MAHARASHTRA EDUCATION SOCIETY`S

ABASAHEB GARWARE COLLEGE

Metaverse 'The future':Are you ready for the change?

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SUBMITTED TO

Department of Statistics,

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STATISTICS PROJECT REPORT

METAVERSE, THE FUTURE:
ARE YOU READY FOR THE CHANGE?

META : BEYOND

VERSE : UNIVERSE

CERTIFICATE

This is to certify that the project report entitled **“METAVERSE ‘THE FUTURE : ARE YOU READY FOR THE CHANGE”** is being submitted by **Samriddhi Raskar (9796), Priyanka Jaybhaye (9789), Kshitija Bhosale (9799), Akshata Satpute (9757) and Vijayalaxmi Birajdar(9758)** as Practical paper-IV of the degree of Bachelor of Science(B.Sc.). This is a record of bonafide work carried out by them under supervision and guidance.

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Prof.Ms.Rutuja Joshi	Prof.Dr.Sandesh Kurade

Place : MES Abasaheb Garware College,Pune

Date : 25/05/2022

ACKNOWLEDGEMENT

We would like to thank Prof Rutuja Joshi for guiding us throughout the project.Her suggestions and improvisations have taken the current project from a rough idea to a proper statistical survey and analysis.This experience will help us tremendously in working towards data projects in the future.

We would also like to express our gratitude towards Prof. Sandesh Kurhade(Head,Department of Statistics) for encouraging us to take challenging projects.His teaching methods, especially with the analysis of real life data, have helped us in our projects.We also appreciate all his efforts in this academic year(2021-2022) towards educating the students of Statistics.

We should also like to convey our sincere thanks to our lab assistants without their help this wouldn't have been possible.

Our classmates have been of great help to us,during the project work.Our ideas were shaped and refined progressively through our discussions with them from time to time. There were some people who were indirectly involved in our preparatory work.We heartly their contribution and thank them too

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MOTIVATION

The Metaverse is one of the hottest topic of the Year so far and many people wants to know more about it. Late last October Facebook co-founder and CEO Mark Zuckerberg made a huge announcement that the company would be known as “Meta”.After this announcement we are curious about Metaverse and we try to understand what we can do in metaverse.

During covid 19 pandemic many people cannot safely travel or attend large gatherings. Through the Metaverse it may be possible to enjoy an immersive experience even when you can’t leave your home.

If you could take a trip to Italy and enjoy the view of the beach while you work.If you need to meet someone you could gather virtually. This could potentially reduce the need for in person means while also avoiding the struggles that come with video call.

ABSTRACT

Metaverse is a project which aims at learning an aspect of application of statistics for the prediction of number of people liking upcoming technology Metaverse and would like to adopt it in the future.It involves a designed experiment to study analyze and interpret the effects of combination of 6 factors which are known to affect the growth of individuals towards the liking of Metaverse.The experiment involves fitting of a logistic regression model which studied the effect of these 6 independent factors on the dependent factors i.e will people like to use Metaverse.Also the methods like proportionality test,chi-square goodness of fit is applied for interpretation of the objectives mentioned.

INTRODUCTION

Metaverse is a combination of the words ‘meta’ and ‘universe’.

‘Meta’ means ‘Beyond’.

So metaverse is a universe that is beyond the universe as we know it

The metaverse concept isn't new. It was first described in the 1992 novel Snow Crash. Several companies later developed online communities based on the concept, most notably Second Life, released in 2003

The metaverse is a virtual world where people interact via their digital avatars!

In that virtual world, people will be able to do almost anything – go shopping, attend meetings, play with their friends and so on

The metaverse is considered the next evolution of the internet. It will take many forms, including gaming, online communities and business meetings where people collaborate via a digital facsimile or avatar of themselves.3D spaces in the virtual world will let you socialize, learn, collaborate and play in ways that go beyond what we can imagine.

In the metaverse, people use avatars to represent themselves, communicate with each other and virtually build out the community. Metaverse has massive potential to change the way communication between people works. More than that, it can change the way businesses operate, how we spend money, what we spend it on, and more. Metaverse is potentially also the next step in technological and social evolution for the entire human race.

OBJECTIVES

1. To study the factors which influence favoring the metaverse.

2. To find how many people are supporting metaverse based on age, gender, profession, hobbies, etc..

3. To study the reasons behind failure of metaverse according to individual perspective.

4. To identify the sector which benefited the most by metaverse.

STATISTICAL METHODS USED

1)Graphical methods :

Graphs are powerful data evaluation tools. They provide quick, visual summaries of essential data characteristics. A few simple plots can replace complex statistical equations or tests to interpret environmental data. Box plots, histograms, and normal probability plots are examples of graphs that are commonly used to display environmental data. These graphs can provide information about concentration ranges. shapes of distributions, extreme values (outliers), relationships between different data sets, and trends (increasing, decreasing, and cyclic). Because graphical methods are qualitative, however, they may not be appropriate as a stand-alone technique to make inferences or support conclusions

Graphical methods are typically used with quantitative statistical evaluations Graphical methods provide information that may not be otherwise apparent from quantitative statistical evaluations, so it is a good practice to evaluate data using these methods prior to performing statistical evaluations. Graphical methods are also a key component of exploratory data analysis (EDA) In EDA, various graphical techniques are used initially to display data for qualitative assessments prior to selecting appropriate statistical tests.

2) Regression :

Regression is a statistical measurement used in finance, investing and other disciplines that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables).

Logistic Regression in R Programming :

Logistic regression in R Programming is a classification algorithm used to find the probability of event success and event failure. Logistic regression is used when the dependent variable is binary(0/1, True/False, Yes/No) in nature. Logit function is used as a link function in a binomial distribution.
Logistic regression is also known as Binomial logistics regression. It is based on sigmoid function where output is probability and input can be from -infinity to +infinity.

3)Chi-Square Test :

Chi-square is a statistical test used to examine the differences between categorical variables from a random sample in order to judge goodness of fit between expected and observed results.

4) Proportionality Test:

A test of proportion will assess whether or not a sample from a population represents the true proportion from the entire population.

METHODOLOGY AND DATA COLLECTION

Since Metaverse is the new emerging term,We went through many websites and previous surveys conducted in the foreign countries to understand it's concept.The main approach of this project is to find the factors which influence the emergence of the Metaverse and the ones favoring it,and to interpret the reason behind the failure of the metaverse according to the individual.

For this project we have collected primary data. Accordingly ,we decided the objective of this survey and developed a questionnaire and circulated a Google form in different age groups. We gathered a total 254 responses of the people for further study.

Following are some methods used by us to analyze the data:

1. Graph plots.
2. Chi-square test for independence of attributes.
3. Logistic regression.
4. Proportionality test.

Softwares Like MS-Excel is used for plotting graphs with a pivot table function converting our attributed data to numerical form and R-software is used in Chi-square test for independence of attributes, logistic regression and proportionality test.

