Effects of rapidly changing technology and revolution of the Computer on HCI

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"Effects of rapidly changing technology and revolution of the Computer on HCI"**, submitted by Sanjana Yesmin, Nusrat Jahan Tamanna, and Afrida Hossain Aurni to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on December 2021.

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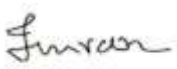

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Shah Md. Tanvir Siddiquee, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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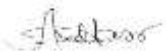

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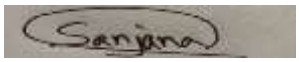

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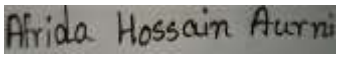

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ABSTRACT

In this age of technological revolution, everything has become machine-dependent. So we can't visualize doing anything without machines now. Technology is growing faster, even in a blink; we may see something different than we saw just a few seconds before. So many things have changed, tools, and devices that we've used before, most of them are no longer in use. We have done our research work based on machine learning algorithms. In this research, our primary focus was on the interactions between humans and computers and how we can make this better. We can make it better after knowing people's opinions on upcoming changes. Are people ready to accept this fastest revolution? Is computer technology only used as a helping hand to do everything better, or causing problems by having an impact on both humans, their behavior, society, and the environment. If we look closely, then we can realize. Not only the size of computers, and its technical parts, but the way of its working procedure is also changing. Everything which has many advantages always comes with disadvantages also. So, we wanted to know about people's opinions regarding these changes, and are they accepting these positively or negatively. That is why we made a survey form of 20 questions and collected as much data we could. Then we applied machine learning algorithms to determine the accuracy and analyze our experiment. Our research will give a clear concept about what humans may face with the upcoming changes. How they can build their ability to accept it with enough skills and knowledge, and how the developers who are behind it make those changes reliable, user friendly, and by focusing on humans need towards upcoming technology.

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CHAPTER-1

INTRODUCTION

1.1 Introduction

Human and Computer Interaction (HCI) is the technical way to think about how humans can communicate or interact with their computing devices. Nowadays, technologies are changing rapidly. With the revolution, the structure of a computer, operating system, windows, software, hardware, and the other things related to computer changes day by day. That is why Human and Computer interaction has affected our everyday life. These effects have been becoming more and more challenging. So, our research topic is related to the changes in technology and the computer revolution and its effect on human beings.

The history of the Computer is considered from the first generation to the fifth generation of a computer. In this era, Computers and technologies are changing rapidly. Among other things, the usability aspect of HCI ensures that it can assist in an effective, efficient, and satisfying way for the user. An AI (Artificial Intelligence) serves to meet the different demands of future technological development. With the revolution of the sixth generation, technological changes will affect almost every area of the environment, society, culture, future generations, and so on. It's challenging now how our future generations accept and adapt to this rapid change.

We got the information from our survey that computer users are already suffering from various computer-related damages. Overuse of Computers can also cause mental and physical problems. Children can suffer from physical and psychological problems if they play computer games or use it too much. The effects of the rapidly changing technology hamper many sectors. It reduced social interaction, created isolation, and damaged our creativity. We are living in the Technological era, where we have to survive. These sudden changes in technology and computer might be good or bad. It varies from person to person.

Some may think that this change is not a positive thing because we need to face many kinds of problems in the future. Everything is becoming automated. Thus the value of machines is increasing while the value of a human being is decreasing. Because of these changes, many people lose their jobs because of a lack of skills. It creates unemployment, which is not a good thing for a country and so on.

Some people may think these changes are positive. Cause technologies are making our life easier. Lots of problems can be solved by using these technologies and many more. That is why we are conducting research. In this research, we are trying to determine what people are thinking about these changes in technology and computer, their ability, their knowledge to adapt to these changes, the problem they face, and many more to find out the things which can make the interaction between Computer and Human better and better.

Thus we have discussed both the positive and also negative effects of these changes. It depends on people how they will use the technology. However, the good news is here, in the history of mankind, human beings always kept moving forward with the struggle of getting the best out of the worst.

1.2 Motivation

HCI refers to the interaction between humans and computers. It is a huge field. We got our motivation from here. We always wanted to study things about human and computer interaction. Other motivation we got from this rapidly changing technology and revolution of the computers.

Rapidly changing technology and revolution of the computer has an enormous impact on a countries economy, human culture, society, environment, and many more. Thus our research is to know about the interactions between humans and computers. With the changes of computers and technology, what will be its effect on human beings? What will be its effects on the thinking of human beings regarding the changing technology and computer revolution?

We want to find out the effects of the changing technology on our future generations, its impact on society, the environment, and many more. As we are students of Computer science and engineering thus, we always thought to do something related to computers and technology. That is another source of our motivation.

1.3 Rationale of the Study

The first mechanical computer was created by Charles Babbage, in 1822. German Konrad Zuse created the very first electromechanical binary programmable computer, and the first functional modern computer in 1936, which was named "The Z1". Since then, in this world technology has reached another level of evolution. This evolution, changes in technology, the revolution of the computer has a huge impact on human, society, the environment, the economy. In a word, everything has been affected by these changes and is continuously being affected by them.

These revolutions, changes in technology, and the computer have an enormous impact on human life. It has been helping humans unconditionally from the very beginning. It helps to settle the problems that humans are encounters in their daily life. To understand the depth of the computer and technologies invention in human life, we should have a look at the developments that happened in the areas of communication, Education, Utility facilities, and health care. With the helping human beings and solving human life problems, the computer also has some dark side. Not only do these changes in technology and computer are not only giving benefits to humans but also because of it many incidents happened, and more incidents can happen in the future.

In November 1980s, a bug in the software of the Therac-25 radiation therapy machine was directly responsible for at least five deaths. In 1991 in Saudi Arabia, a bug in the software of the MIM-104 Patriot surface-to-air missile system led to an incoming Scud missile not being located and indirectly to the death of 28 people. In August 2003, faulty software on a single computer that failed to detect what should have been a harmless local outage led to a power cut in the United States put 55 million people in the dark.

In 2007 in South Africa, a robotic anti-aircraft cannon accidentally killed nine people and injured 15 others. Because of the failure of a single router board, in 2009, the entire air traffic control system of the United States crashed, causing chaos to travelers, and many more incidents have been happening. From here, we can easily understand that how much human being is dependent on computers and technologies. So, it is paramount to make the interaction of humans and computers better. We are mainly doing this research to know about the viewpoint of humans regarding the computer and the changes in technology. We also want to know about humans' desire concerning these revolutions and changes in technology. This will help us to make changes in technology in the acceptance of human beings, to make the interaction between humans and computers much easier than before.

1.4 Research Questions

Some of our research questions are:

- What is HCI?
- What are humans think about computers?
- What is the importance of computers to humans?
- Can they (humans) be able to adapt to the sudden changes of computers and technology?
- What kinds of problems they'll face with the rapid changes in technology?
- Can our future generation be able to adapt to these changes in technology?
- Can computers satisfy the social needs of humans?
- Do Humans know about Artificial Intelligence?
- Do Humans know the impact of AI on the computer revolution?
- What changes do human wants to occur in the next computer revolution?
- What kinds of problems do they face while using computers for a long time, and what types of crisis may they encounter with the updated technology?
- What do Humans think about these changes in technology, it is a positive thing or a negative thing?

1.5 Expected Output

The outputs we foresee are-

- We want to know on which occupation, gender, and age's people are used more computer?
- What kind of physical problems do they face after using computers excessively?
- What do they think about the computer and how much it is paramount to them?
- We want to know their current knowledge level about technology and computer.
- How confident are they in their ability to adapt to the sudden changes of computers and technology?
- What kinds of problems they'll face with the rapid changes in technology?
- Can our future generation be able to adapt to these changes in technology or not?
- Can computers satisfy the social needs of humans?
- Can changes in technology affect our social behavior?
- Do they know about Artificial Intelligence and it's on the computer revolution?
- What changes do they want to occur in the next computer revolution?
- What do they think about these changes in technology, is it a positive thing or a negative thing?

1.6 Project Management and Finance

We are accomplishing a research paper. So, we followed some steps to manage our work. At first, we formed our question for collecting data and then started our survey. Secondly, after collecting about 100 amounts of data we started to preprocess our data, applied train test split to make a model, and tried to find out the accuracy. After finding the accuracy, we are still trying to manage more data to get the perfect precision.

As for finance, we printed about 300 copies of our survey to collect more data which cost us about 1500 TK.

1.7 Report Layout

We have a total of six chapters which we discussed in detail in our report. Each chapter holds its own importance for explaining our research subject. The report paper includes the content as follows:

Chapter 1 (Introduction): In this chapter we discussed the Introduction, Motivation of our research. Rationale of our study, our research question, Expected output of our research and our project management and finance.

Chapter 2 (Background): In this chapter, we discussed our research preliminaries. Related works with our research topic, Comparative Analysis, and Summary, Scope of the Problem, Challenges of our research topic.

Chapter 3 (Research Methodology): In this chapter we discussed our research subject and instrumentation, data collection procedure or dataset utilized, statistical analysis, proposed methodology, and implementation requirements.

Chapter 4 (Experimental Results and Discussion): In this chapter, we discussed our experimental setup, experimental results & analysis, and discussion.

Chapter 5 (Impact on Society, Environment and Sustainability): In this chapter, we discussed our research impact on society, environment, ethical aspects and sustainability plan.

