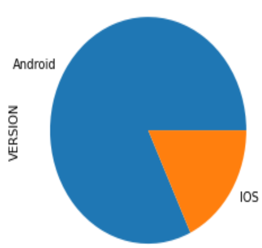
Out[8]: <matplotlib.axes._subplots.AxesSubplot at 0x20c1ba6c850>



In [9]:
```
import matplotlib.pyplot as plt
dataset['GENDER'].value_counts()
```

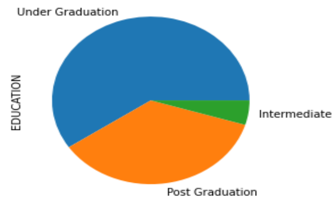
Out[9]:
```
Female    53
Male      53
Name: GENDER, dtype: int64
```

In [10]:
```
import matplotlib.pyplot as plt
dataset['VERSION'].value_counts().plot.pie()
plt.show()
dataset['VERSION'].value_counts()
```



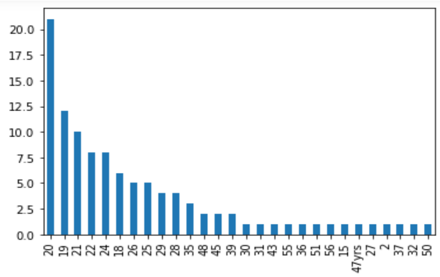
Out[10]:
```
Android    87
IOS        19
Name: VERSION, dtype: int64
```

In [11]:
```
import matplotlib.pyplot as plt
dataset['EDUCATION'].value_counts().plot.pie()
plt.show()
dataset['EDUCATION'].value_counts()
```



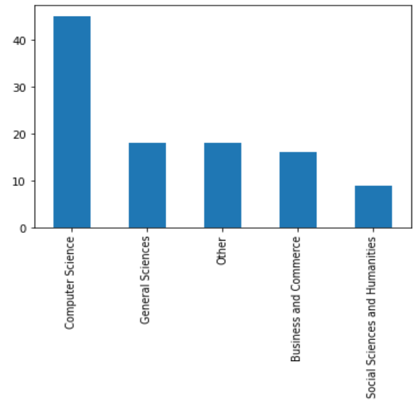
Out[11]:
```
Under Graduation    63
Post Graduation     38
Intermediate         5
Name: EDUCATION, dtype: int64
```

In [12]:
```
import matplotlib.pyplot as plt
dataset['AGE'].value_counts().plot.bar()
plt.show()
dataset['AGE'].value_counts()
```



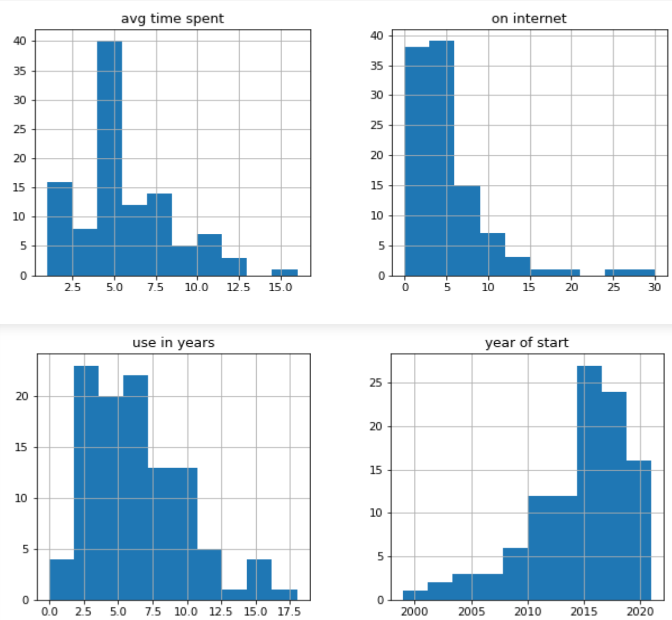
Out[12]:
```
20       21
19       12
21       10
22        8
24        8
18        6
26        5
25        5
29        4
28        4
35        3
48        2
45        2
39        2
30        1
31        1
43        1
55        1
36        1
51        1
56        1
15        1
47yrs     1
27        1
2         1
37        1
32        1
50        1
Name: AGE, dtype: int64
```

In [13]:
```
import matplotlib.pyplot as plt
dataset['Discipline'].value_counts().plot.bar()
plt.show()
dataset['Discipline'].value_counts()
```

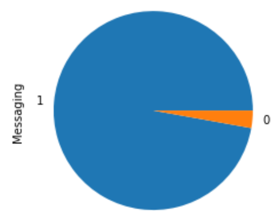


Out[13]:
```
Computer Science                  45
General Sciences                  18
Other                             18
Business and Commerce             16
Social Sciences and Humanities     9
Name: Discipline, dtype: int64
```