DATA

	A	B	C	D	E	F	G	H	I
1	Timestamp	Age	Gender	Profession	Area of residence	You / your family income	How much money would	Would you like to use me	What do you think are th
2	4/8/2022 16:33:07	21-30	Female	Student	Rural	1.5 Lakh & above	11000 and above	Yes	Art & live entertainment
3	4/8/2022 16:35:11	21-30	Male	Student	Urban	1.5 Lakh & above	3000-5000	Yes	No restrictions of space
4	4/8/2022 16:35:33	31-40	Male	Government servants	Urban	50K - 1 Lakh	0	Yes	No dependence on hardv
5	4/8/2022 16:35:39	21-30	Male	Student	Rural	50K - 1 Lakh	11000 and above	Yes	No restrictions of space
6	4/8/2022 16:36:40	Below 20	Male	Student	Rural	50K - 1 Lakh	3000-5000	Yes	No dependence on hardv
7	4/8/2022 16:36:51	21-30	Female	Student	Urban	50K - 1 Lakh	3000-5000	Yes	Art & live entertainment
8	4/8/2022 16:36:55	Below 20	Female	Student	Urban	0K - 50K	3000-5000	Yes	Socializing
9	4/8/2022 16:37:37	Below 20	Female	IT Professionals	Urban	1.5 Lakh & above	3000-5000	Yes	Art & live entertainment
10	4/8/2022 16:38:29	21-30	Female	Student	Urban	0K - 50K	5000-8000	Yes	Art & live entertainment
11	4/8/2022 16:38:38	21-30	Male	Student	Rural	0K - 50K	8000-11000	No	Art & live entertainment
12	4/8/2022 16:39:42	Below 20	Female	Student	Urban	1.5 Lakh & above	3000-5000	Yes	Art & live entertainment
13	4/8/2022 16:39:58	Below 20	Male	Student	Rural	1.5 Lakh & above	3000-5000	Yes	Art & live entertainment
14	4/8/2022 16:41:19	21-30	Male	Student	Urban	50K - 1 Lakh	3000-5000	Yes	Art & live entertainment
15	4/8/2022 16:41:45	31-40	Male	Teachers	Rural	1.5 Lakh & above	11000 and above	Yes	Art & live entertainment
16	4/8/2022 16:42:04	21-30	Male	Student	Rural	50K - 1 Lakh	0	Yes	No restrictions of space
17	4/8/2022 16:42:34	21-30	Female	IT Professionals	Urban	1 Lakh - 1.5 Lakh	3000-5000	Yes	Art & live entertainment
18	4/8/2022 16:44:47	21-30	Female	Student	Urban	1.5 Lakh & above	5000-8000	Yes	No restrictions of space
19	4/8/2022 16:46:00	21-30	Male	Other	Rural	0K - 50K	0	Yes	No restrictions of space
20	4/8/2022 16:46:41	21-30	Male	Student	Urban	0K - 50K	5000-8000	Yes	No restrictions of space
21	4/8/2022 16:47:04	21-30	Female	Student	Rural	1.5 Lakh & above	0	Yes	Art & live entertainment
22	4/8/2022 16:47:30	Below 20	Male	Student	Rural	0K - 50K	0	No	Socializing
23	4/8/2022 16:52:32	21-30	Female	Student	Rural	1.5 Lakh & above	3000-5000	Yes	No restrictions of space
24	4/8/2022 16:53:22	21-30	Male	Other	Rural	0K - 50K	3000-5000	Yes	No dependence on hardv

	J	K	L	M	N	O	P	Q
1	What would you prefer?	What sort of technology	What profession do you t	Which factor would make	What transition of techno	What could be the bigges	Do you think metaverse c	According to you which is the major
2	3D interacting experienc	Using VR headsets	Advertizing industry	Encourages practical ap	Allows you to create your	Increasing creativity and imagination		Privacy and security issues
3	3D interacting experienc	Using AR technology (lik	Game developers	Encourages practical ap	Virtual open worlds	Overcoming real time obstacles		Privacy and security issues
4	3D interacting experienc	3D goggles (like in theatr	Education	Encourages practical ap	Virtual open worlds	Increasing creativity and imagination		Loosing connections physically
5	3D interacting experienc	3D goggles (like in theatr	Building payment system	Connects learners from a	Allows you to create your	Creating completely new job opportunities		Loosing connections physically
6	3D interacting experienc	Using VR headsets	Education	Make digital interaction f	Text based interaction (lik	Increasing creativity and imagination		None of the above
7	3D interacting experienc	Using VR headsets	Education	Encourages practical ap	Allows you to create your	Travelling the world without moving		Privacy and security issues
8	3D interacting experienc	Using VR headsets	Game developers	Encourages practical ap	Allows you to create your	Increasing creativity and imagination		Addiction
9	3D interacting experienc	Using VR headsets	IT Industry	Make digital interaction f	Allows you to create your	Creating completely new job opportunities		Privacy and security issues
10	3D interacting experienc	Using VR headsets	Game developers	Encourages practical ap	Virtual open worlds	Increasing creativity and imagination		Connection and hardware issues
11	3D interacting experienc	Using VR headsets	IT Industry	Connects learners from a	Virtual open worlds	Increasing creativity and imagination		Connection and hardware issues
12	3D interacting experienc	3D goggles (like in theatr	Game developers	Make digital interaction f	Virtual open worlds	Increasing creativity and imagination		Loosing connections physically
13	3D interacting experienc	Using VR headsets	Education	Make digital interaction f	Virtual open worlds	Increasing creativity and imagination		Addiction
14	2D interaction connectivi	2D	Education	Gamification	Allows you to create your	Travelling the world without moving		None of the above
15	3D interacting experienc	2D	Education	Connects learners from a	Virtual open worlds	Increasing creativity and imagination		Connection and hardware issues
16	3D interacting experienc	Using VR headsets	E-commerce	Connects learners from a	Immersive virtual environ	Increasing creativity and imagination		Privacy and security issues
17	3D interacting experienc	Using VR headsets	Game developers	Make digital interaction f	Allows you to create your	Increasing creativity and imagination		Loosing connections physically
18	3D interacting experienc	3D goggles (like in theatr	Education	Connects learners from a	Text based interaction (lik	Overcoming real time obstacles		Connection and hardware issues
19	3D interacting experienc	3D goggles (like in theatr	Building payment system	Make digital interaction f	Immersive virtual environ	Creating completely new job opportunities		Privacy and security issues
20	3D interacting experienc	Using VR headsets	Game developers	Make digital interaction f	Allows you to create your	Travelling the world without moving		Privacy and security issues
21	3D interacting experienc	3D goggles (like in theatr	IT Industry	Connects learners from a	Allows you to create your	Increasing creativity and imagination		Addiction
22	3D interacting experienc	Using AR technology (lik	Game developers	Connects learners from a	Virtual open worlds	Overcoming real time obstacles		Loosing connections physically
23	3D interacting experienc	2D	Game developers	Connects learners from a	Immersive virtual environ	Creating completely new job opportunities		Loosing connections physically
24	3D interacting experienc	3D goggles (like in theatr	Advertizing industry	Connects learners from a	Text based interaction (lik	Overcoming real time obstacles		None of the above

	S	T	U	V	W	X	Y	Z
1	What are the opinions of	Which social media platfc	Would you like to add an	Your opinion regarding th	Your opinion regarding th	Your opinion regarding th	Your opinion regarding th	Your opinion regardi
2	Haven't heard about it yet		Yes	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
3	Haven't heard about it yet		No	Disagree	Disagree	Can't say	Strongly agree	Strongly disagree
4	They are excited about it		Yes	Strongly agree	Agree	Agree	Agree	Can't say
5	Would like to decide on the basis of its success in t		Yes	Agree	Agree	Strongly agree	Strongly agree	Agree
6	They are excited about it		Yes	Agree	Agree	Agree	Agree	Agree
7	Haven't heard about it yet		Yes	Can't say	Strongly agree	Strongly agree	Can't say	Strongly disagree
8	Haven't heard about it yet		Yes	Can't say	Agree	Agree	Can't say	Can't say
9	Would like to decide on the basis of its success in t		Yes	Agree	Agree	Agree	Can't say	Can't say
10	Haven't heard about it yet		No	Agree	Can't say	Disagree	Agree	Strongly disagree
11	Thinks it will make no change		No	Disagree	Can't say	Strongly disagree	Can't say	Strongly disagree
12	Haven't heard about it yet		Yes	Strongly agree	Can't say	Disagree	Can't say	Can't say
13	Haven't heard about it yet		Yes	Agree	Strongly agree	Strongly agree	Can't say	Can't say
14	Haven't heard about it yet		Yes	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly disagree
15	They are excited about it		Yes	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
16	Haven't heard about it yet		Yes	Strongly agree	Agree	Agree	Can't say	Strongly disagree
17	Haven't heard about it yet		No	Can't say	Agree	Strongly disagree	Can't say	Agree
18	They are excited about it		Yes	Agree	Agree	Agree	Agree	Agree
19	Haven't heard about it yet		Yes	Agree	Disagree	Strongly agree	Disagree	Agree
20	Haven't heard about it yet		Yes	Strongly agree	Strongly agree	Can't say	Can't say	Can't say
21	They are excited about it		Yes	Agree	Disagree	Disagree	Disagree	Can't say
22	Haven't heard about it yet		Yes	Can't say	Can't say	Agree	Strongly agree	Can't say
23	Haven't heard about it yet		Yes	Disagree	Agree	Strongly disagree	Disagree	Strongly disagree
24	They are excited about it		Yes	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree

QUESTIONNAIRE

Age

Gender

Profession

Area Of residence

1) Would you like to use metaverse?

i. **Yes**
ii. **No**

2)What would you prefer?

i. **3D interacting experience similar to the real world**
ii. **2D interaction connectivity (video call,voice call,message,etc)**