Chapter 6 (Summary, Conclusion, Recommendation and Implication for Future Research): In this chapter, we discussed our research summary, conclusions, and implication for further study.

Chapter 2

Background

2.1 Preliminaries/Terminologies

Computers and technology are linked inextricably with our life. We cannot think of a single day without it. After the invention of technology and the computer, it is continuously changing and updating day by day. This continuous updating and changing make things easier for us. However, many people find these changes challenging to adapt to. Humans face many kinds of problems regarding adapting to those updates and changes. Every person in the world has his or her own opinion. Some of them think that this revolution and changes are positive, and some of them think in the negative. However, in our research, we are trying to harbinger the opinion of every person.

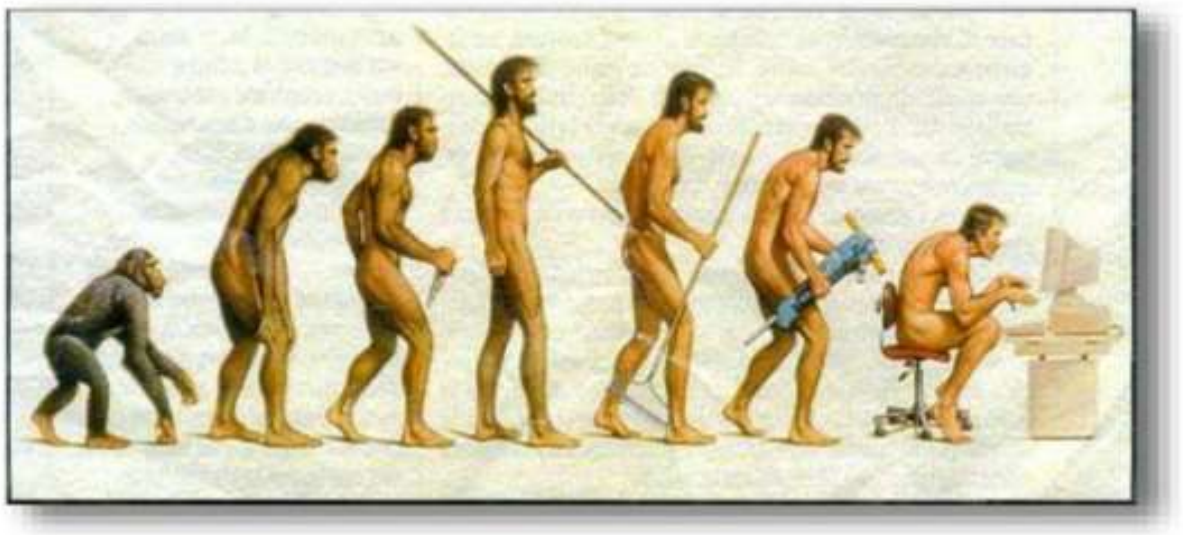

Figure 2.1 History of revolution

Revolutions of computers happen many times, and continuously it is happening. There is a total of five generations of computers; some research says it is six. The period of 1940 to 1956 or from 1946 to 1959 (in other research) is known as the first generation of computers. The period of the second generation of computers is 1956 to 1963 or in other research, it is 1959 to 1965. The period of 1963 to 1971 or 1965 to 1971 is known as the third generation of computers.

Similarly, the period of 1971 to 2010 (In other research, it is 1971 to 1980 or 1971 to the present) is considered as the fourth generation of computers. The fifth generation of computers is considered from the period of 2010 to the present and beyond (In other research, it is 1980 to onwards or the present and beyond). And the future generation of computers is known as the sixth generation of computers. Technology and computer updates as follows:

i. The first generation of computers was vacuum tube-based.
ii. The second generation of computers was Transistor based.
iii. The third generation of computers was Integrated circuit-based.
iv. The fourth generation of computers was VLSI microprocessor-based.
v. The fifth generation of computers is ULSI microprocessor-based or AI (Artificial intelligence) based.
vi. And the sixth generation of computers most probably will be quantum, molecular, and nanotechnology-based.

In the late 1970s, when the first personal computer emerged as a consumer, it had a massive impact on human beings. At that time, many people didn't know how to use computers properly. Many business sectors started using the computer, those people who already built a skill on the computer, they can easily adapt with those kinds of situation. But those who didn’t have a skill lose their jobs because of a lack of skills, which creates unemployment. It also has a huge impact on a country economy. Like that whenever a new change happened and revolution happened many human beings face many kinds of problems. It can disturb the interaction between humans and computers if it continues like that. Thus, that is why we are researching to know about the problems human being faces, their ability to adapt, their knowledge about technology, and their opinion about these changes, and many more to establish a better interaction between humans and computers.

2.2 Related Works

There are a lot of works related to computers, technologies, the revolution of computers, and many more. But we didn't find any work related to using machine learning approaches to predicting something of computer and technologies.

The Next Computer Revolution; Author(s): Abraham Peled; Source: Scientific American, Vol. 257, No. 4 (OCTOBER 1987), pp. 57-65; Published by: Scientific American, a division of Nature America, Inc. In this work, he said that computers impact every field of occupation like technologists, physicists, and many more. He discussed different segments of a computer and gave lots of knowledge about it. He also showed the calculation of the economics of system design by using some equations to purchase a system competent in executing tasks at the lowest cost.

Once more—a computer revolution by Joseph Weizenbaum; in this work, he said that any notion or connection, can be started in an ordinary language can be translated into computer model language. He asked many questions and briefly answered them. He also talked about Artificial Intelligence, limitations to impose on the application of computers to human affairs, the impact of the computer on human dignity, and many other things.

The Computer Revolution and the problem of Global Ethics by Krystyna Gorniak-kocikowska; Southern Connecticut State University, USA. In this paper, he mainly wanted to define the computer revolution and the problems of global ethics with the perspective of a human being who has not connected with the process of the computer revolution. His theoretical background had not related to computers and technology. He compared the computer revolution with the printing press revolution and ethics. He also defines the problems with the definition of computer ethics.

The Computer revolution in science: steps toward the realization of computer-supported discovery environment by Hidde de Jong, Arie Rip. In this paper, they mainly concentrated on computer-supported environments, how developers should make them. Developers should not just focus on remote programming but also on how these programs would use.

They discussed every detail of the computer-supported discovery environment and its uses. They also described the computer-supported discovery environment of the future and many other things.

The Computer revolution hasn't happened yet; Grand challenge: make it happen in the best possible way. In this work, he mainly discussed three basic most important things which have a huge impact on the computer revolution. Those are the internet, personal computing, and teaching real computer literacy to all.

Social attitudes and the computer revolution by Robert S. Lee. The purpose of their analysis is to examine favored beliefs and attitudes about one of the prime symbols of our rapidly changing technology that is mean the electronic computer.

Did the Computer Revolution shift the fortunes of U.S. cities? Technology shocks and the geography of new jobs by Thor Berger and Carl Benedikt Frey. In this paper, they showed that how the computer revolution affected the economic trajectories of U.S. cities. This had created new skills job opportunities and many more.

Mathematics and the computer revolution by M. F. Atiyah. In this work, he discussed the computer revolution, the relationship between mathematics and theoretical computer science, human and artificial intelligence, the advantages and dangers of computer growth in different sectors, and many more.

On the Computer Revolution; Author(s): Jean-Jacques Servan-Schreiber and Fred Branfman; Source: World Policy Journal, Vol. 2, No. 3 (Summer, 1985), pp. 569-586; Published by: Duke University Press. It is an interview paper of Jean-Jacques Servan-Schreiber who was interviewed by Fred Branfman. In this paper, they discussed bunches of things about the changes that might happen in the next revolution and how we could prepare for it.

Hydrology- the Computer Revolution Continues by JAMES R. WALLIS; The Real Computer Revolution Hasn't Happened Yet by Alan Kay; Information Ages: literacy, Numeracy, and the computer revolution by Michael E. Hobart and Zachary S. Chiffman;

The computer revolution: An economic perspective by Daniel E. Sichel; The computer revolution in philosophy: philosophy science and models of mind by Aaron Sloman and many more are other related works and books.

All of the paper, works and books mentioned here is slightly closed to our works but none of them discussed how human beings are taking these changes and its effects on the interaction between human and computer.

2.3 Comparative Analysis and Summary

As we didn't find any work related to ours so, for comparative analysis we'll say that all of the works, papers and books discussed the computer revolution, changing technology, and its effects on different sectors. All of these things are slightly related to our work. In our work, we also want to know the opinions of human beings about these changes and revolution effects, their effect on future generations, our social behavior, the interaction between humans and computers, and many more.

In our thesis, we used machine learning algorithms to determine the accuracy of what human beings think about these changes in technology and the computer revolution. To determine if they are accepting these changes positively or negatively. These changes do or don't affect our future generation, our behavior, and many more. For this thesis, we collected about 150 data and we are still trying to collect more data for our paper. We are continuously updating our dataset. The dataset is full of different opinions of human beings of different ages, occupations, and genders about these changes in technology and revolution. We sorted our data as per our needs. Then we checked our data, if there had any null values or not. We described our data. We used countplot from seaborn library to check the graphical presentations of the class data and other data. Then for preprocessing our data, we encoded it using the label encoder. Then applied the train test and split method to train our model. Then we applied different types of algorithms to find out its accuracy.