In [14]:
```
ds=dataset.iloc[:,5:9]
ds.hist(figsize=(10,10))
plt.show()
```

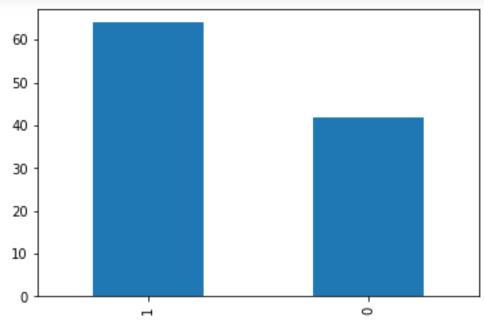


In [15]:
```
import matplotlib.pyplot as plt
dataset['Messaging'].value_counts().plot.pie()
plt.show()
dataset['Messaging'].value_counts()
```



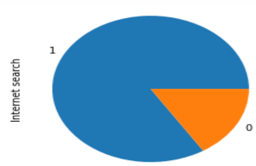

```
Out[15]: 1    103
         0      3
         Name: Messaging, dtype: int64
```

```
In [16]: import matplotlib.pyplot as plt
         dataset['Shopping'].value_counts().plot.bar()
         plt.show()
         dataset['Shopping'].value_counts()
```



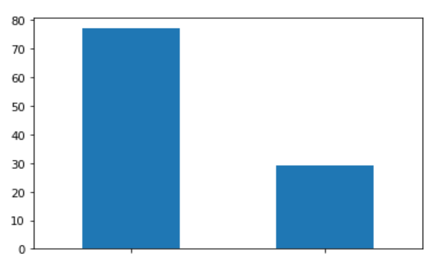

```
Out[16]: 1    64
         0    42
         Name: Shopping, dtype: int64
```

```
In [17]: import matplotlib.pyplot as plt
         dataset['Internet search'].value_counts().plot.pie()
         plt.show()
         dataset['Internet search'].value_counts()
```



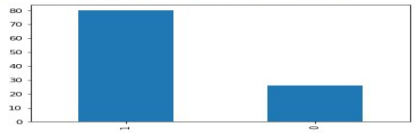

```
Out[17]: 1    89
         0    17
         Name: Internet search, dtype: int64
```

```
In [18]: import matplotlib.pyplot as plt
         dataset['Setting alarm'].value_counts().plot.bar()
         plt.show()
         dataset['Setting alarm'].value_counts()
```



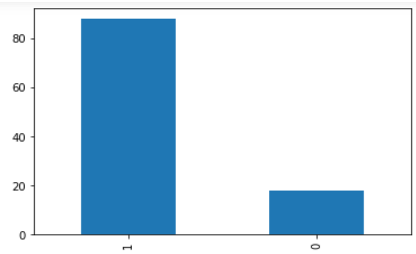

```
Out[18]: 1    77
         0    29
         Name: Setting alarm, dtype: int64
```

In [19]:
```
import matplotlib.pyplot as plt
dataset['Checking time'].value_counts().plot.bar()
plt.show()
dataset['Checking time'].value_counts()
```



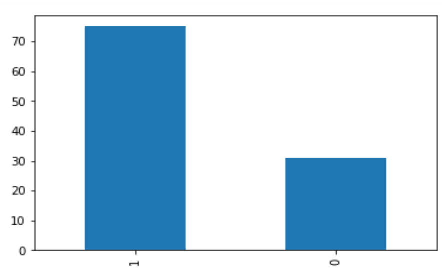
Out[19]:
```
1    80
0    26
Name: Checking time, dtype: int64
```

In [20]:
```
import matplotlib.pyplot as plt
dataset['Taking photo'].value_counts().plot.bar()
plt.show()
dataset['Taking photo'].value_counts()
```



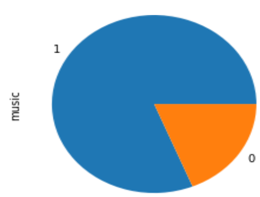
Out[20]:
```
1    88
0    18
Name: Taking photo, dtype: int64
```

In [21]:
```
import matplotlib.pyplot as plt
dataset['Checking mails'].value_counts().plot.bar()
plt.show()
dataset['Checking mails'].value_counts()
```



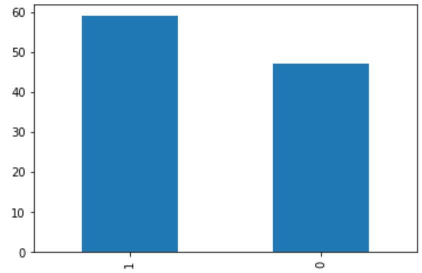
t[21]:
```
1    75
0    31
Name: Checking mails, dtype: int64
```