3)What sort of technology would you choose for the entertainment purpose?

i. **2D**
ii. **3D goggles(like in theatres)**
iii. **Using VR headsets**
iv. **Using AR technology (like in pokrmon go)**

4)How much money would you spend in metaverse on basic VR headset?

i. **0**
ii. **3000-5000**
iii. **5000-8000**
iv. **8000-11000**
v. **11000 and above**

5)What do you think are the most popular reasons to voluntarily join the metaverse?

i. **No dependence of space**
ii. **No restriction of space**
iii. **Art and Live entertainment**
iv. **Socializing**

6)Your opinion regarding the following features in metaverse

i. **Buying digital land using digital currency is an interesting concept**
ii. **I would like to enjoy real-like 3D/4D experience of adventure sports without actually participating in it**
iii. **Parties/gathering with virtual avatars can allow me to enjoy interactions without leaving my home**
iv. **Metaverse can cause serious harm to modern society**
v. **Metaverse doesn't pose any threat with respect to cyberbullying or data thefting**

7)What profession do you think would be more benefited from metaverse usage?

i. **IT Industry**
ii. **Advertizing industry**
iii. **E-commerce**
iv. **Building payment systems**
v. **Education**
vi. **Game developers**

8)Which factor would make you choose metaverse in education the most?

i. **Connects learners from all over the world**
ii. **Gamification**
iii. **Encourages practical application**
iv. **Make digital interaction feel more human**

9)What transition of technology would you favour?

i. **Text based interaction (like in 90,s Nokia cell phone)**
ii. **Virtual open worlds**
iii. **Immersive virtual environments on smart mobiles and wearbles**
iv. **Allows you to create your own identity using 3D avatar**

(like in Metaverse)

10)What could be the biggest benefits of the metaverse?

i. **Overcoming real time obstacles**
ii. **Increasing creativity and imagination**
iii. **Traveling the world without moving**
iv. **Creating completely new job opportunities**

11)According to you, which is the major reason behind not choosing metaverse?

i. **Connection and hardware issues**
ii. **Losing connections physically**
iii. **Privacy and security issues**
iv. **Addiction**
v. **None of the above**

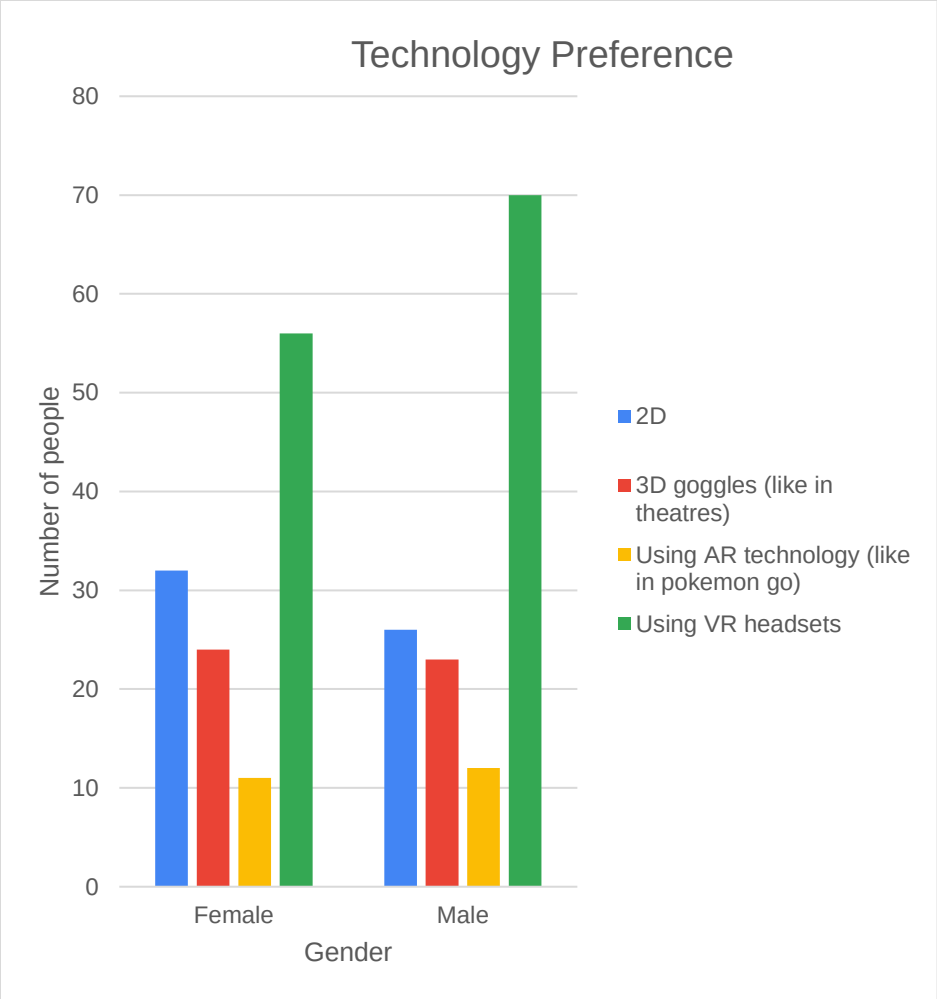
12)What are the opinions of your friends and family members on metaverse?

i. **They are excited about it**
ii. **Haven't heard about it yet**
iii. **Would like to decided on the basis of its success in the market**
iv. **Thinks it will make no change**

13)Would you like to add an element namely(digital human i.e.Avatar and workplace automation) of metaverse in your daily most used app on mobile?