2.4 Scope of the Problem

To build our model, we used logistic regression algorithm, decision tree algorithm, random forest algorithm, Support Vector Machine, Gaussian Naive Bayes, Bernoulli Naive Bayes, and Multinomial Naive Bayes to differentiate the accuracy between them. We wanted to find out which algorithm gives us the highest accuracy from our dataset. As we couldn't collect enough data for our report but we are still trying to collect more data and continuously updating our model for our paper. In our class column in dataset, there are total 134 positive values and 16 negative values among 150 data.

```
In [20]: df['Is CCT neg or pos'].value_counts()

Out[20]: Positive    134
         Negative     16
         Name: Is CCT neg or pos, dtype: int64
```

Figure 2.2 Class value counts

Here, CCT means Changing in computers and Technology. We want to know human's opinions that what do they think these changes are positive or not? Among all the algorithms we got the accuracy but also faced some errors in logistic regression, support vector machine, and multinomial Naive Bayes because of the iteration limit and not having negative data. That is why we had to use zero_division = 0 to get rid of that error. Although all of the models gave us very high accuracy beyond our expectation but that is also why we are thinking that our models aren't ready enough to give us the perfect accuracy. It is normal to get positive response more than the negative one as per our research topic. But it varies from person to person. Most people only thought about the advantages they can get from these changes in technology and evolution, that is why their opinion regarding this matter was positive. Others thought about the disadvantages they will face from these changes in technology and evolution that is why their opinion regarding this matter was negative. There is nothing in this world that has only advantages and not having disadvantages.

2.5 Challenges

It was hard to collect data from people in the pandemic situation. The challenging, stressful situation was why people would fill up our form. It was a big deal for us that how many people we were able to comprehend or explain to them about the importance of the form, and also convinced them to fill the form. Because of the online platform, many people among our relatives and friends were afraid of being hacked because of our survey link. It was very challenging for us to convince them.

So because of the online platform, we couldn’t collect enough data as our expectation. But still, we are trying to collect more and more data for our paper to get better accuracy.

Our other challenge is that determine the perfect accuracy from our dataset. Choosing models was challenging, that is why we tried various types of models to find out the precision from our dataset.

As for collecting more data, we printed our survey. We are trying to go to different places to collect various types, ages, genders, and occupation's people's opinions. That is also very challenging for us because many people rejected us to fill up the form because they were very busy, couldn't get enough time.

Chapter 3

Research Methodology

3.1 Research Subject and Instrumentation

The main subject of our research is to determine people's opinions regarding these changes in technology and the computer revolution. We want to know about what ages, occupations, and genders human beings are taking it positively or negatively. What peoples think about computers, what are their knowledge about computers, the importance of computers for them, their adaptability, their social behavior, the problems they face physically or problems which are related to technology, and many more.

As, we are trying to find out the opinions of the human beings regarding these changes in technology and revolution of the computer. And also trying to find out the accuracy of our models. That is why we used machine learning algorithms to build our research project. To develop our models and conduct our research, we used many development tools, software, and hardware. A list of the instruments we used is given below-

- Hardware and Software
  - Intel core i5 8th generation (4GB Ram)
  - 1TB HDD
  - Google Colab
  - Anaconda Jupyter Notebook
- Development tools
  - Windows 10
  - Python 3
  - Pandas
  - Numpy
  - Matplotlib
  - Seaborn

3.2 Data Collection Procedure/Dataset Utilized

We created our own data set for this research. We surveyed 20 questionnaires and tried to collect data from them. But it was very challenging for us in that pandemic situation where we couldn't go outside to collect data. As a result, we couldn't manage enough data for our research. Then we decided to print our survey form. After print, we tried to collect more data with maintaining our safety. But still, now we couldn't manage much data. We know that the more data we can use to build our models, the more preferable accuracy we can get. Currently, we used 150 data for our work. After arranging all the data we checked if everything was flawless or not and saved it as Data.csv. There is a total of 17 columns of our data. We remove 3 columns of physical problems humans face, what do they think about computers, and what they want from the next revolution. We will discuss these 3 in our paper. A sample picture of our data is given below-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Age	Gender	Occupatio	Have any	Importanc	Time per	can revol	Rating yo	confident	CCT affect	Satisfy so	Know abo	Impact of	problems	Is CCT neg	Is revoluti	Next Generation	ability
2	24	Male	Student	Yes	Highly im	More thar	No	Expert	Extremely	Yes	Not Sure	Yes	Appropria	Security	Positive	Strongly A	Maybe, not sure	
3	22	Male	Student	Yes	Important	2-4 hours	No	Proficient	Moderate	Yes	No	Yes	Low	Planned	Positive	Agree	Yes	
4	22	Female	Student	Yes	Important	4-6 hours	No	Proficient	Very	Yes	No	Yes	Appropria	Security	Positive	Agree	Maybe, not sure	
5	24	Male	Student	Yes	Highly im	4-6 hours	No	Competer	Moderate	Yes	Not Sure	Yes	Moderate	Technical	Positive	Agree	Yes	
6	22	Female	Student	Yes	Important	1-2hours	No	Competer	A little	Yes	No	Yes	Moderate	Nothing	Positive	Agree	Yes	
7	22	Male	Student	Yes	Highly im	4-6 hours	No	Competer	Moderate	Yes	No	Yes	Appropria	Mental	Positive	Agree	Maybe, not sure	
8	23	Male	Student	Yes	Highly im	More thar	No	Proficient	Very	Yes	Yes	Yes	Moderate	Nothing	Positive	Agree	Yes	
9	19	Female	Student	No	Highly im	less than	Yes	Novice	Moderate	Yes	Not Sure	Yes	Low	Planned	Positive	Disagree	Yes	
10	23	Female	Student	Yes	Highly im	More thar	No	Competer	Very	Yes	No	Yes	Moderate	Understar	Positive	Agree	Yes	
11	18	Male	Student	Yes	Average	4-6 hours	No	Competer	Moderate	Yes	No	Yes	Appropria	Mental Pr	Negative	Neutral	Yes	
12	23	Male	Business	Yes	Highly im	4-6 hours	No	Expert	A little	Yes	No	Yes	Appropria	Security	Positive	Strongly A	Maybe, not sure	
13	22	Male	Student	Yes	Highly im	4-6 hours	No	Advanced	Moderate	Yes	No	Yes	Moderate	Security	Positive	Agree	Yes	
14	23	Male	Student	Yes	Important	1-2hours	Yes	Novice	Moderate	Yes	No	Yes	Low	Planned	Positive	Agree	Maybe, not sure	
15	25	Male	Student	Yes	Important	2-4 hours	No	Proficient	Moderate	Yes	Yes	Yes	Moderate	Security	Positive	Agree	Yes	
16	27	Female	Student	Yes	Important	1-2hours	No	Advanced	Moderate	Yes	No	Yes	Low	Security	Positive	Agree	Yes	
17	21	Female	Student	Yes	Highly im	4-6 hours	Yes	Advanced	Moderate	No	Not Sure	Yes	Low	Planned	Positive	Agree	Yes	
18	27	Male	Student	Yes	Highly im	4-6 hours	No	Advanced	Moderate	Yes	No	Yes	Moderate	Nothing	Positive	Strongly A	Yes	
19	22	Male	Student	Yes	Highly im	8-10 hour	No	Proficient	Very	Yes	Not Sure	Yes	Low	Technical	Positive	Strongly A	Maybe, not sure	
20	22	Female	Student	Yes	Highly im	4-6 hours	Yes	Advanced	Moderate	Yes	Yes	Yes	Moderate	Planned	Positive	Strongly A	Yes	
21	22	Female	Student	Yes	Highly im	2-4 hours	Yes	Novice	Moderate	Yes	Not Sure	Yes	Moderate	Nothing	Positive	Strongly A	Yes	
22	18	Female	Student	Yes	Important	2-4 hours	No	Competer	A little	No	No	No	Nothing	Understar	Positive	Neutral	Maybe, not sure	
23	23	Male	Student	Yes	Highly im	More thar	No	Expert	Very	No	Not Sure	Yes	Moderate	Nothing	Positive	Strongly A	Yes	
24	54	Female	Housewif	No	Average	less than	Yes	Novice	Moderate	Yes	Yes	Yes	Low	Understar	Positive	Agree	Yes	
25	21	Female	Student	Yes	Highly im	8-10 hour	Yes	Competer	Moderate	Yes	No	Yes	Moderate	Security	Positive	Strongly A	Yes	

Figure 3.1 Sample data

3.3 Statistical Analysis

In our work, we have collected 150 data currently. Among all of them, only age is numeric data, and others are non-numeric data. As we are using all non-numeric data that is why we cannot perform any descriptive analysis. However, during working on our research project, we encoded all of our data without the class data. Hence after encoding, we can analyze our dataset by using describe function. Pictures of statistical analysis of our data is given below-

	Age	Gender	Occupation	Have any computer	Importance of computer	Time per day	can revolution replace human	Rating your knowledge
count	150.000000	150.000000	150.000000	150.000000	150.000000	150.000000	150.000000	150.00000
mean	25.873333	0.673333	3.400000	0.893333	1.253333	2.526667	0.446667	1.84000
std	8.042919	0.470565	0.969328	0.309723	0.569784	1.677713	0.498813	1.49756
min	18.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
25%	21.250000	0.000000	3.000000	1.000000	1.000000	1.000000	0.000000	1.00000
50%	23.000000	1.000000	4.000000	1.000000	1.000000	2.000000	0.000000	1.00000
75%	29.000000	1.000000	4.000000	1.000000	2.000000	4.000000	1.000000	3.00000
max	69.000000	1.000000	4.000000	1.000000	2.000000	5.000000	1.000000	4.00000