[22]:
```
import matplotlib.pyplot as plt
dataset['music'].value_counts().plot.pie()
plt.show()
dataset['music'].value_counts()
```



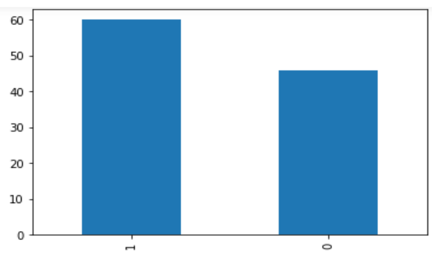
Out[22]:
```
1    86
0    20
Name: music, dtype: int64
```

In [23]:
```python
import matplotlib.pyplot as plt
dataset['news'].value_counts().plot.bar()
plt.show()
dataset['news'].value_counts()
```



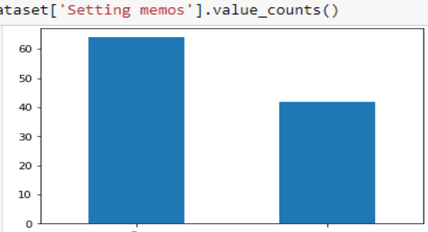
Out[23]:
```
1    59
0    47
Name: news, dtype: int64
```

In [24]:
```python
import matplotlib.pyplot as plt
dataset['Reviewing notes'].value_counts().plot.bar()
plt.show()
dataset['Reviewing notes'].value_counts()
```



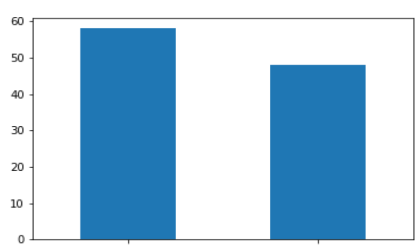
Out[24]:
```
1    60
0    46
Name: Reviewing notes, dtype: int64
```

In [25]:
```python
import matplotlib.pyplot as plt
dataset['Setting memos'].value_counts().plot.bar()
plt.show()
dataset['Setting memos'].value_counts()
```



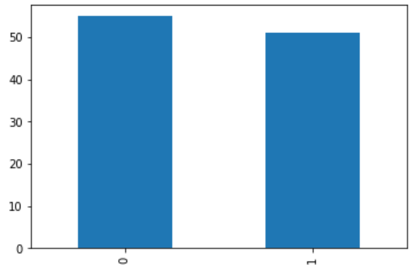
Out[25]:
```
0    64
1    42
Name: Setting memos, dtype: int64
```

In [26]:
```python
import matplotlib.pyplot as plt
dataset['Playing games'].value_counts().plot.bar()
plt.show()
dataset['Playing games'].value_counts()
```



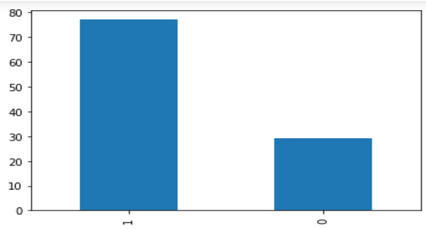
Out[26]:
```
0    58
1    48
Name: Playing games, dtype: int64
```

In [27]:
```python
import matplotlib.pyplot as plt
dataset['Editing photos'].value_counts().plot.bar()
plt.show()
dataset['Editing photos'].value_counts()
```



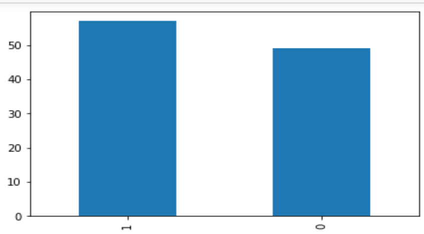
Out[27]:
```
0    55
1    51
Name: Editing photos, dtype: int64
```

In [28]:
```python
import matplotlib.pyplot as plt
dataset['transactions'].value_counts().plot.bar()
plt.show()
dataset['transactions'].value_counts()
```



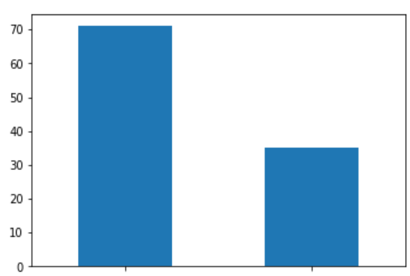
Out[28]:
```
1    77
0    29
Name: transactions, dtype: int64
```