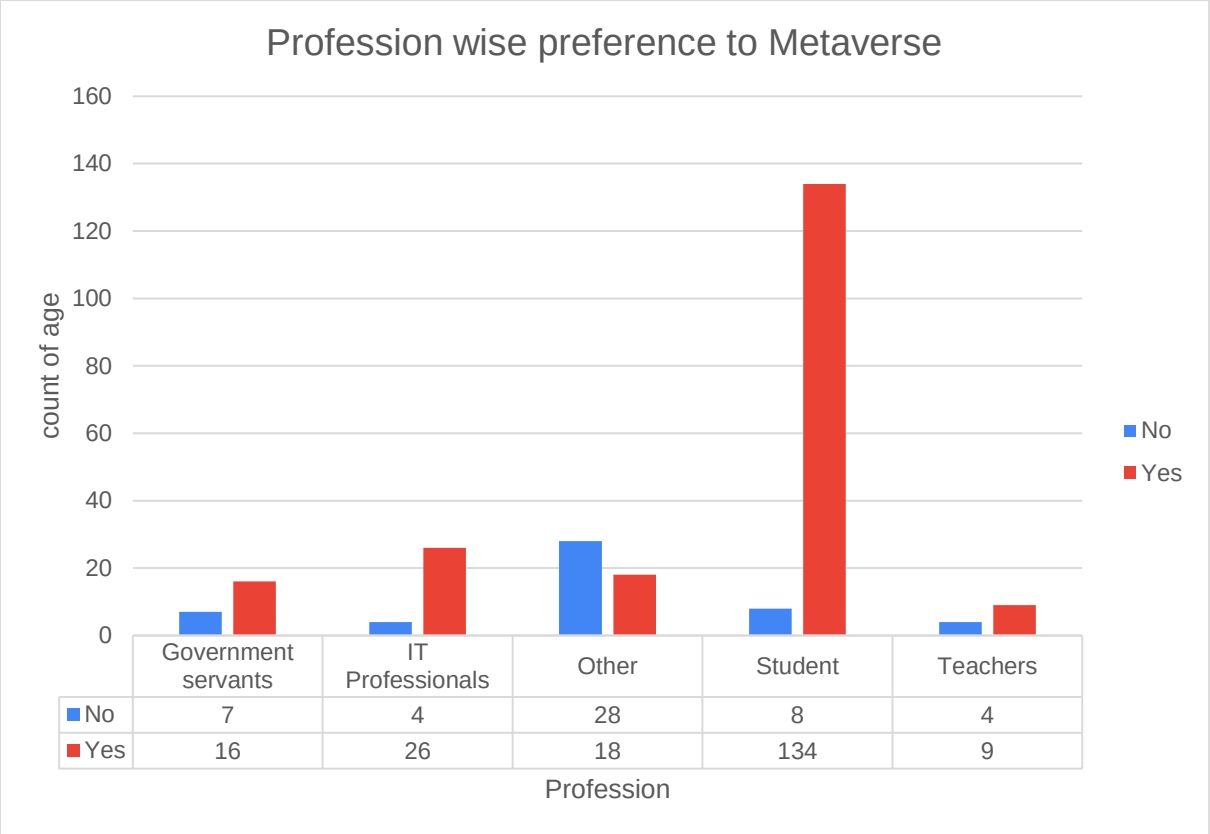
i. **Yes**
ii. **No**

Graphical Representation



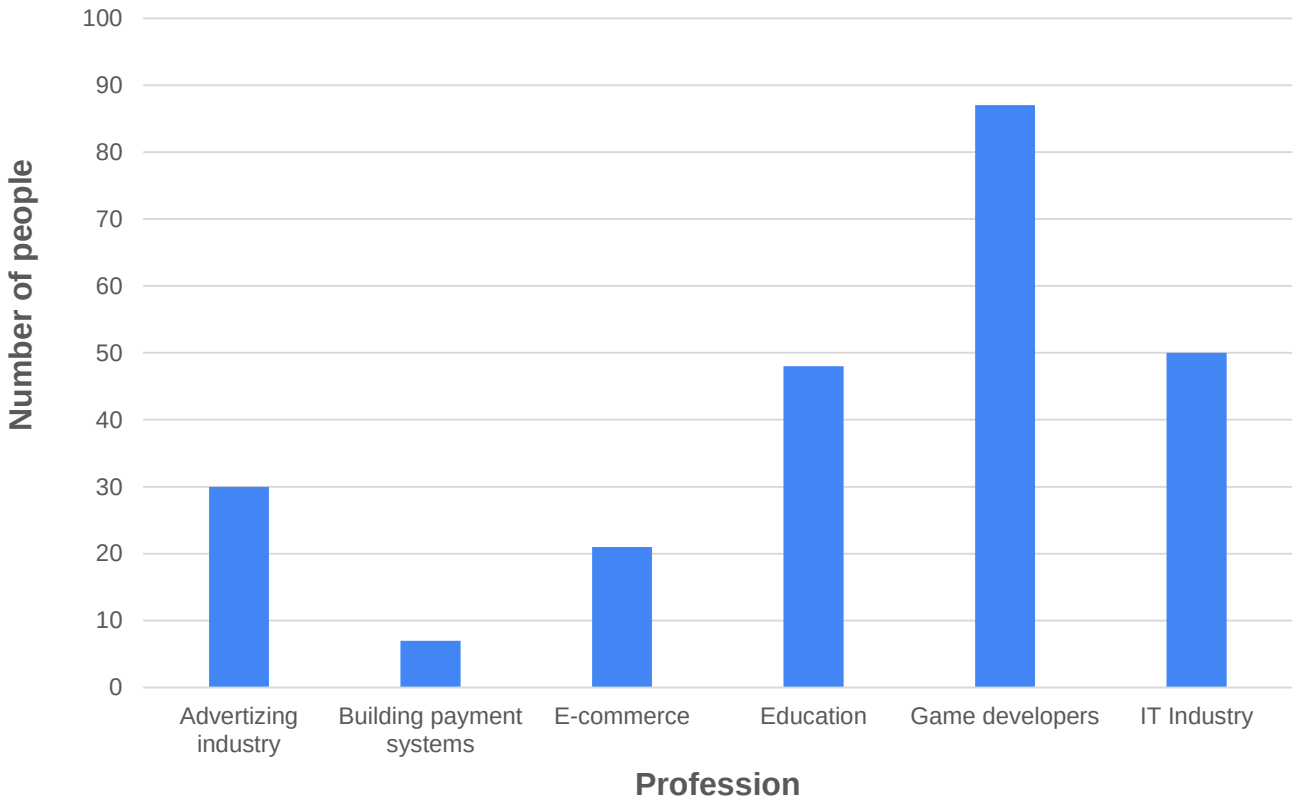
INTERPRETATION- According to the above graph we can see how the preference of technology has changed along with count of age groups with respect to gender.

The part of reason the preference of technology had declined for the 2D,3D technology is due to the introduction of new upcoming technologies providing 3D interacting experience with the use of VR headsets.

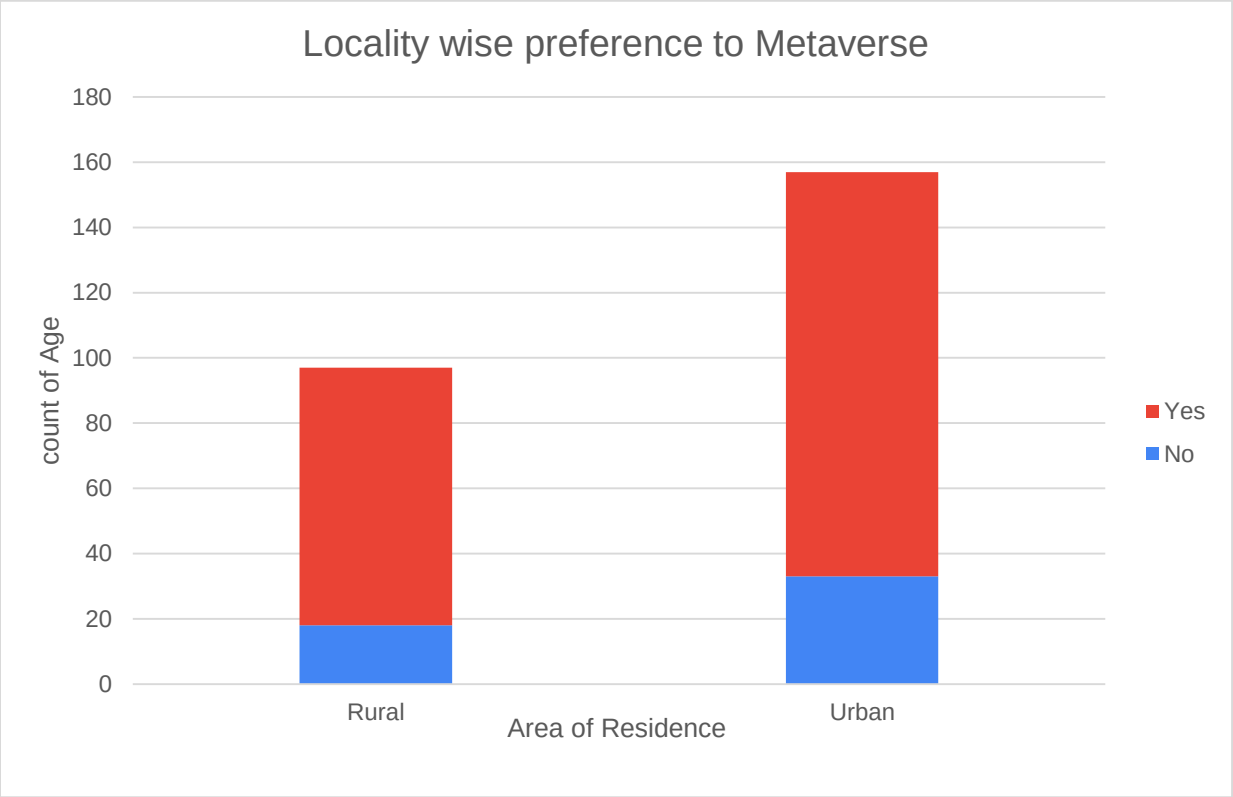


INTERPRETATION: From the above graph we can interpret that student gives the highest preference to the metaverse among other professions.