Figure 3.2 Statistical analyses of our data (part 1)

confident in CCT	CCT affect social behaviour	Satisfy social needs	Know about AI	Impact of AI	problems due to CCT	Is revolution becificial	Next Generation ability
150.000000	150.000000	150.000000	150.000000	150.000000	150.000000	150.000000	150.00000
2.293333	0.920000	0.726667	0.873333	1.246667	2.986667	1.380000	1.60000
1.348858	0.272202	0.866193	0.333713	0.968890	1.562938	1.369221	0.78578
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
2.000000	1.000000	0.000000	1.000000	0.000000	2.000000	0.000000	2.00000
2.000000	1.000000	0.000000	1.000000	1.000000	3.000000	2.000000	2.00000
4.000000	1.000000	2.000000	1.000000	2.000000	4.000000	3.000000	2.00000
4.000000	1.000000	2.000000	1.000000	3.000000	5.000000	3.000000	2.00000

Figure 3.3 Statistical analyses of our data (part 2)

3.4 Proposed Methodology/Applied Mechanism

Each work must have a method to follow. We also have a methodology for our research work. The methodology of our work is given below-

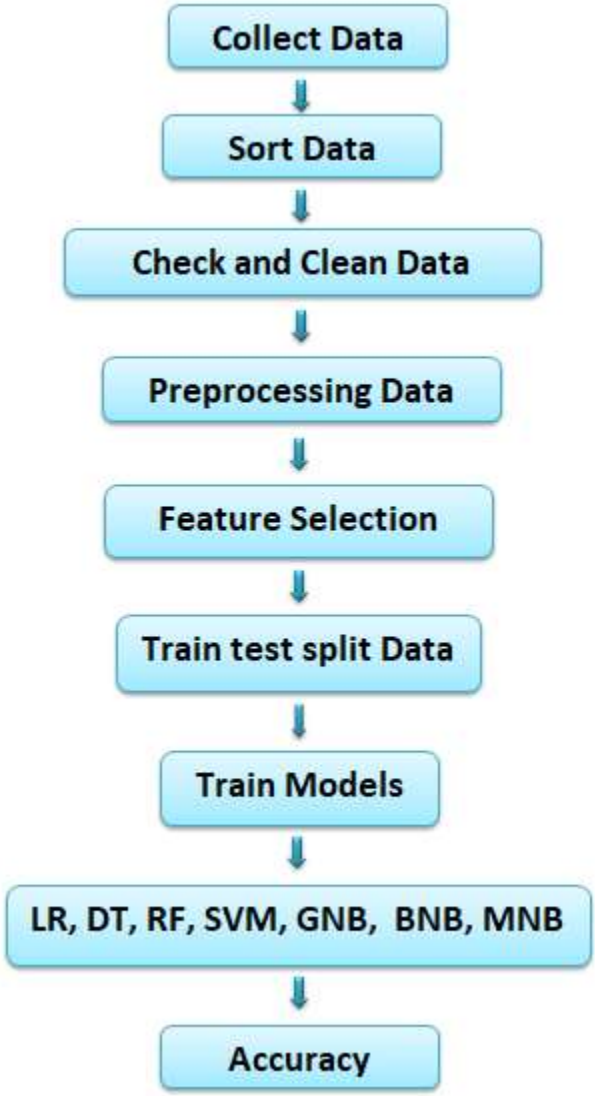

Figure 3.4 Methodology of our research work

We applied a total of 7 algorithms in our research. They are Logistic Regression Algorithm, Decision Tree Algorithm, Random Forest, Support Vector Machine, Gaussian Naïve Bayes, Bernoulli Naïve Bayes, and Multinomial Naïve Bayes.

3.5 Implementation Requirements

The requirements of implementation are huge. There have many algorithms in machine learning and data mining techniques for train models and finding accuracy. We used 7 of the algorithms to build our research models. They are Logistic Regression Algorithm, Decision Tree Algorithm, Random Forest, Support Vector Machine, Gaussian Naïve Bayes, Bernoulli Naïve Bayes, and Multinomial Naïve Bayes. Their definitions with a sample diagram is given below-

Logistic Regression: Logistic regression is one of the numerous widespread Machine Learning algorithms. It comes beneath the Supervised Learning technique. It is used for predicting the categorical dependent variable using a given set of independent variables.

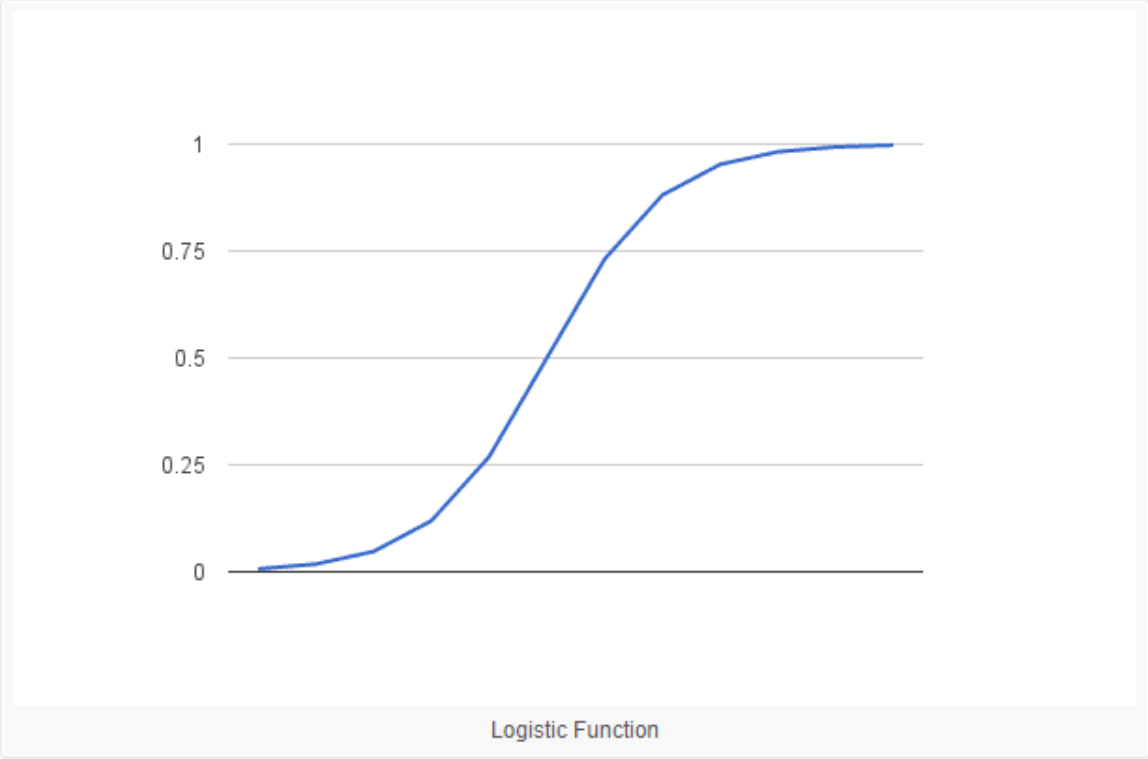

Figure 3.5 Logistic function

Decision Tree: Decision Tree Learning is a mainstream data mining technique and is a form of supervised machine learning. A decision tree is like a diagram using which people illustrate a statistical probability or locate the course of transpiring, action, or the outcome.

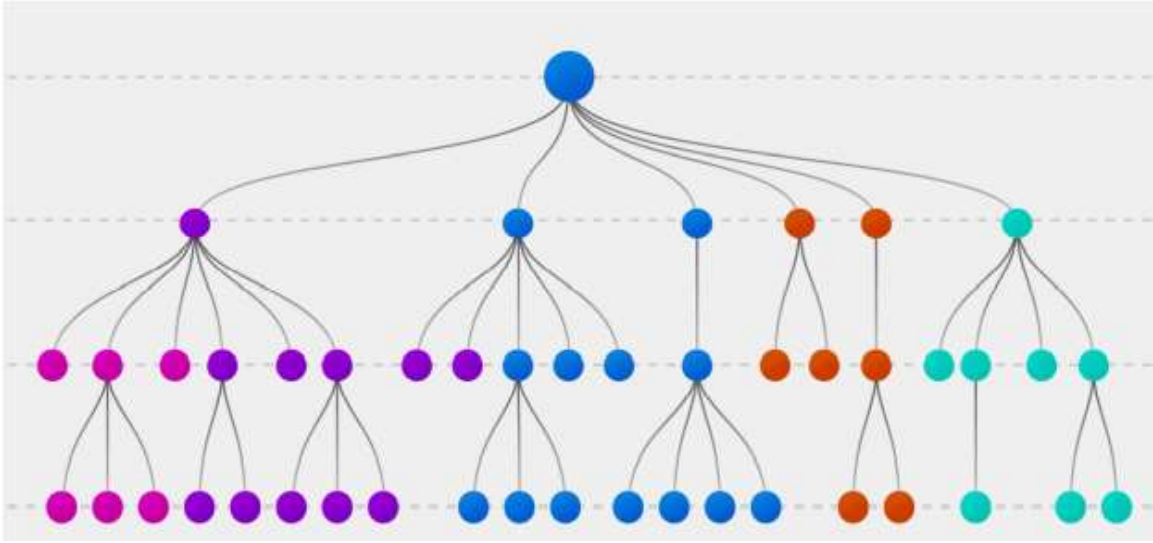

Figure 3.6 Decision tree

Random Forest: Random Forest is an emphatic and adaptable supervised machine learning algorithm that produces and incorporates numerous decision trees to assemble a "forest." It can be used for both classification and regression problems in R and Python.