In [29]:
```python
import matplotlib.pyplot as plt
dataset['Setting meetings'].value_counts().plot.bar()
plt.show()
dataset['Setting meetings'].value_counts()
```



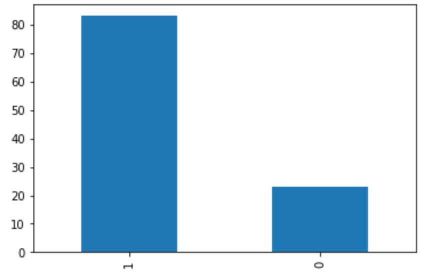
Out[29]:
```
1    57
0    49
Name: Setting meetings, dtype: int64
```

In [30]:
```python
import matplotlib.pyplot as plt
dataset['GPS Location'].value_counts().plot.bar()
plt.show()
dataset['GPS Location'].value_counts()
```



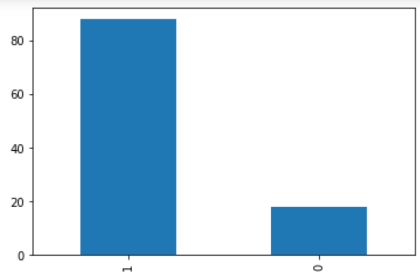
Out[30]:
```
1    71
0    35
Name: GPS Location, dtype: int64
```

In [32]:
```
import matplotlib.pyplot as plt
dataset['When get bored'].value_counts().plot.bar()
plt.show()
dataset['When get bored'].value_counts()
```



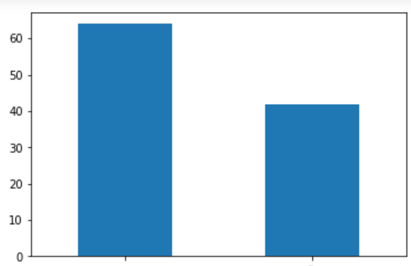
Out[32]:
```
1    83
0    23
Name: When get bored, dtype: int64
```

In [33]:
```
import matplotlib.pyplot as plt
dataset['When alone'].value_counts().plot.bar()
plt.show()
dataset['When alone'].value_counts()
```



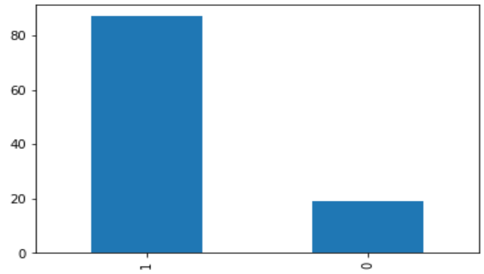
Out[33]:
```
1    88
0    18
Name: When alone, dtype: int64
```

In [34]:
```
import matplotlib.pyplot as plt
dataset['On public transportation'].value_counts().plot.bar()
plt.show()
dataset['On public transportation'].value_counts()
```



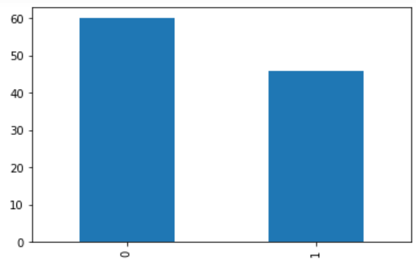
Out[34]:
```
1    64
0    42
Name: On public transportation, dtype: int64
```

In [35]:
```
import matplotlib.pyplot as plt
dataset['In leisure times'].value_counts().plot.bar()
plt.show()
dataset['In leisure times'].value_counts()
```



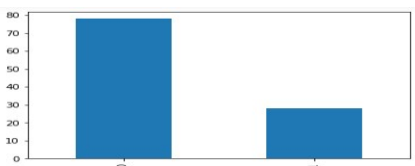
Out[35]:
```
1    87
0    19
Name: In leisure times, dtype: int64
```

In [36]:
```
import matplotlib.pyplot as plt
dataset['Hanging out with friends'].value_counts().plot.bar()
plt.show()
dataset['Hanging out with friends'].value_counts()
```



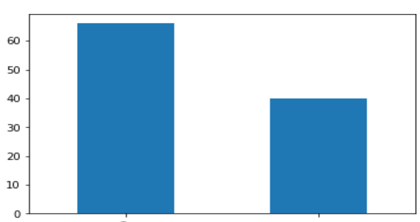
Out[36]:
```
0    60
1    46
Name: Hanging out with friends, dtype: int64
```

In [37]:
```
import matplotlib.pyplot as plt
dataset['In restroom'].value_counts().plot.bar()
plt.show()
dataset['In restroom'].value_counts()
```