Benefited profession

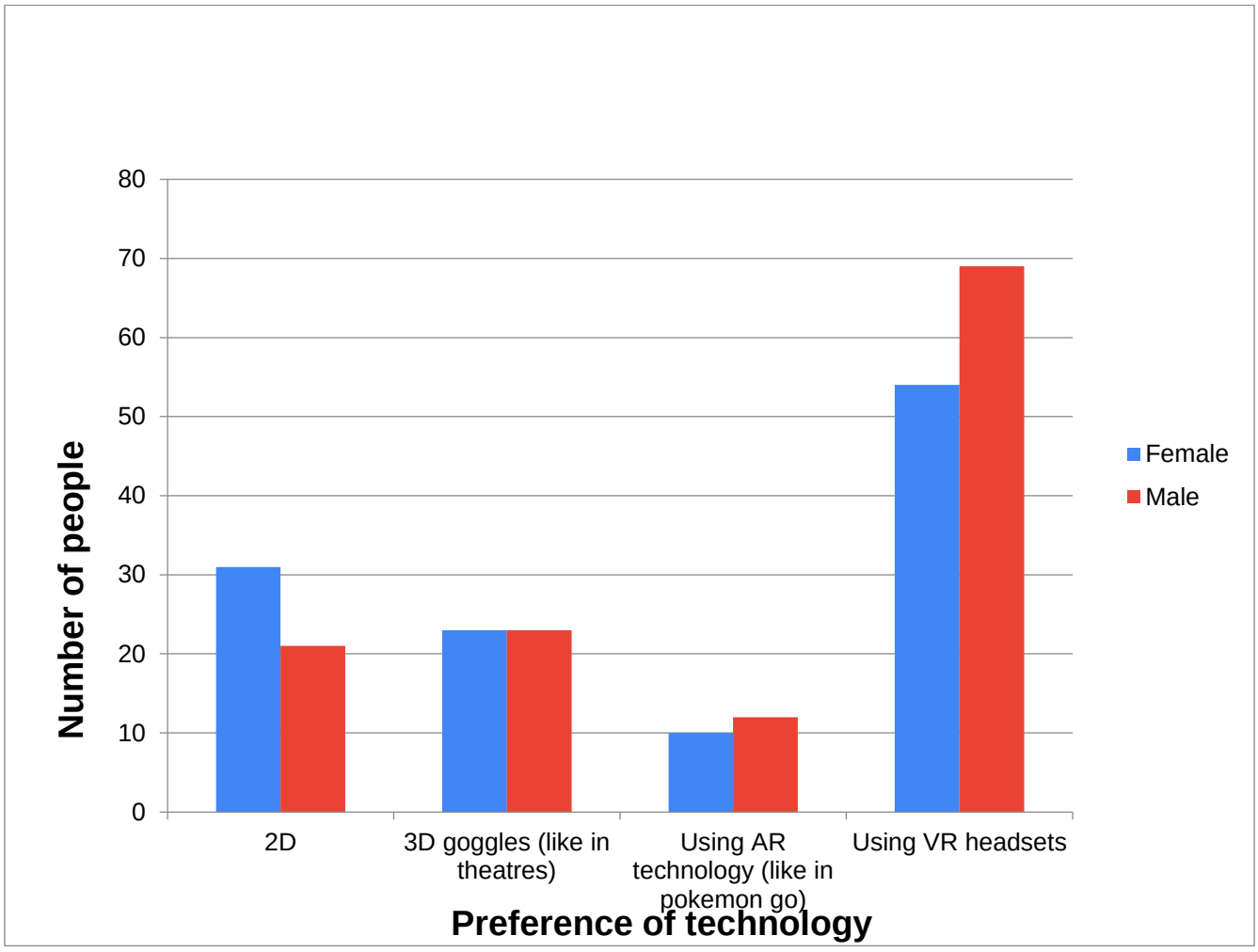


Interpretation : Game developers industry will be more benefited from metaverse usage



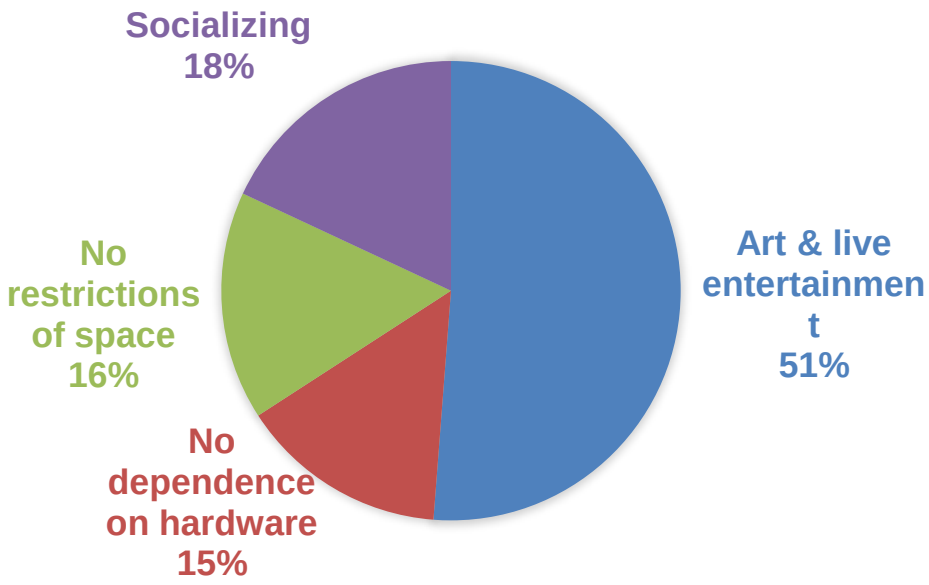
INTERPRETATION: From the above graph we can see that the preference for the Metaverse is seen high in the Urban as well as the Rural areas. Whereas, a considerable drop is seen in preference of Metaverse in the Rural area as they lag behind the speed with which the Urban areas tend to adopt new technology as well as awareness

Sort of technology used for entertainment purpose



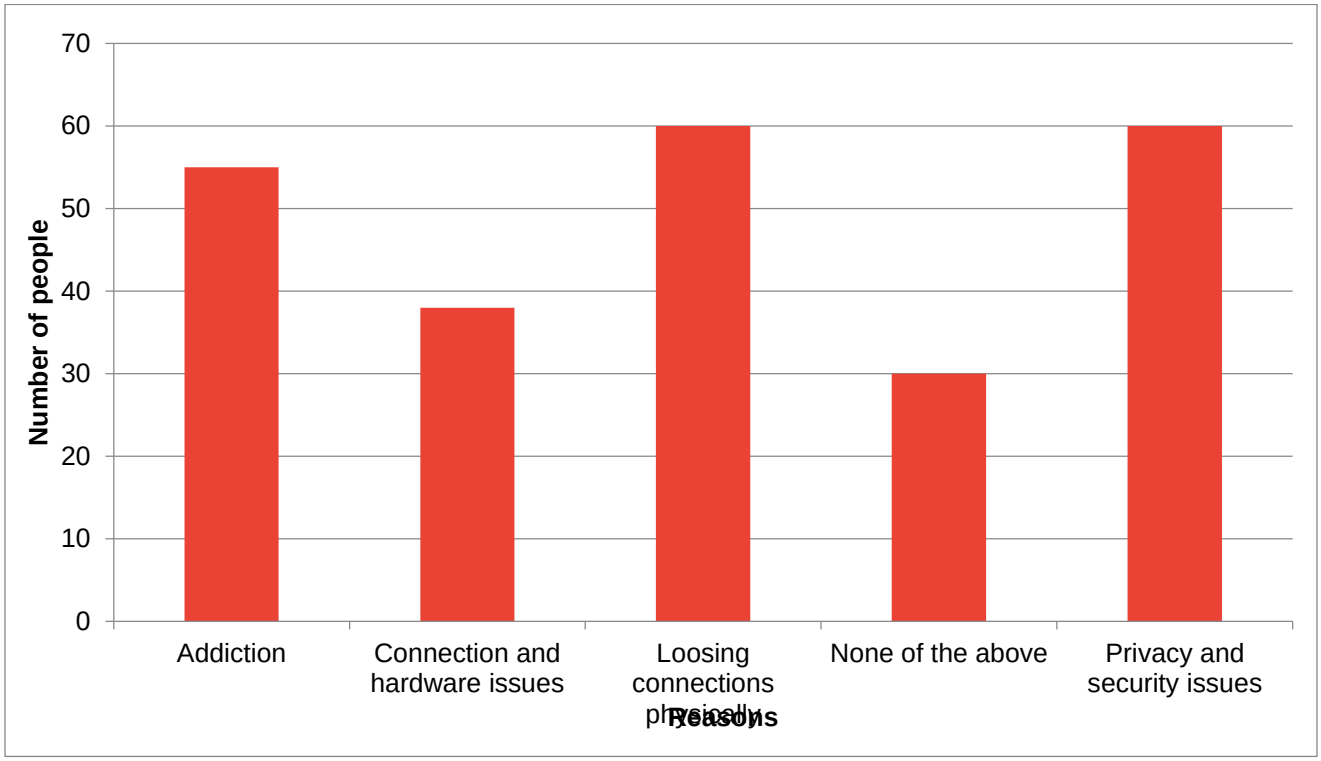
Interpretation : Preference of technology has declined for 2D, 3D, AR technology due to introduction of new technology VR headsets.