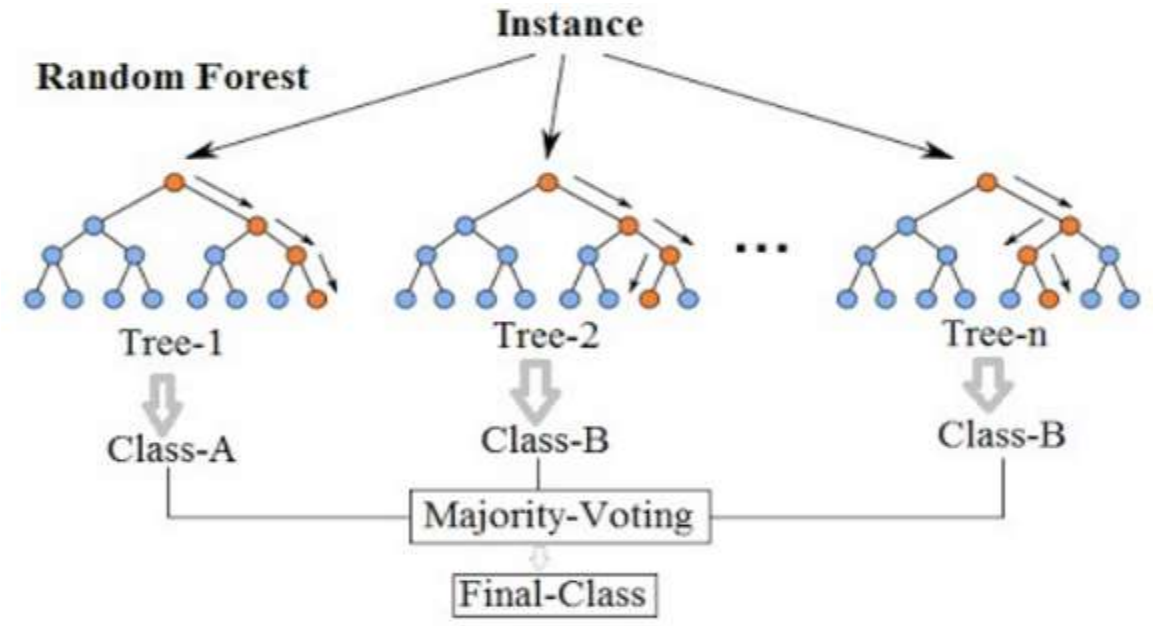

Figure 3.7 Random Forest

Support Vector Machine: Support Vector Machine (SVM) is a supervised machine learning algorithm utilized for both classification and regression. The pursuit of the support vector machine algorithm is to locate a hyper plane in N-dimensional space (N — the number of features) that distinctly categorizes the data points.

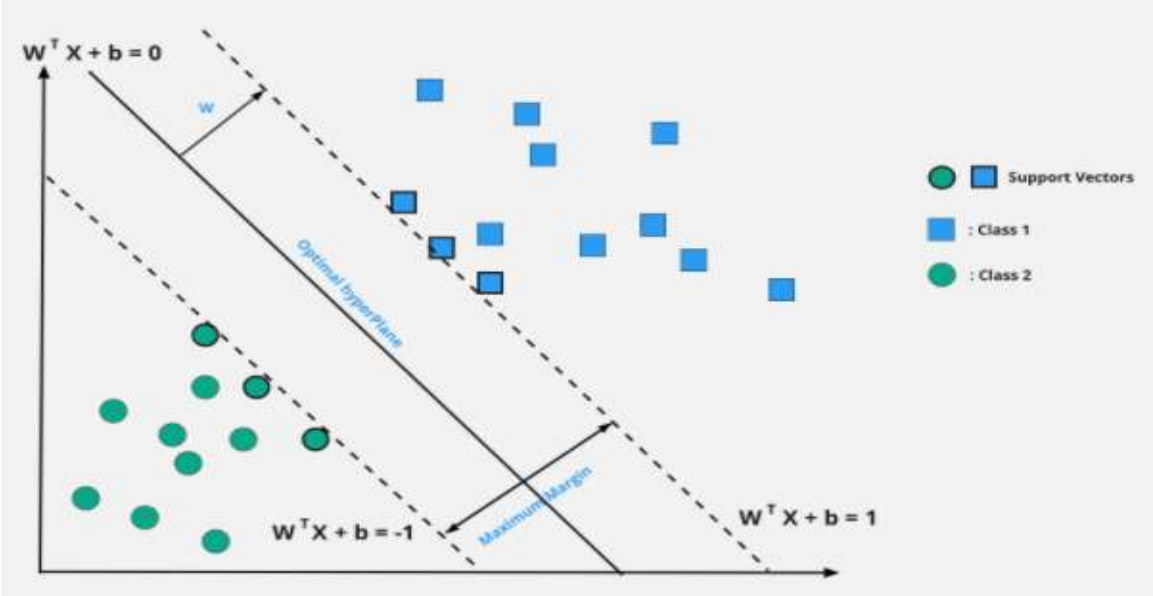

Figure 3.8 Support Vector Machine

Gaussian Naïve Bayes: Gaussian Naive Bayes is a variant of Naive Bayes that observes Gaussian standard distribution and supports continuous data. While other functions are used to estimate data distribution, Gaussian or normal distribution is the most straightforward to execute as you will need to estimate the mean and standard deviation for the training data.

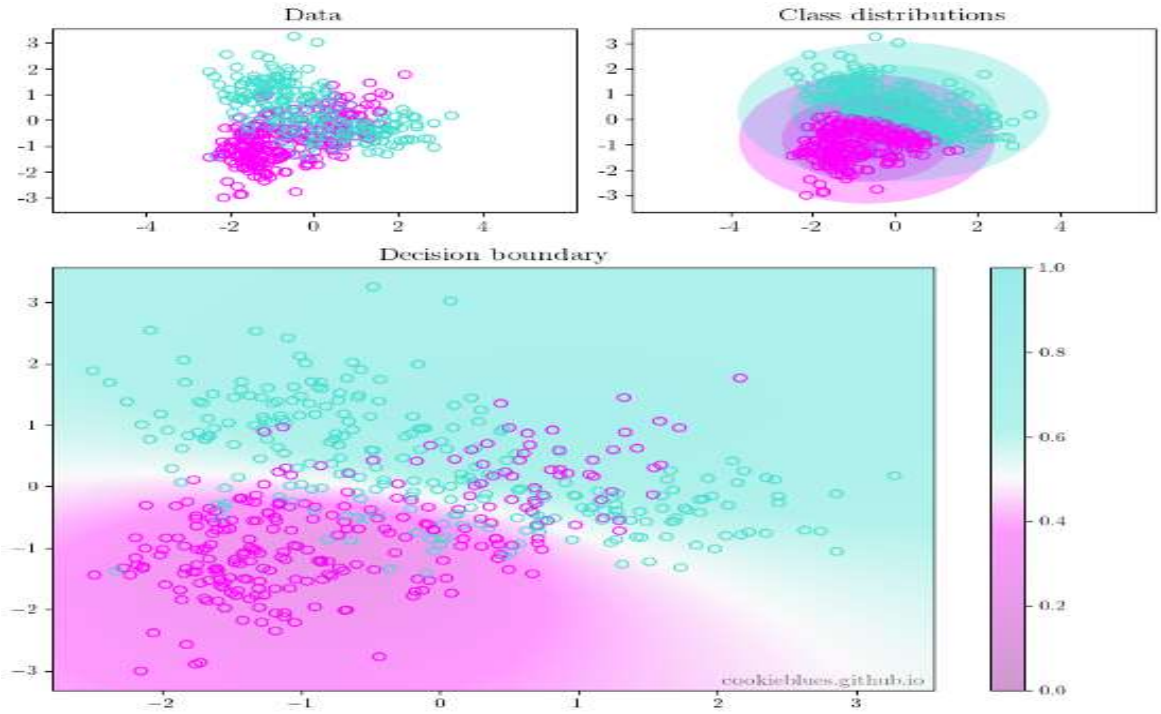

Figure 3.9 Gaussian Naïve Bayes

Bernoulli Naïve Bayes: Bernoulli Naive Bayes is also a variant of Naive Bayes. It is utilized for discrete data, where components are only in binary form.

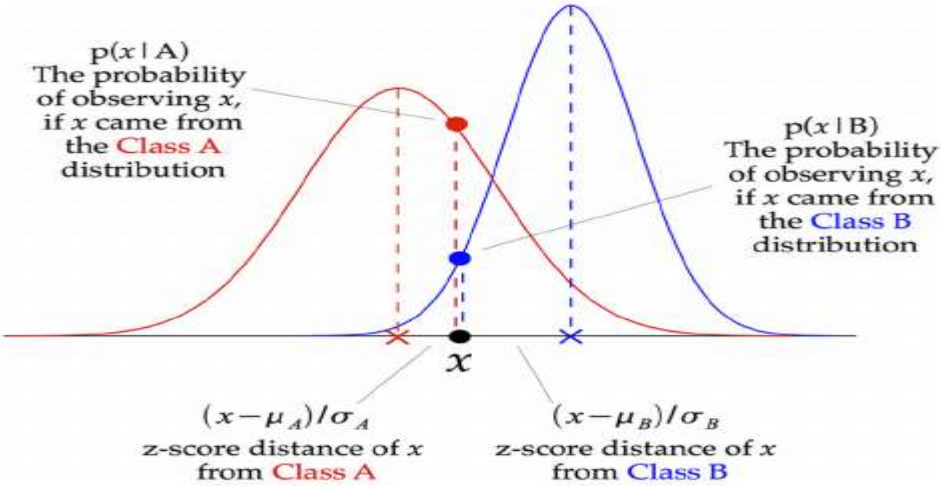

Figure 3.10 Bernoulli Naïve Bayes

Multinomial Naïve Bayes: Multinomial Naive Bayes algorithm is a probabilistic learning technique. It widely used classifier for document classification, which keeps the count of frequent words present in the documents. It calculates the probability of each label for a given sample and then offers the title with the highest probability as output.