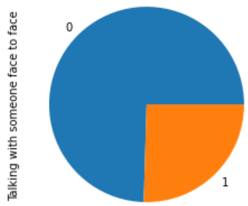
Out[37]:
```
0    78
1    28
Name: In restroom, dtype: int64
```

In [38]:
```
import matplotlib.pyplot as plt
dataset['Eating something'].value_counts().plot.bar()
plt.show()
dataset['Eating something'].value_counts()
```



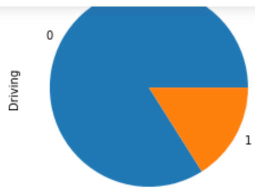
Out[38]:
```
0    66
1    40
Name: Eating something, dtype: int64
```

```
In [39]: import matplotlib.pyplot as plt
         dataset['Talking with someone face to face'].value_counts().plot.pie()
         plt.show()
         dataset['Talking with someone face to face'].value_counts()
```



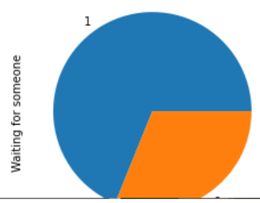

```
Out[39]: 0    79
         1    27
         Name: Talking with someone face to face, dtype: int64
```

```
In [40]: import matplotlib.pyplot as plt
         dataset['Driving'].value_counts().plot.pie()
         plt.show()
         dataset['Driving'].value_counts()
```



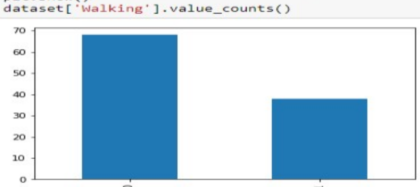

```
Out[40]: 0    89
         1    17
         Name: Driving, dtype: int64
```

```
In [41]: import matplotlib.pyplot as plt
         dataset['Waiting for someone'].value_counts().plot.pie()
         plt.show()
         dataset['Waiting for someone'].value_counts()
```



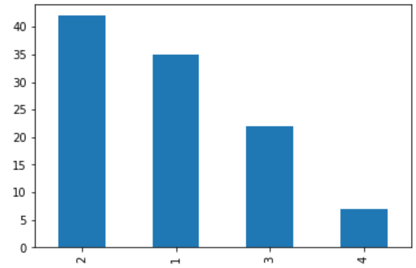

```
Out[41]: 1    73
         0    33
         Name: Waiting for someone, dtype: int64
```

```
In [42]: import matplotlib.pyplot as plt
         dataset['Walking'].value_counts().plot.bar()
         plt.show()
         dataset['Walking'].value_counts()
```



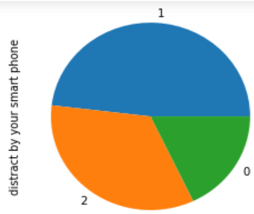

```
Out[42]: 0    68
         1    38
         Name: Walking, dtype: int64
```

In [43]:
```python
import matplotlib.pyplot as plt
dataset['will phones help in education'].value_counts().plot.bar()
plt.show()
dataset['will phones help in education'].value_counts()
```



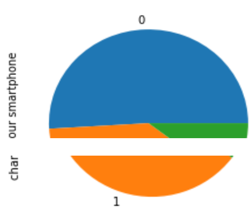
Out[43]:
```
2    42
1    35
3    22
4     7
Name: will phones help in education, dtype: int64
```

In [44]:
```python
import matplotlib.pyplot as plt
dataset['distract by your smart phone'].value_counts().plot.pie()
plt.show()
dataset['distract by your smart phone'].value_counts()
```



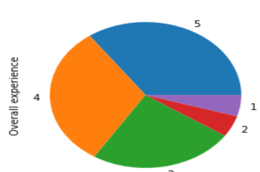
Out[44]:
```
1    51
2    36
0    19
Name: distract by your smart phone, dtype: int64
```

In [45]:
```python
import matplotlib.pyplot as plt
dataset['change of your smartphone '].value_counts().plot.pie()
plt.show()
dataset['change of your smartphone '].value_counts()
```



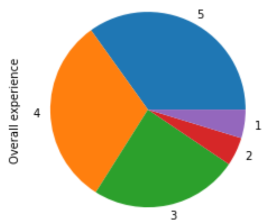
Out[45]:
```
0    54
1    41
2    11
Name: change of your smartphone , dtype: int64
```

In [46]:
```python
import matplotlib.pyplot as plt
dataset['Overall experience'].value_counts().plot.pie()
plt.show()
dataset['Overall experience'].value_counts()
```



Out[46]:
```
5    37
4    33
3    26
```

In [46]:
```
import matplotlib.pyplot as plt
dataset['Overall experience'].value_counts().plot.pie()
plt.show()
dataset['Overall experience'].value_counts()
```