Reasons to voluntarily join Metaverse



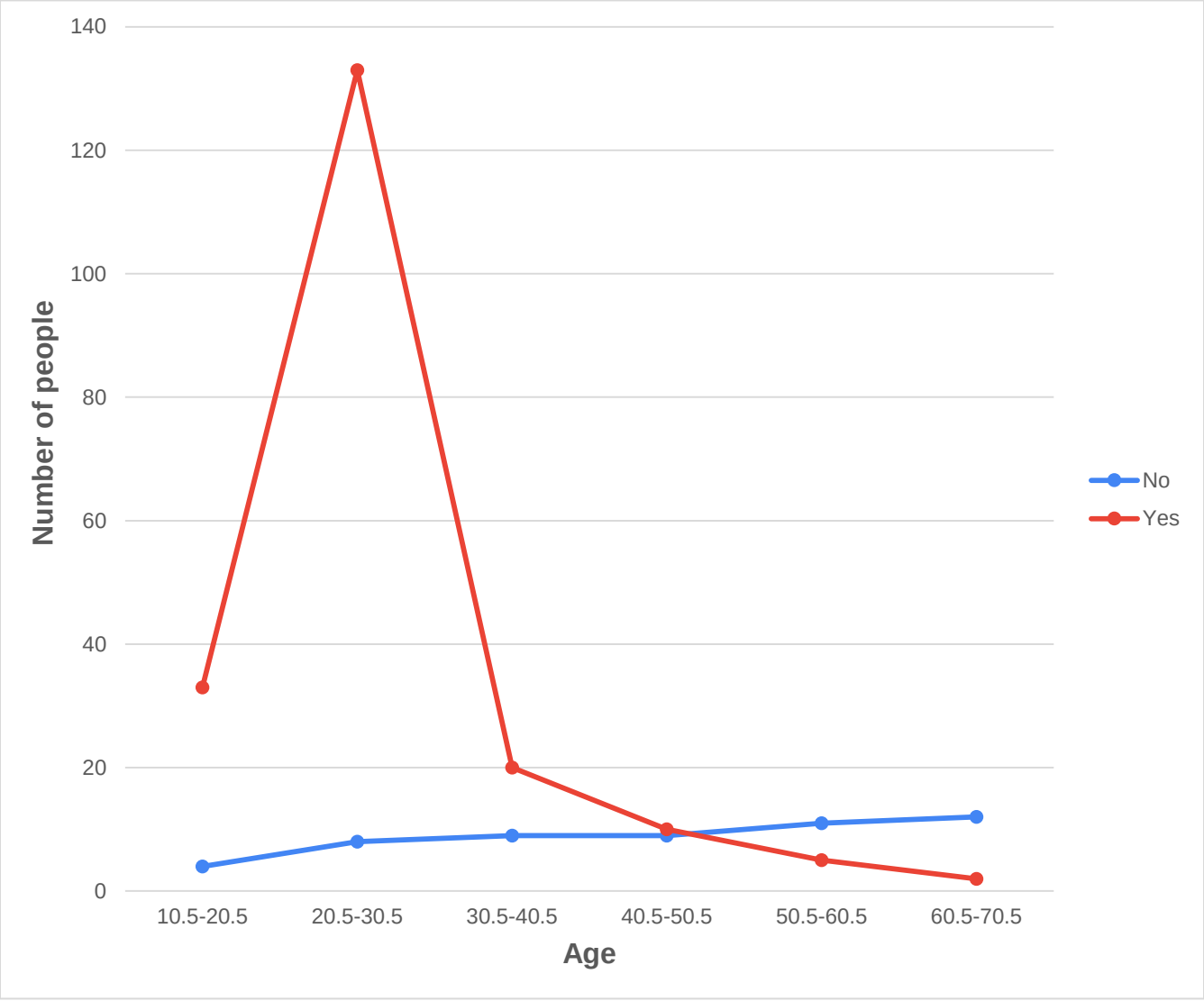
Interpretation : Above Graph Interpret that Art and Live Entertainment is the main reason to Voluntarily join the metaverse

Major reason behind not choosing Metaverse



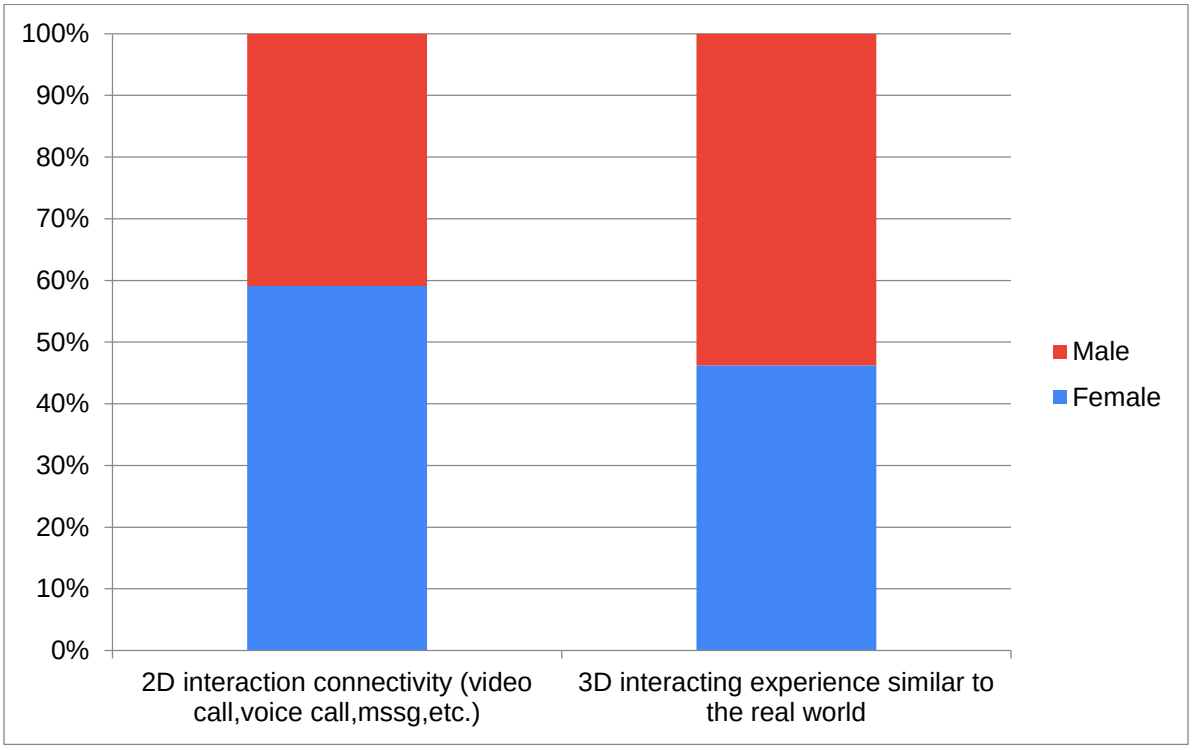
Interpretation : From above we can say that loosing connections physically and privacy & security issues are the main reasons behind not choosing Metaverse.