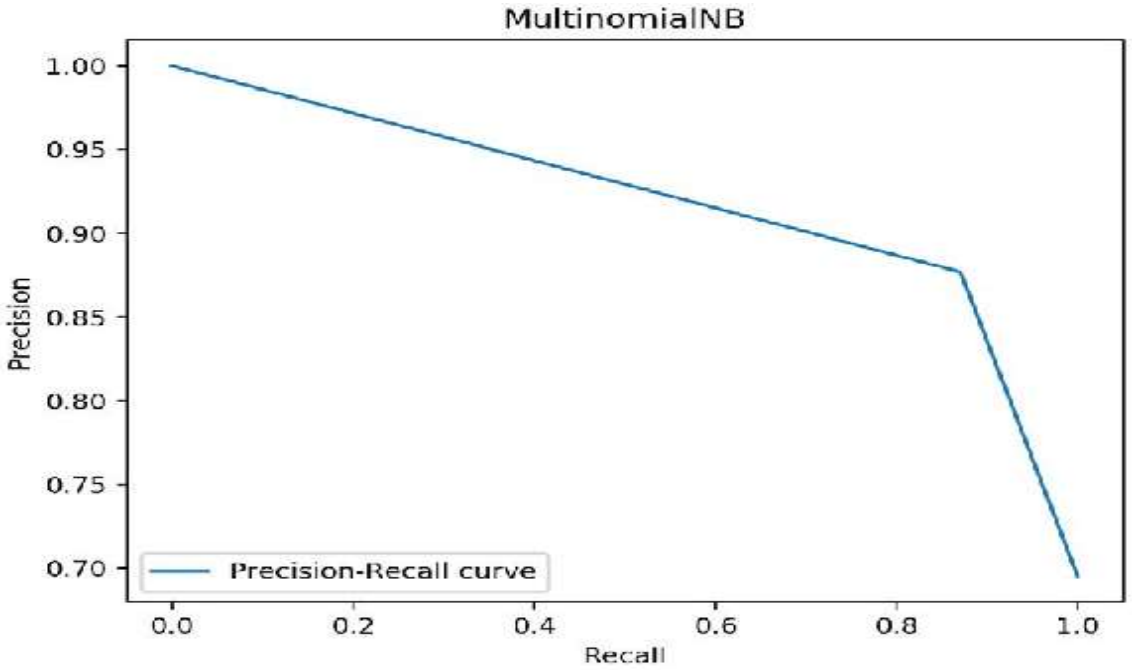

Figure 3.11 Multinomial Naïve Bayes

Chapter 4

Experimental Results and Discussion

4.1 Experimental Setup

In our research, we used 150 datasets. There are a total of 17 columns in our dataset. To build our model, we had to train our data. For training purposes, we used the train test split method. We divided our data into 80% and 20%, 80% for training our model, and 20% for testing. We also specified the random state so that no matter how many times we execute our code, the result would be the same, same values in train and test datasets. After training and testing our data, we used various algorithms to determine the accuracy. Though the accuracy we get from every algorithm is very high, but the precision, recall, and fi-score are very low. Because of not having enough data and fewer negative responses, we had to use zero_division.

4.2 Experimental Results & Analysis

Some of our experiment results and their analysis are given below-

In our research, we surveyed only 18 to 18+ age people. We got the minimum age of people was 18, and the maximum was 69.

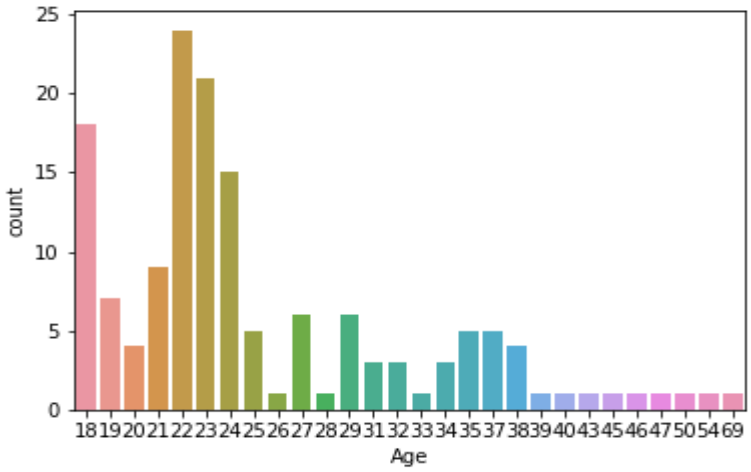

Figure 4.1 Ages of people

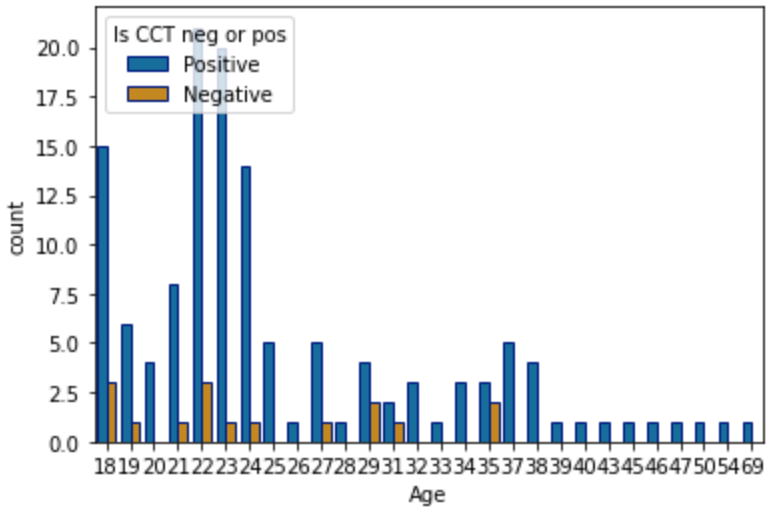

Figure 4.2 Class response based on age

We can see from the graph that we got our data most from the young generations. The people of age 22 are the maximum. So, the results we got from our experiments were most of the thought of young people regarding the changes in technology and the revolution of computer.

We noticed a huge crisis during the procedure of our data collection and also our research. Many of our relatives and friends are afraid of being hacked because of filling our survey.

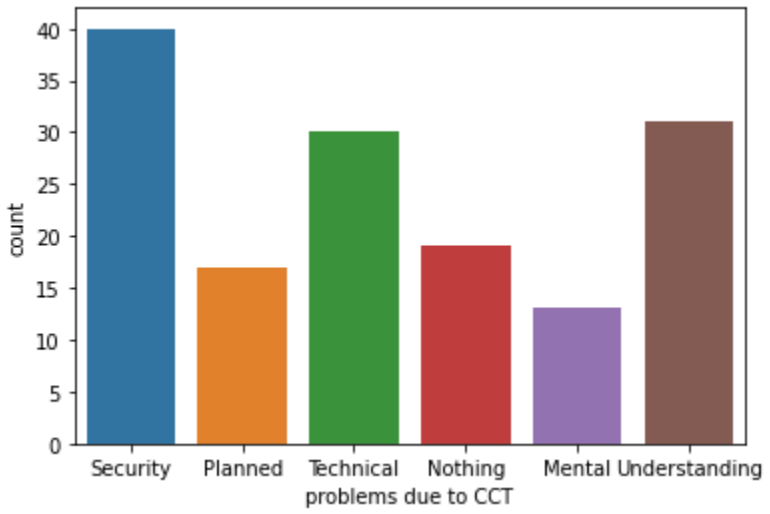

Figure 4.3 Problems people will face due to Changing computers and technology.

Because they were concerned about their security and also from our research, we found that many human beings are concerned about their security which they may face with this changing technology. It is now an issue with this changing technology. It is a bitter truth that the more the technology will updates, evolution will happens, the more our security will become vulnerable.

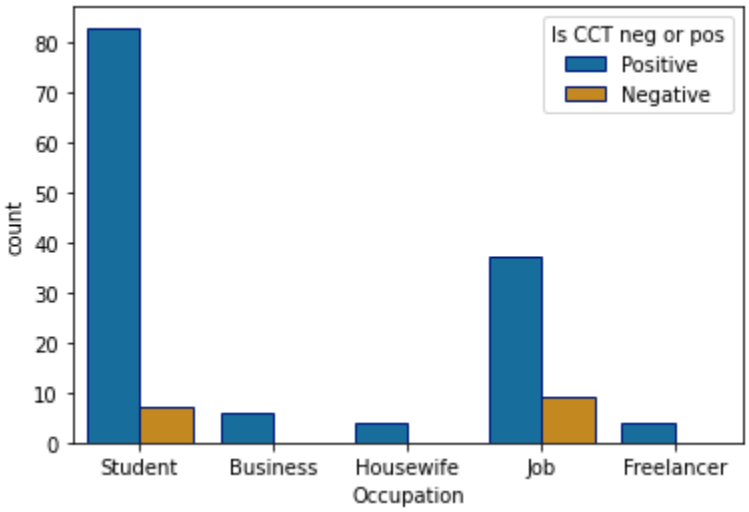

Figure 4.4 Class response based on occupations

Most of the students gave positive responses, and the Job holders gave negative responses more than the students.