Out[46]:
```
5    37
4    33
3    26
2     5
1     5
Name: Overall experience, dtype: int64
```

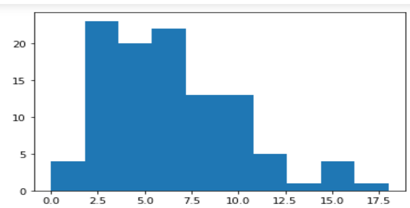
In [47]:
```
dataset.describe()
```

Out[47]:

	year of start	use in years	avg time spent	on internet	for notifications	Messaging	Calling	Shopping	Checking social media	Internet search	...	In restroom	Eating something
count	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	106.000000	...	106.000000	106.000000
mean	2014.518868	6.386792	5.509434	4.801887	33.962264	0.971698	0.933962	0.603774	0.783019	0.839623	...	0.264151	0.377358
std	4.498108	3.637296	2.785149	4.540652	45.796636	0.166622	0.249528	0.491436	0.414148	0.368699	...	0.442975	0.487029
min	1999.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000
25%	2012.250000	3.250000	4.000000	2.000000	6.000000	1.000000	1.000000	0.000000	1.000000	1.000000	...	0.000000	0.000000
50%	2015.000000	6.000000	5.000000	3.000000	20.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	0.000000	0.000000
75%	2018.000000	8.000000	7.000000	6.000000	49.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	1.000000	1.000000
max	2021.000000	18.000000	16.000000	30.000000	250.000000	1.000000	1.000000	1.000000	1.000000	1.000000	...	1.000000	1.000000

8 rows × 39 columns

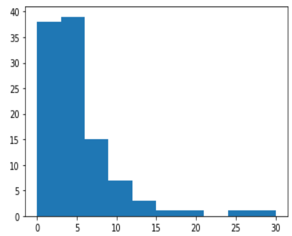
In [48]:
```
plt.hist(dataset['use in years'])
plt.show()
print("Skewness: %f" % dataset['use in years'].skew())
```




```
Skewness: 0.726379
Kurtosis: 0.595636
```

In [49]:
```
plt.hist(dataset['avg time spent'])
plt.show()
print("Skewness: %f" % dataset['avg time spent'].skew())
print("Kurtosis: %f" % dataset['avg time spent'].kurt())
```

In [50]:
```python
plt.hist(dataset['on internet'])
plt.show()
print("Skewness: %f" % dataset['on internet'].skew())
print("Kurtosis: %f" % dataset['on internet'].kurt())
```

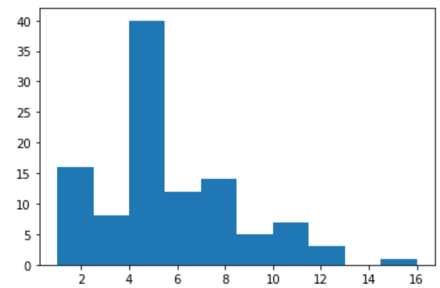


```
Skewness: 2.808336
Kurtosis: 11.110384
```

In [51]:
```python
ct=pd.crosstab(dataset['GENDER'],dataset['Overall experience'],margins=True)
ct
```

Out[51]:

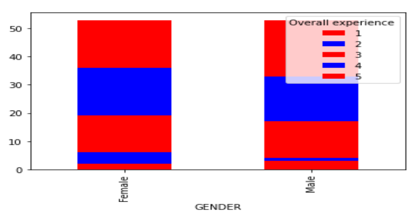
Overall experience	1	2	3	4	5	All
GENDER						
Female	2	4	13	17	17	53
Male	3	1	13	16	20	53
All	5	5	26	33	37	106



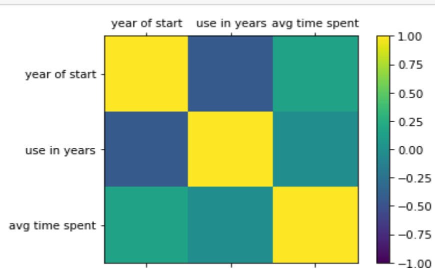
```
Skewness: 0.900939
Kurtosis: 1.168428
```

In [52]:
```python
import matplotlib
%matplotlib inline
ct.iloc[:-1,:-1].plot(kind='bar', stacked=True, color=['red','blue'],grid=False)
```

