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ijirset@gmail.com



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Application Preferences during the Pandemic

Karnaraj Rathod¹, Rohan Wadikar², Kushal Pasumarth³, Aliasger Karachiwala⁴

BS.c Applied Statistics & Analytics, Sunandan Divatia School of Science, NMIMS
Navi Mumbai, India

ABSTRACT: During the lockdowns that were imposed due to the pandemic, the amount of time spent while using technology staggeringly increased. In turn, users became much more picky with where they spent that particular time, according to their preferences. This study aimed to find out if the preference of using PUBG & Instagram was linked to the demographics of the user or not. Both studies were conducted independently and while age was associated with both, only gender was associated with using PUBG. Occupation remained independent.

KEYWORDS: PUBG, Instagram, Chi-Square, Age, Gender.

I. INTRODUCTION

In today's world, there are multiple applications for multiple things. Users can choose an app, based on its performance, its interface, its design, its personalization availabilities or any other important factor. During the pandemic, most of the population was forced to stay indoors for long periods of time. This resulted in a huge increase in the amount of time that users spent on their phones. Due to the increased usage, users began to scrutinize the characteristics of the applications they used on a much higher level. Comparisons were made for every other app. This way, users became picky with where they wanted to spend their time. This study aimed to find if these choices made, were dependant of a few specific demographic factors or not.

One mode of entertainment that is quite popular among people today is gaming on PUBG. Another such popular social media app in Instagram. Due to the immense amount of users available, these two apps were selected to be studied for this paper.

For the demographics of the user to be studied, the most influential among them were chosen. Those are:

- Occupation
- Age
- Gender

II. METHODOLOGY

The data for the study is primary data which was collected through an online questionnaire as network sampling technique. There were more than three hundred responses, each aging between 10-55[1]. Soon after the data was cleaned. The Chi-square test of independence was then applied to the data using the R programming language.. The test was done for both applications and all three factors independently. The p-value was used to conclude the results.

III. ANALYSIS 1 - PUBG

A. Hypothesis & Test Statistics[2]

The null and alternate hypothesis for case 1 (age) are as follows:

- H_0 : PUBG usage and age are independent of one another

Vs

- H_1 : The two attributes are dependent on each other

Thus the test statistic is given by:

$$X^2 = \sum |(f_0 - f_e)^2 / f_e| \sim X^2_{(r-1)(c-1)}$$

with $(r-1)(c-1)$ degrees of freedom, where

- r = the number of rows and c = number of columns

and

- f_0 = experimented frequency of the observed facts
- f_e = expected frequency of occurrence on null hypothesis.

At α level of significance, the critical value is:

$$X^2_{\alpha, (r-1)(c-1)}$$

Thus the null hypothesis will be rejected if:

$$X^2_{cal} > X^2_{\alpha, (r-1)(c-1)}$$

or if:

$$P(X^2_{tab} > X^2_{cal}) \leq \alpha$$

B. Assumptions for the test[2]

- The data is randomly drawn from a population.
- The values in the cells are considered adequate when expected counts are not less than 5 and there are no cells with zero count.
- The application of the chi-square test to a smaller sample could lead to type II error.
- The variables under consideration must be mutually exclusive (independent).

C. R Program & Tables

The following R program was applied on the data gathered:

```
Tech_Gaming<-read.csv("C:\\Users\\Rohan\\Downloads\\Gaming_Age.csv")
```

```
Tech_Gaming
```

```
table(Tech_Gaming$PUBG.Players)
```

```
head(Tech_Gaming)
```

```
str(Tech_Gaming)
```

```
library(gmodels)
```

```
Tech_Table4<-CrossTable(Tech_Gaming$PUBG.Players,Tech_Gaming$Age,chisq = TRUE,expected = TRUE,prop.r = FALSE,prop.c = FALSE,prop.t = F,prop.chisq = F)
```

```
Tech_Count<-Tech_Table4$t
```

```
Tech_Count
```

```
barplot(Tech_Count,beside=T,col=c("Maroon","Yellow"),ylab="Frequency",xlab="Age",legend=T,width = 15, xlim = c(0,120))
```

The output obtained was as follows:

Tech_Gaming\$ PUBG.Players	25 or more	Under 25	Row Total
Non-Players	38 27.359	97 107.641	135
Players	23 33.641	143 132.359	166
Column Total	61	240	301