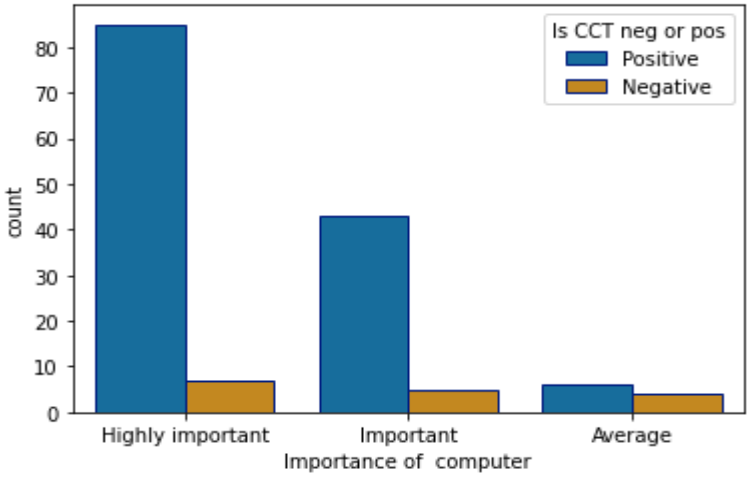

Figure 4.5 Class response based on Importance of computer to people

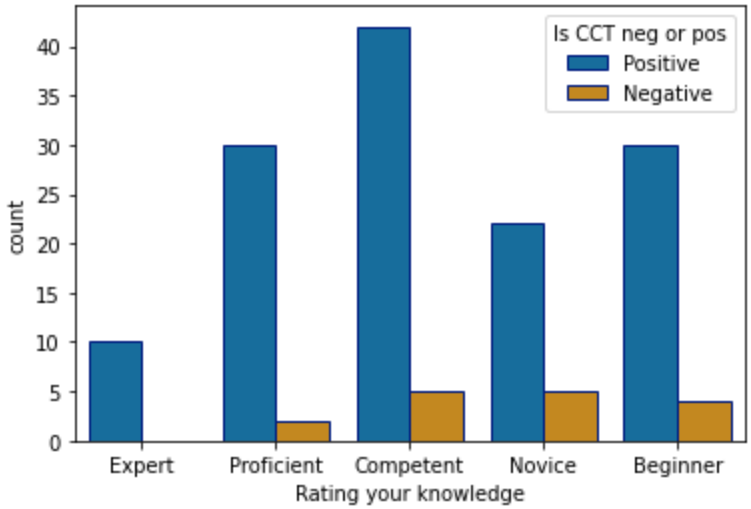

Figure 4.6 Class response based on people's knowledge regarding technology

We can see that people of knowledge with expert level only gave positive responses. Most of the people rated their knowledge with competent level, and also gave most of negative responses.

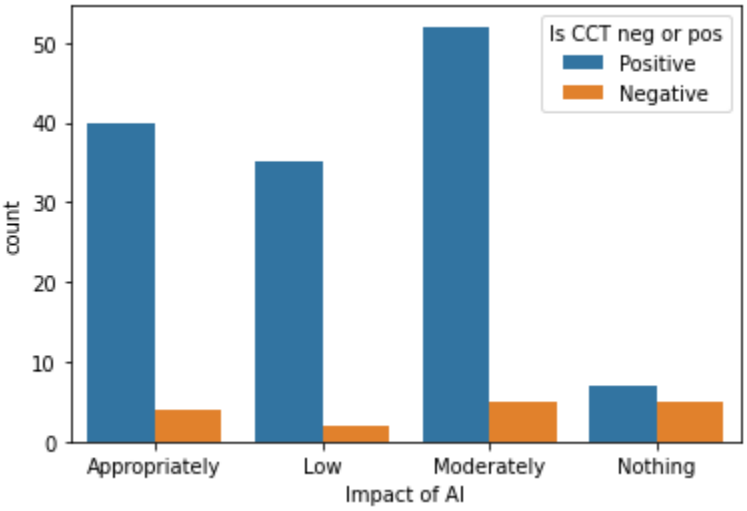

Figure 4.7 Class response based on knowing the impact of AI on the computer revolution

As we used 7 algorithms for our research work. We get very high accuracy from all of them. A table with accuracy for each algorithm is given below which we got from our research work-

Table 4.1 Accuracy Table

Names of Algorithm	Accuracy
Logistic Regression	90%
Decision Tree	93%
Random Forest	93%
Support Vector Machine	97%
Gaussian Naïve Bayes	83%
Bernoulli Naïve Bayes	83%
Multinomial Naïve Bayes	93%

We can see from the accuracy table that the highest accuracy we got from the support vector machine is a very high accuracy of 97%. The second-largest accuracy we got from Decision Tree, Random Forest, and Multinomial Naïve Bayes is the accuracy of 93%. From Logistic regression, we got an accuracy of 90%. And the lowest accuracy we got from Gaussian and Bernoulli Naïve Bayes is an accuracy of 83%.

4.3 Discussion

Among all the data we have collected, most of the data are positive, and some of the data are negative.

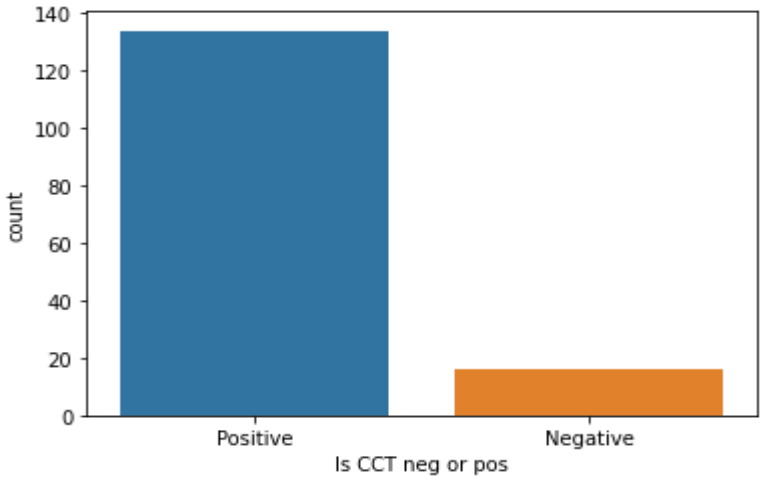

Figure 4.8 Graphical representations of class data

We can see from the graphical representation of our class data that among 150 data, 134 of the data are positive, and only 16 of the data are negative. That means most people thought about the advantages they will get, with the changing technology and computer revolution. Some of the people thought about the disadvantages they will face with the changing technology and computer revolution. Although most of the people respond positively, also most of the people said that they may face security problems, technical problems, understanding problems, and many other problems due to upcoming changes in technology and revolution. As we couldn't collect enough data and still trying to collect more data for our research so, the accuracy we got may not be flawless accuracy for now. We got the highest accuracy of 97% for our research work. However, with our research, if peoples understand our work and try to build their skills, gain knowledge, and developers who are behind this revolution understand the requirements of humans, then the interaction of humans and computers will be better.

Chapter 5

Impact on Society, Environment, Ethical Aspects and Sustainability

5.1 Impact on Society

Our research paper will have an immense impact on our society. Our research is all about changes in technology and computer, and it has a huge effect on our society. With the development of technology, and computer, society is also developing. However, updated technology is creating isolation between the people in it. From our data, we find that 54.7% of people respond that computers and technology can not satisfy the social needs of humans. 28.1% of people respond that it can satisfy their social needs, and remain 17.2% of people are not sure about it still now. Again, about 93% of people think that this changing technology is affecting our social behavior, and 7% of them think that it is not influencing.

As technologies are advancing continuously, it's having a tremendous impact on society and human beings. Science is growing up, and technology is changing rapidly. So, our research is about this effect. The computer is one of the greatest inventions of this era of advanced technology, and it's now a tool of everyday use for most humans in their life. We are trying to determine how the revolution of computers and changes in technology impact human beings. So, we can see how it is contributing to society as well.

In our research, we are trying to get the view of every aspect to know both of the positive and negative sides of this issue. From the data, we can see for some people it is having a good impact such as making life easier, comfortable, helping a lot at work, and making work quicker, and so on. However on the other hand, people are getting much more trouble and frustration, people are getting more and more unsocialized day by day because of many different perspectives. Manpower is decreasing slowly, and we are getting much more dependent on technology. So we can see, we have both of the conditions. So, our research can identify how we can bring down the bad impacts and have more good impacts on society.

From the outcome of our research, people can get to know if human beings are behind the cause of slowly destructing the society and handing over everything to the technology, or not!