Out[52]: <matplotlib.axes._subplots.AxesSubplot at 0x20c1f0d75b0>



In [53]:
```python
import numpy
dataset1 = dataset[['year of start','use in years', 'avg time spent']]
names= ['year of start','use in years', 'avg time spent']
correlations = dataset1.corr()
fig = plt.figure()
ax = fig.add_subplot(111)
cax = ax.matshow(correlations, vmin=-1, vmax=1)
fig.colorbar(cax)
ticks = numpy.arange(0,3,1)
ax.set_xticks(ticks)
ax.set_yticks(ticks)
ax.set_xticklabels(names)
ax.set_yticklabels(names)
plt.show()
```



In [54]:
```
dataset1.corr()
```

Out[54]:

	year of start	use in years	avg time spent
year of start	1.000000	-0.432664	0.155068
use in years	-0.432664	1.000000	-0.023397
avg time spent	0.155068	-0.023397	1.000000

In [55]:
```
print(dataset1.describe())
print(dataset1.head())
```

```
       year of start  use in years  avg time spent
count     106.000000    106.000000      106.000000
mean     2014.518868      6.386792        5.509434
std         4.498108      3.637296        2.785149
min      1999.000000      0.000000        1.000000
25%      2012.250000      3.250000        4.000000
50%      2015.000000      6.000000        5.000000
75%      2018.000000      8.000000        7.000000
max      2021.000000     18.000000       16.000000
   year of start  use in years  avg time spent
0           2015             7              12
1           2013             2               7
2           2005            18               4
3           2018             2               3
4           2015            10               8
```