Table 1 R output for Analysis 1 (case 1)

Person's Chi-squared test:

$$\chi^2 = 9.412336$$

$$\text{d.f.} = 1$$

$$p = 0.002155304$$

The contingency table turned out in this way:

PUBG	Frequency	Age Group		Total	$X^2_{(1)}$	p-value
		Less than 25	More than 25			
Non-players	Observed Frequency	38	97	135	9.412336	0.002155304
	Expected Frequency	27.35	107.6			
Players	Observed Frequency	23	143	166		
	Expected Frequency	33.64	132.3			
	Total	61	240	301		

Table 2 Contingency Table for Analysis 1 (case 1)

The clustered bar chart is as follows:

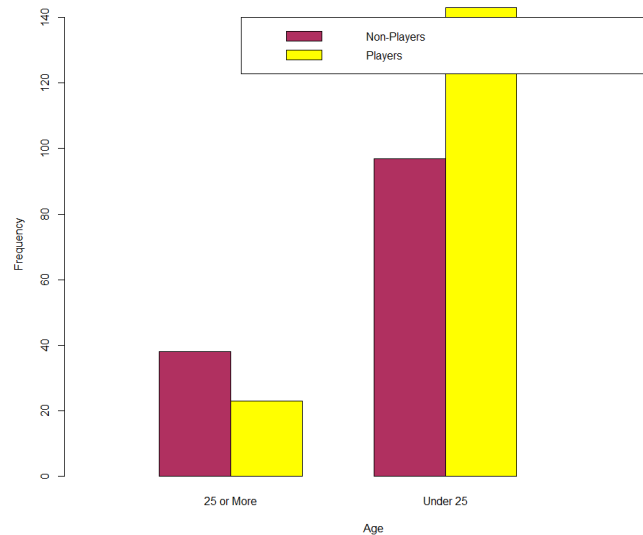


Figure 1 Analysis 1 (case 1)

D. Conclusion – Case 1

Under H_0 , the obtained X^2 value is 9.412 at 5% level of significance. The critical value, $X^2_{0.05(1)} = 3.841$.

Since:

$$X^2_{cal} > X^2_{a,(r-1)(c-1)}$$

the null hypothesis is rejected.

Similarly, the p-value obtained is 0.00216.

Since:

$$p\text{-value} < 0.05$$

the null hypothesis is rejected.

In conclusion, the choice to play PUBG and the age of the respondent are dependent on each other.

This result proves that most adults have less interest in PUBG, than youngsters. This may be due to a number of reasons including time, small screens, no peers etc.

E. Conclusion - Case 2 & 3

For case 2 & 3, the gender and occupation of the user was tested against the usage. The exact same test procedure as followed for case 1 was used. The results showed that gender was associated with PUBG usage as well. However occupation was not associated.

These results prove the common notion that young males are more interested in first person shooting games than their female counterparts. However, since the game is flexible as it can be played any time of the day, and since it is usually played with friends, students and professionals both can take out the time together with their respective groups to play. Thus it is not dependant on occupation.

IV. ANALYSIS 2 – INSTAGRAM

A. Hypothesis, Test Statistics and Assumptions

Similar hypothesis, test statistics and assumptions were applied for Instagram usage as was applied for the usage of PUBG.

B. R Program and Tables

The following R program was applied on the data gathered:

```
Insta_Occupation<-read.csv("C:\\Users\\Rohan\\Downloads\\Insta_Occupation.csv")
```

```
Insta_Occupation
```

```
head(Insta_Occupation)
```

```
str(Insta_Occupation)
```

```
library(gmodels)
```

```
Tech_Table7<-CrossTable(Insta_Occupation$Instagram.User,Insta_Occupation$..Occupation,chisq = TRUE,expected = TRUE,prop.r = FALSE,prop.c = FALSE,prop.t = F,prop.chisq = F )
```

```
Tech_Count<-Tech_Table7$t
```

```
Tech_Count
```

```
barplot(Tech_Count,beside=T,col=c("#FFFF66","#FF66CC"),ylab="Frequency",
```

```
xlab="Occupation",legend=T,width = 10, xlim = c(0,120))
```

The output obtained was as follows:

Insta_Occupation\$Instagram.User	Employed	Self-Employed	Student	Row Total
Non-User	29 29.153	18 12.558	88 93.289	135
User	36 35.847	10 15.442	120 114.711	166
Column Total	65	28	208	301

Table 3 R output for Analysis 1 (case 1)

Person's Chi-squared test:

$\chi^2 = 4.821083$

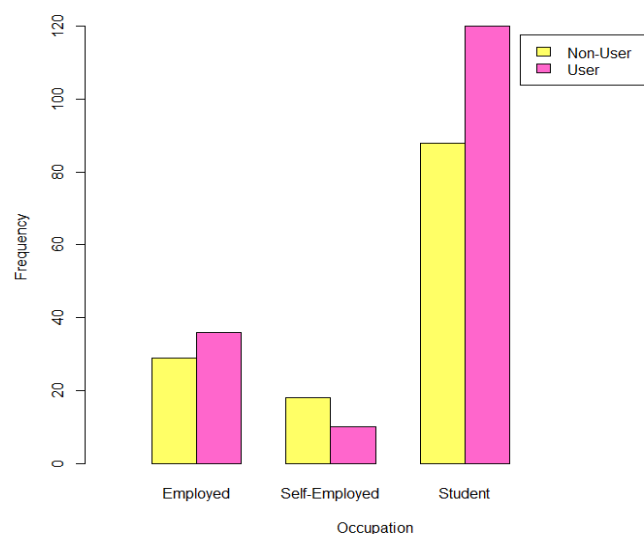
d.f. = 2

p = 0.0897666

The contingency table turned out in this way:

Instagram	Frequency	Occupation			Total	$X^1_{(1)}$	p-value
		Employed	Self Employed	Student			
Non-users	Observed Frequency	29	18	88	135	4.821083	0.0897666
	Expected Frequency	29.153	12.558	93.289			
Users	Observed Frequency	36	10	120	166		
	Expected Frequency	35.847	15.442	114.711			
	Total	65	28	208	301		

Table 4 Contingency Table for Analysis 1 (case 1)



The clustered bar chart is as follows:

Figure 2 Analysis 1 (case 1)

Under H_0 , the obtained X^2 value is 4.821 at 5% level of significance. The critical value, $X^2_{0.05(1)} = 5.991$.

C. Conclusion – Case 1

Since:

$$X^2_{cal} < X^2_{a,(r-1)(c-1)}$$

the null hypothesis is accepted.

Similarly, the p-value obtained is 0.0898.

Since:

$$p\text{-value} > 0.05$$

the null hypothesis is accepted.

In conclusion, the choice to use Instagram and the occupation of the respondent are independent on each other.

This result proves that as marketed, Instagram is a platform that serves all different types of people. It can be used for leisure as well as many kinds of work such as shopping, building contacts etc.

D. Conclusion - Case 2 & 3

For case 2 & 3, the gender and age of the user was tested against the usage. The exact same test procedure as followed for case 1 was used. The results showed that age was associated with Instagram usage as well. However gender was not associated.

These results prove that Instagram is a platform that caters to both men and women equally. However, adults tend to be less frequent on it, which ultimately results in them quitting it over time as they loose interest. This is backed by the fact that the usage was dependant on age.

V. OVERALL CONCLUSION

The overall conclusion table is as follows:

	Using PUBG	Using Instagram
Occupation	Not Associated	Not Associated
Age	Associated	Associated
Gender	Associated	Not Associated

Table 5 Overall Conclusion Table

Thus, it can be concluded that age is the strongest demographic character as it influences the usage of both applications. Likewise, occupation is the weakest of the three. Gender is in between these two.

The results seem plausible, as a person goes through many changes even in a day. Age, plays a crucial role in everyday life. Occupations change frequently, and have each of them has a smaller impact on a person than the gender and age.

These studies can be carried out with other applications and other demographic factors to better understand the situation.

REFERENCES

[1]The link for the data is:

https://docs.google.com/spreadsheets/d/1fYY01yhd4v_ulWVlpkvixtOCQQ5RmBUZ/edit?usp=sharing&ouid=117536046545803041041&rtpof=true&sd=true

[2] Gupta, S.C, and V.K Kapoor. Fundamentals of Mathematical Statistics. New Delhi: Sultan Chand & Sons, 2018.



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