5.2 Impact on Environment

The impact of our study on the environment is enormous. It will create awareness among all the people. They will know about the effects of these changes in technology and the impact of artificial intelligence on the computer revolution. As per their knowledge about these things and artificial intelligence, they can choose which platform they want to build up their skills. It will also create many opportunities in the future era. But it completely depends on humans that how they will take it. If the choice is to stay on the right way then it'll be creating a lot of opportunities, economic conditions will get better, the rate of unemployment will be decreased, and many more advantages. But if they will use this technology with immoral means then it will bring disaster. Human beings will be only responsible for that.

As for the environment, we can say from our outcome that as technology is advancing, we have to use different types of elements and resources for the particular devices and their parts to make them upgraded. For that reason, the machinery and electronic fragments which we had to use in the past, most of them are no longer needed. So these are wastage, and most of them are not getting recycled. That's how the environment is getting affected.

For example, we can mention some of the things that once were important to us however, now their uses are extinct, such as floppy disks, magnetic tape, compact discs, older RAM, processors, various types of media players, etc. As people are getting much more attracted towards various types of devices, and these are attached to our daily life activities with or without our will, however using for our need, we can't imagine a day without using most of these, we are worried about when more updated technology will arrive how we will deal with these much of unused trashes.

5.3 Ethical Aspects

During this research, we haven't collected any data without people's consent. Our research contains no harmful things for humans and the environment. We didn’t collect any kinds of personal information from them. We tried to research to learn about the good and bad impacts of rapidly changing technology and the revolution of the computer on human, their point of view about these changes in technology and the computer revolution. We haven't used anything unethical are illegal for any of our research purposes. For this thesis, we used our laptop. Neither did we use another person's laptop or other equipment nor did we steal any kind of information from anywhere. We are 100% hopeful that our work will never do any harm to anyone. We have done every part of our research being honest, loyal, truthful, and maintaining legality and transparency.

5.4 Sustainability plan

Since the innovation of technology arrived, the revolution of the computer has always become faster. However, the type of impact, the method of change, and the way to the interaction between computers and humans almost remain the same. In that sense, the sustainability of our research work will last longer. As the revolution of computer is a regular thing. So, most of the concept of our research work is stable. However, there are many opportunities to research, with the other relevant facts related to our research. That is an important fact related to humans and their surrounding things. So, we have to reach deep, to have much more exact information and realize the solutions to the problems that we are getting to see while continuing this research work.

Chapter 6

Summary, Conclusion, Recommendation and Implication for Future Research

6.1 Summary of the Study

We are living in the technological era. So, we have done our whole research work based on this technology, its changes, the Computer Revolution, its impact on human beings, and the interaction between humans and computers. There have many works related to technology and computers. But in all of those works, authors discussed technology and computers works, effect and many other things on different sectors. There has also been a lot of work on Humans and computers interaction. However, there was no work-related to ours. The main goal of our research work was to know human's opinions regarding these changing technology and computer for better interaction between humans and computers. In our work, we used different machine learning algorithms to determine the accuracy of our project. Starting from making a survey questionnaire and data collection, it took us four months to complete the whole work. In that time, we had to proceed via many steps. The summarization of our entire working steps is given below-

Step 1: Prepare questions for data collection.

Step 2: Create a survey form.

Step 3: Collecting data by doing the survey.

Step 4: Sort and clean data as per our need.

Step 5: Store all data in Excel .csv file.

Step 6: Preprocessing dataset.

Step 7: Graphical representation of data.

Step 8: Select algorithms for our research work.

Step 9: Select features.

Step 10: Train and test the models.

Step 11: Check output or result.

By following the above steps, we have completed our research work. Our work not only aware human beings, but also it will help developers bring a better revolution, technologies, and better chances in the forthcoming future. That will not only ensure the security of human beings, but also it will make the interaction between humans and computers better and better.

6.2 Conclusions

As we know that technologies and computers are changing rapidly. Human needs to build up their skill to keep pace with this changing world. They need to gain more knowledge about these technologies and computers. If humans can't acquire enough knowledge to easily get adapt to these changing technologies, and then there will be a time when machines, robots, or automation will control human beings. So it is very important and our responsibility to build up our skills and acquire more and more knowledge as human beings to keep pace with these rapidly changing technologies.

The developers who are behind these changes should also know about the wants, abilities, and adaptability of human beings. As we read in "The Computer revolution in science: steps toward the realization of computer-supported discovery environment by Hidde de Jong, Arie Rip", developers should not only concentrate on isolated computer programs but also focus on how human beings are going to use them in the future.

Our research paper will create awareness for both human beings and developers. As for human beings, they will get to know, how important it is to build up their skills and acquire knowledge. Those people, who aren't conscious enough regarding these changes in technologies, the computer revolution, artificial intelligence, their impact on our society, environment, our behavior, will face dire circumstances in the future.

The developers who are bringing these revolutions and changes will get to know about human beings' wants, desires, abilities, knowledge, and many more. That will help them

to make such computer programs, computer-supported environment, which will create a better interaction between the humans and computers to make a better future.

6.3 Implication for Further Study

While doing this research, we face many limitations. We inquired about 20 questions for our survey. We used 17 of them to determine our accuracy. Because of the online platform, we couldn't ask more than 20 questions. It was inconvenient in this pandemic situation to persuade people to give some time to fill up our survey. Hence one of the limitations is, we are not able to collect enough data. We'll try to collect more data to conduct efficient research on this topic in the future. We used a total of 7 algorithms. We will also try to apply the remaining algorithms to find out their accuracy in the future.

Another limitation is in the work, we only discussed human opinions on different things related to these changing technologies and revolutions of computers. We collected data to know if they are taking these changes positively or negatively. But we don't know and have not discussed detailed reasons for that. Hence, we'll research it in the future with detailed discussion based on human positive and negative opinions regarding these changes in technology for further study about this topic to create a better interaction between humans and computers.

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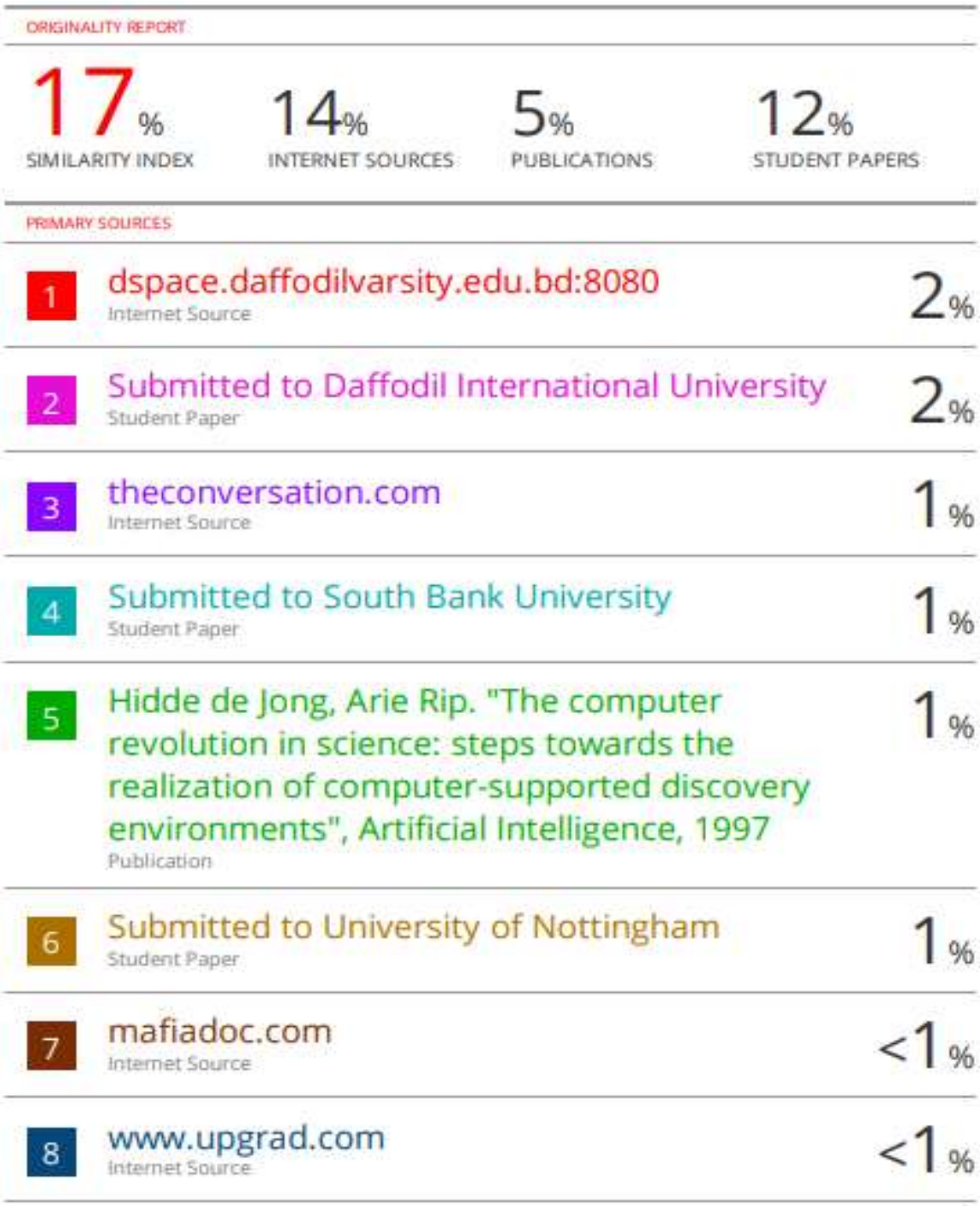

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