Age Vs No. of peoples saying yes/no to Metaverse



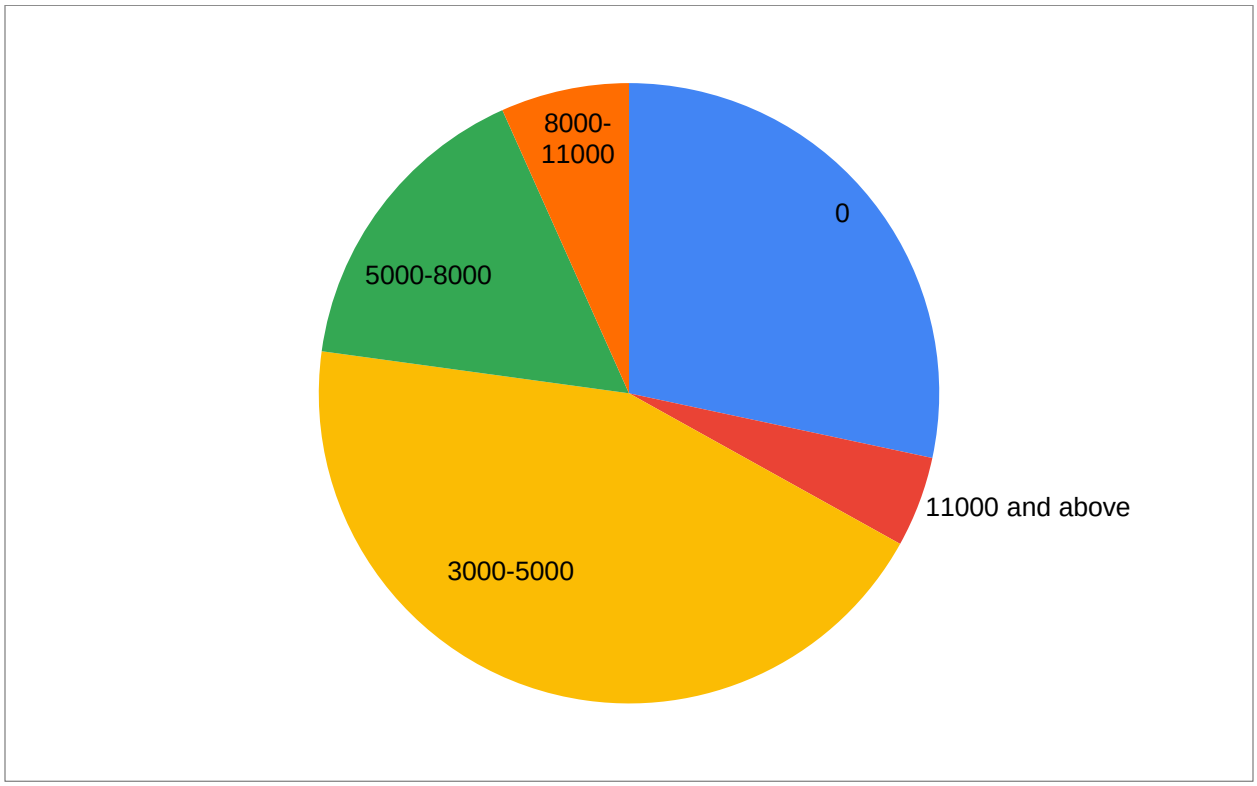
Interpretation : Here we can see that as the age group increases,number of people saying no to Metaverse also increases and vice versa in case of saying yes.

Technology Preference



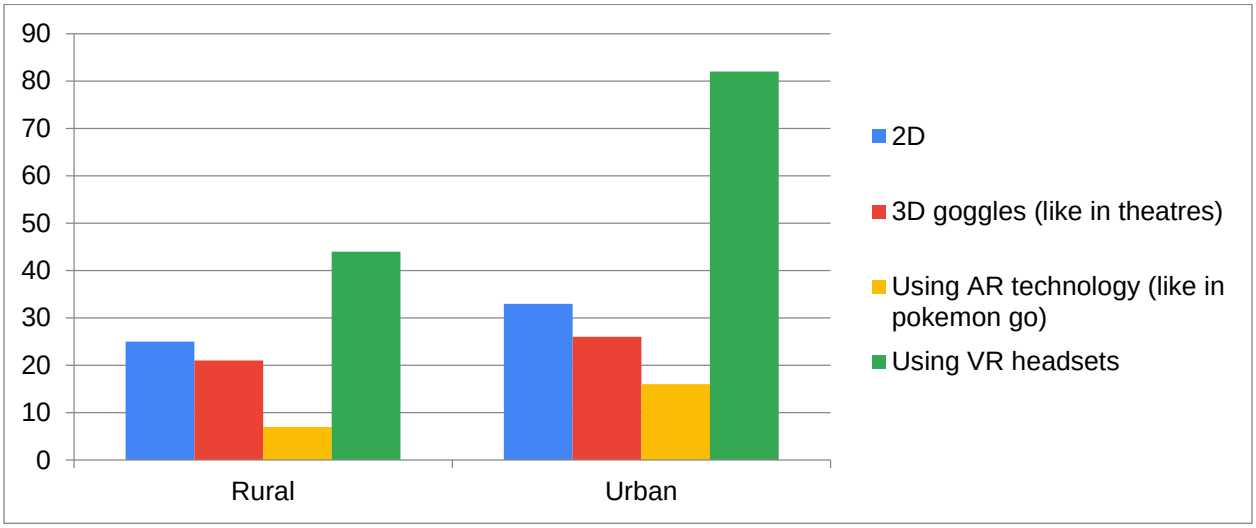
Interpretation : From above, large number of females are choosing 2D interaction and males are choosing 3D interaction

How much they can spend on a VR headset



Interpretation : On an average people can spend 3000-5000 on a basic VR headset

Locality Vs. Technology preference



Interpretation: Rural and Urban both people choose VR headset for their entertainment purpose

CHI-SQUARE TEST

H0:Attributes are independent.

H1:Attributes are dependent.

- When the p-value is less than 5% level of significance we reject H0 i.e Attributes are dependent

When the p-value is greater than 5% level of significance we accept H0 i.e Attributes are independent

#Factors to voluntarily join the metaverse w.r.t. Profession

H_0 : Factors to voluntarily join the metaverse are independent of Profession vs

H_1 : Factors to voluntarily join the metaverse are dependent on Profession

Chi-squared = 25.208, df = 12, p-value = 0.01387

Conclusion: At 5% level of significance we reject null hypothesis and conclude that Factors to voluntarily join the metaverse and Profession are dependent on each other.

#Sort of technology chosen for entertainment purposes w.r.t. profession

H_0: Sort of technology choose for entertainment purpose are independent of profession vs

H_1: Sort of technology choose for entertainment purpose are dependent on profession

Chi-squared = 34.736, df = 12, p-value = 0.0005158

Conclusion: At 5% level of significance we reject null hypothesis and conclude that: Sort of technology chosen for entertainment purpose and profession are dependent on each other.

#Major reason behind not choosing metaverse w.r.t. profession

H_0: Major reasons behind not choosing metaverse are independent of profession.

H_1: Major reasons behind not choosing metaverse are dependent on profession.

Chi-squared = 34.736, df = 12, p-value = 0.0005158

Conclusion: At 5% level of significance we reject the null hypothesis and conclude that Major reasons behind not choosing metaverse and profession are dependent on each other .

#Sort of technology chosen for entertainment purposes w.r.t. gender

H_0: Sort of technology chosen for entertainment purposes is independent of gender.

H_1: Sort of technology chosen for entertainment purposes is dependent on gender.

Chi-squared = 1.991, df = 3, p-value = 0.5743

Conclusion: At 5% level of significance we accept null hypothesis and conclude that Sort of technology chosen for entertainment purpose and gender are independent of each other.

#Major reason behind not choosing metaverse w.r.t. gender

H0: Major reasons behind not choosing metaverse are independent of gender.

H1: Major reasons behind not choosing metaverse are dependent on gender.

Chi-squared = 1.4544, df = 3, p-value = 0.6928

Conclusion: At 5% level of significance we accept the null hypothesis and conclude that Major reasons behind not choosing metaverse and gender are independent of each other.

#Sort of technology chosen for entertainment purposes w.r.t. locality

H0: Sort of technology chosen for entertainment purposes are independent of locality.

H1: Sort of technology chosen for entertainment purposes are dependent on locality.

Chi-squared = 2.5886, df = 3, p-value = 0.4595

Conclusion: At 5% level of significance we accept null hypothesis and conclude that Sort of technology chosen for entertainment purpose and locality are independent of each other.

#Factors to voluntarily join the metaverse w.r.t. locality

H0: Factors to voluntarily join the metaverse are independent of locality.
H1: Factors to voluntarily join the metaverse are dependent on locality.

Chi-squared = 9.5403, df = 3, p-value = 0.02291

Conclusion: At 5% level of significance we reject the null hypothesis and conclude that Factors to voluntarily join the metaverse and locality are dependent on each other.

#Major reason behind not choosing metaverse w.r.t. locality

H0: Major reasons behind not choosing metaverse are independent of locality.
H1: Major reasons behind not choosing metaverse are dependent on locality.

Chi-squared = 8.6502, df = 3, p-value = 0.03432

Conclusion: At 5% level of significance we reject the null hypothesis and conclude that : Major reasons behind not choosing metaverse and locality are dependent on each other .