In [56]:
```
from scipy.stats import chi2_contingency
from scipy.stats import chi2
```

```
ct=pd.crosstab(dataset['will phones help in education'],dataset['AGE'],margins=True)
ct
stat, p,dof,expected=chi2_contingency(ct)
print(expected)
print(stat)
print(p)
alpha=0.05
print("p value is" +str(p))
if p<=alpha:
    print('Dependent(rejectH0)')
else:
    print('Independent(H0 holds true')
```

```
[[3.30188679e-01 1.98113208e+00 3.96226415e+00 3.30188679e-01
  6.93396226e+00 3.30188679e+00 2.64150943e+00 2.64150943e+00
  1.65094340e+00 1.65094340e+00 3.30188679e-01 1.32075472e+00
  1.32075472e+00 3.30188679e-01 3.30188679e-01 3.30188679e-01
  9.90566038e-01 3.30188679e-01 3.30188679e-01 6.60377358e-01
  3.30188679e-01 6.60377358e-01 3.30188679e-01 6.60377358e-01
  3.30188679e-01 3.30188679e-01 3.30188679e-01 3.30188679e-01
  3.50000000e+01]
 [3.96226415e-01 2.37735849e+00 4.75471698e+00 3.96226415e-01
  8.32075472e+00 3.96226415e+00 3.16981132e+00 3.16981132e+00
  1.98113208e+00 1.98113208e+00 3.96226415e-01 1.58490566e+00
  1.58490566e+00 3.96226415e-01 3.96226415e-01 3.96226415e-01
  1.18867925e+00 3.96226415e-01 3.96226415e-01 7.92452830e-01
  3.96226415e-01 7.92452830e-01 3.96226415e-01 7.92452830e-01
  3.96226415e-01 3.96226415e-01 3.96226415e-01 3.96226415e-01
  4.20000000e+01]
 [2.07547170e-01 1.24528302e+00 2.49056604e+00 2.07547170e-01
  4.35849057e+00 2.07547170e+00 1.66037736e+00 1.66037736e+00
  1.03773585e+00 1.03773585e+00 2.07547170e-01 8.30188679e-01
```

```
In [57]: from scipy.stats import chi2_contingency
         from scipy.stats import chi2
         ct=pd.crosstab(dataset['distract by your smart phone'],dataset['AGE'],margins=True)
         ct
         stat, p,dof,expected=chi2_contingency(ct)
         print(expected)
         print(stat)
         print(p)
         alpha=0.05
         print("p value is" +str(p))
         if p<=alpha:
             print('Dependent(rejectH0)')
         else:
             print('Independent(H0 holds true')
```

```
[[  0.17924528   1.0754717    2.1509434    0.17924528   3.76415094
    1.79245283   1.43396226   1.43396226   0.89622642   0.89622642
    0.17924528   0.71698113   0.71698113   0.17924528   0.17924528
    0.17924528   0.53773585   0.17924528   0.17924528   0.35849057
    0.17924528   0.35849057   0.17924528   0.35849057   0.17924528
    0.17924528   0.17924528   0.17924528  19.        ]
 [  0.48113208   2.88679245   5.77358491   0.48113208  10.10377358
    4.81132075   3.8490566    3.8490566    2.40566038   2.40566038
    0.48113208   1.9245283    1.9245283    0.48113208   0.48113208
    0.48113208   1.44339623   0.48113208   0.48113208   0.96226415
    0.48113208   0.96226415   0.48113208   0.96226415   0.48113208
    0.48113208   0.48113208   0.48113208  51.        ]
 [  0.33962264   2.03773585   4.0754717    0.33962264   7.13207547
    3.39622642   2.71698113   2.71698113   1.69811321   1.69811321
    0.33962264   1.35849057   1.35849057   0.33962264   0.33962264
    0.33962264   1.01886792   0.33962264   0.33962264   0.67924528
    0.33962264   0.67924528   0.33962264   0.67924528   0.33962264
```

```
  8.30188679e-01 2.07547170e-01 2.07547170e-01 2.07547170e-01
  6.22641509e-01 2.07547170e-01 2.07547170e-01 4.15094340e-01
  2.07547170e-01 4.15094340e-01 2.07547170e-01 4.15094340e-01
  2.07547170e-01 2.07547170e-01 2.07547170e-01 2.07547170e-01
  2.20000000e+01]
 [6.60377358e-02 3.96226415e-01 7.92452830e-01 6.60377358e-02
  1.38679245e+00 6.60377358e-01 5.28301887e-01 5.28301887e-01
  3.30188679e-01 3.30188679e-01 6.60377358e-02 2.64150943e-01
  2.64150943e-01 6.60377358e-02 6.60377358e-02 6.60377358e-02
  1.98113208e-01 6.60377358e-02 6.60377358e-02 1.32075472e-01
  6.60377358e-02 1.32075472e-01 6.60377358e-02 1.32075472e-01
  6.60377358e-02 6.60377358e-02 6.60377358e-02 6.60377358e-02
  7.00000000e+00]
 [1.00000000e+00 6.00000000e+00 1.20000000e+01 1.00000000e+00
  2.10000000e+01 1.00000000e+01 8.00000000e+00 8.00000000e+00
  5.00000000e+00 5.00000000e+00 1.00000000e+00 4.00000000e+00
  4.00000000e+00 1.00000000e+00 1.00000000e+00 1.00000000e+00
  3.00000000e+00 1.00000000e+00 1.00000000e+00 2.00000000e+00
  1.00000000e+00 2.00000000e+00 1.00000000e+00 2.00000000e+00
  1.00000000e+00 1.00000000e+00 1.00000000e+00 1.00000000e+00
  1.06000000e+02]]
59.02250876108018
0.9999908834755894
p value is0.9999908834755894
Independent(H0 holds true
```

```
 [  1.           6.          12.           1.          21.
   10.           8.           8.           5.           5.
    1.           4.           4.           1.           1.
    1.           3.           1.           1.           2.
    1.           2.           1.           2.           1.
    1.           1.           1.         106.        ]]
56.81455968352254
0.9899957700513657
p value is0.9899957700513657
Independent(H0 holds true
```

```
In [58]: from scipy.stats import chi2_contingency
         from scipy.stats import chi2
         # contingency table
         table = [ [3404, 1139],
         [4559, 898]]
         print(table)
         stat, p, dof, expected = chi2_contingency(table)
         print(expected)
         print(stat)
         print(p)

         [[3404, 1139], [4559, 898]]
         [[3617.5909  925.4091]
          [4345.4091 1111.5909]]
         112.91857062096116
         2.2482100097131755e-26
```

```
In [59]: import numpy as np
         from scipy import stats
         from numpy.random import seed
```

```
         from numpy.random import randn
         from numpy.random import normal
         from scipy.stats import ttest_1samp
         stats.ttest_ind(df['avg time spent'][df['GENDER'] == 'Male'],
                         df['avg time spent'][df['GENDER'] == 'Female'])

Out[59]: Ttest_indResult(statistic=0.27776129196051186, pvalue=0.7817470266114159)
```

```
In [60]: import numpy as np
         from scipy import stats
         from numpy.random import seed
         from numpy.random import randn
         from numpy.random import normal
         from scipy.stats import ttest_1samp
         stats.ttest_ind(df['on internet'][df['EDUCATION']== 'Intermediate'],
                         df['on internet'][df['EDUCATION']== 'Under Graduation'])

Out[60]: Ttest_indResult(statistic=-1.6015419562535969, pvalue=0.1140328773961044)
```

```
In [61]: import numpy as np
         from scipy import stats
         from numpy.random import seed
         from numpy.random import randn
         from numpy.random import normal
         from scipy.stats import ttest_1samp
         stats.ttest_ind(df['In leisure times'][df['GENDER']== 'Male'],
                         df['In leisure times'][df['GENDER']== 'Female'])

Out[61]: Ttest_indResult(statistic=-1.2637450680622242, pvalue=0.20914691241138886)
```