CHI-SQUARE TABLE:

Sr.No.	Attribute	p-value	Decision	Inference
1.	Factors to voluntarily join the metaverse w.r.t. Profession.	0.01387	Reject H0	Attributes are Dependent
2.	Sort of technology chosen for entertainment purposes w.r.t. Profession.	0.0005158	Reject H0	Attributes are Dependent
3.	Major reason behind not choosing metaverse w.r.t.profession.	0.0005158	Reject H0	Attributes are Dependent
4.	Sort of technology chosen for entertainment purposes w.r.t. gender.	0.5743	Accept H0	Attributes are Independent
5.	Major reason behind not choosing metaverse w.r.t.gender.	0.6928	Accept H0	Attributes are Independent

6.	Sort of technology choose for entertainment purpose w.r.t.locality.	0.4595	Accept H0	Attributes are Independent
7.	Factors to voluntarily join the metaverse w.r.t.locality.	0.02291	Reject H0	Attributes are Independent
8.	Major reason behind not choosing metaverse w.r.t. locality	0.03432	Reject H0	Attributes are independent

LOGISTIC REGRESSION

The data collected for analysis is in the form of attributed data. To fix a regression model we converted the data to a variable form by replacing Yes and No responses with 1 and 0 respectively. Professions and income intervals with numbering 1 to 5. The row 6 which provides the total interpretation whether the response filled by the individual is valid as well as supporting the new features and factors in Metaverse. The data further converted is in such a way that it contains one dependent binary response variable (would like to choose metaverse or not in the form of Yes or No with 6 independent variables Age, Gender, Profession, Income, Area of residence and count of opinions favoring and not favoring Metaverse. Hence, we fixed the Logistic regression Model.

Logistic Regression: A regression in which the response variable is dichotomous or binary taking only two values say 0 and 1, Yes and No is a Logistic Regression

Would you like to use metaverse?	Your opinion regarding the following features in metaverse [Buying digital land using digital currency is an interesting concept]	Your opinion regarding the following features in metaverse [I would like to enjoy real-like 3D/4D experience of adventure sports without actually participating in it]	Your opinion regarding the following features in metaverse [Parties/gathering with virtual avatars can allow me to enjoy interactions without leaving my home]	Your opinion regarding the following features in metaverse [Metaverse can cause serious harm to modern society]	Your opinion regarding the following features in metaverse [Metaverse doesn't pose any threat with respect to cyberbullying or data thefting]	Your opinion [Row 6]
1	2	2	2	0	0	6
1	0	0	0	0	2	2
1	2	1	1	0	0	4
1	1	1	2	0	0	4
1	1	1	1	0	0	3
1	0	2	2	0	2	6
1	0	1	1	0	0	2
1	1	0	0	0	2	3
1	2	0	0	0	0	2
1	1	2	2	0	0	5
1	2	2	2	0	2	8
1	2	2	2	0	0	6
1	2	1	1	0	2	6
1	0	1	0	0	0	1
1	1	1	1	0	0	3
1	1	0	2	1	0	4
1	2	2	0	0	0	4
1	1	0	0	1	0	2
0	0	0	1	0	0	1
1	0	1	0	1	2	4
1	2	2	2	0	0	6
1	2	1	1	0	0	4
1	0	1	1	0	0	2
1	1	1	2	1	0	5
1	2	2	2	0	0	6

1	1	2	0	0	1	4

BASIC ASSUMPTIONS

Basic Assumption that must be met for logistic regression include :

1. independence of errors,

2.linearity in the logit for continuous variables.

3. Absence of multicollinearity, and lack of strongly influential outliers.

By Using Forward Selection Method:

The Best regression model is $Y=\beta_0+\beta_1x_1+\beta_2x_2+\beta_3x_3+\beta_4x_4+\beta_5x_5+\beta_6x_6$

R Code:

>glm.metaverse=glm(y~x1(Age)+x2(Gender)+x3(Profession)+x4(Locality)+x5(Income)+x6(Count of opinions favoring and not favoring Metaverse),family="binomial")

> summary(glm.metaverse)

Call:

>glm(formula=y~x1(Age)+x2(Gender)+x3(Profession)+x4(Locality)+x5(Income)+x6(Count of opinions favoring and not favoring Metaverse), family = "binomial")

Deviance Residuals: ###It is the contribution of individual observation to the likelihood function.(MLE is the method of estimating the parameter of an assumed probability distribution given some observed data)

Min 1Q Median 3Q Max

-2.6928 0.1857 0.3521 0.5192 1.9337

Coefficients:

	Estimate	**z value**	**Pr(>|z|)**
(Intercept)	2.86099	2.983	0.00286 **
x1(Age)	-1.28816	-6.769	1.3e-11 ***
x2(Gender)	0.28446	0.683	0.49431
x3(Profession)	-0.02901	-0.177	0.85946
x4(Locality)	-0.23353	-0.517	0.60522
X5(Income)	0.45118	2.216	0.02666 *
X6(Count of opinions			
favoring and			
not favoring			
Metaverse)	0.33716	3.263	0.00110 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

##This can be seen only in for Poisson and binomial logistic regression.

Null deviance: 254.76 on 253 degrees of freedom

Residual deviance: 165.09 on 247 degrees of freedom

AIC: 179.09

Here the difference between Null deviance and Residual deviance has a Chi-Square distribution with 6 degrees of freedom and is significant.

###AIC is Akalke information criterion. This is helpful in selection of model. Model with lower AIC is preferable.

##From p value we conclude that Factors like Age ,Income, Count of opinions favoring and not favoring Metaverse are highly significant at 5% level of significance. i.e corresponding hypothesis are rejected

##Mathematical model:

$\text{Log}_e(\Pi(x)/1 - \Pi(x)$ = 2.8699-1.28816*x1+0.28446*x2-0.02901*x3-0.23353*x4+0.45118*x5+0.33716*x6

Here, x1=Age

x2=Gender

x3=Profession

x4=Locality

x5=Income

x6=Count of opinions favoring and not favoring Metaverse

ACCURACY

```
>predict_reg = predict(glm.metaverse,mydata,type='response')

>predict_reg

>predict_reg=ifelse(predict_reg > 0.5,1,0)

>table(mydata$y, predict_reg)

>missing_classerr=mean(predict_reg!=mydata$y)

>accuracy=1-missing_classerr;

>accuracy;

###accuracy;

[1] 0.8818898
```

Goodness of fit

```
> with(glm.metaverse,pchisq(null.deviance-deviance,df.null-
df.residual,lower.tail=F))

##Goodness of fit

[1] 3.546636e-17
```

Conclusion: Since p value is less than 5% level of significance, our model is statistically significant i.e highly significant.

PROPORTIONALITY TEST

Hypothesis for Proportionality Test:

H0: Proportion of Male and Female saying “Yes” to metaverse are same.

H1: Proportion of male and female saying “Yes” to metaverse are not same

##Proportion of male and female saying yes to metaverse

> x<-c(107,96);x;

[1] 107 96

> n<-c(131,125);n;

[1] 131 125

> prop.test(x,n);

data: x out of n

p-value = 0.4186

95 percent confidence interval:

(-0.05833934 0.15592712)

sample estimates:

prop male	prop female
0.8167939	0.7680000

Conclusion:

As the proportion of male and female are nearly equal and we get P value as 0.4186 which is greater than 0.05(P>0.05) we Accept the null hypothesis H0 that is male and female saying “Yes” to Metaverse are in the proportion.

CONCLUSION

The age group supporting Metaverse lies between 10-30 age group.

The main reason behind choosing metaverse is Art and Live Entertainment.

Attributes like factors to voluntarily join metaverse,Sort of technology choose for entertainment purpose, Major reason behind choosing Metaverse are dependent on Profession.

Factors like Gender, Age and income are highly significant in fitting logistic regression model. Male and female saying yes to Metaverse are in proportion.

Reason behind not choosing Metaverse are Privacy and Security issue and losing connectivity physically.

SCOPE AND LIMITATIONS

SCOPE:

We can use experiments similar to the one conducted in this project to study the effect of various upcoming factors and hurdles in the launch of metaverse in future. This analysis can be conducted on the large population i.e in different countries and the results can be noted down

LIMITATIONS:

The analysis is conducted on the sample of 254 individuals. The result interpreted on the large sample space may vary to the great extent and may show a fluctuation in the outcomes. Hence the outcome interpreted right now can’t be considered as final and valid.

REFERENCES

i. Fundamental of Mathematical Statistics by Gupta and Kapoor and ,

ii. Nirali's Statistical Computation using R software