

**An ISP based survey on user's satisfaction and improvement scopes in
Bangladesh**

BY

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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 “An ISP based survey on user’s satisfaction and improvement scopes in Bangladesh”, submitted by H.M. Imrul Kayes 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 04-02-2023.

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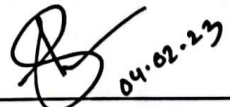
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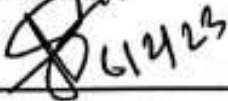
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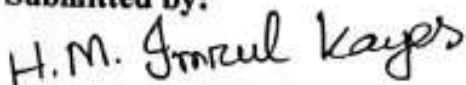


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ABSTRACT

As a developing country, moving forward to the advanced technology is very important. This study examines the users' satisfaction on their regular usage of internet service and finalize the development scopes for ISP services. There are 10.9 million ISP and PTSN (Public Switched Telephone Network) users in Bangladesh. There are 37 IIG and around 2000 registered ISP companies in Bangladesh. For a betterment of our country, it is very essential to make skillful people and communication between external countries and getting learning from all over the world through internet. Internet helps us with information, knowledge, learning, connectivity, communication, sharing, address, mapping, banking, bills, shopping, collaboration, work from home. So, finding out the key points for the improvement scopes of broadband internet service is very necessary.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Internet Service Provider companies are provided internet to the client end. They bought internet from IIG companies. IIG companies are basically internet wholesaler. For betterment of internet service ISP companies need to make sure that they are providing consistent network to the client end and so that the users do their jobs more efficiently. There are few types of ISP companies: some ISP companies sell internet to the distributor ISP and they forward it to the client end and some ISP has their own business, they directly buy from IIG.

Internet Working Principles:

Internet is basically interconnections between two or more computers. An organization named ARPANET (Advance Research Project Agency) first built connections between four computers the University of Utah, UCSB, UCLA, and Stanford Research Institute. While the connection between the computers completed, the universities were able to access files and transmit data from one organization to the other. Internet works by using a packet routing network that follows the Internet Protocol (IP) and Transport Control Protocol (TCP). TCP and IP work together to ensure the data transmission across the internet is consistent and reliable, no matter which device are you using or where you're using it.

Causes of WIFI network interruption:

The network can be interrupted by many ways such as POP down, mikrotik down, Fiber wire cut, power down, bandwidth congestion, router unstable performance due to long time connected, laser high, latency high. It is also depending on required devices that added to build the connection. It can be mikrotik, OLT router, ONU, router. Sometimes it has seen that an user is long time connected through router (8 hours) , then the network performance is not stable, because their a lots of cache stores in ram, so it becomes slow down. Then the router need to restart, then the issue will be okay. Sometimes users gets slow internet connection because last mile laser is so high, then need to lower laser in between 15 db to 25 db. Mikrotik router has a limitations for local ISP companies that is some routers are used for 500 users, some are used for 1000 users. When the capacity is 500 users but users are 700, then CPU

usage will high and speed will slow. As like that, if the fiber wire cut, then data packets will not able to pass. So, these are the basic interruptions.

1.2 Motivation

By the help of internet, it becomes very easy to get information, knowledge all over the world. Learnings become very easy. Connectivity, communication and sharing is more comfortable now. We can go to any places; we want by the help of google mapping. We can get required contact information through websites. Banking, bills and shopping are now in online. A huge amount of foreign currency come to our country through freelancer. By this survey we can know the user's feedback and can understand the betterment scopes.

1.3 Objectives

Through this project we will able to know the satisfaction level of ISP services towards the consumers from the client end. And the qualitative question will help use to gather knowledge to find out the scope of betterment to this technology.

1.4 Research Questions

My research contains of various types of quires which are qualitative questions.

1. How long have you been a consumer of the internet?
2. How long have you been using current internet service provider?
3. How many hours does your family use the internet in an average week?
4. Which following factors are more important while choosing and ISP?
5. What is you level of satisfaction with you current ISP?
6. How likely are you to switch to another internet service provider based on following factors?
7. Dou get 24-hour technical support from your ISP?
8. Does your current internet service provider, provide 24-hour technical support?
9. If you have used more than one ISP, what would you like to change?
10. Would you like to change your ISP in near future?
11. If you wanted to change internet service provider, what would be the most difficult or inconvenient aspect for you?

12. What is your gender?
13. What is your marital status?
14. Which best describes your highest level of education?
15. Which best describes your occupation?
16. What age group do you belong to?
17. Are you satisfied with the reliability of the internet service you currently receive?
18. How much satisfied you family to the ISP services?
19. How would you rate the quality of the service received from your current internet service provider?
20. Which website you visit most?
21. Do you play online games?
22. If yes, which game do you play?
23. How much ping do you get while gaming most of the game?
24. How satisfied are you with the download and upload speed of your current internet package?
25. Do you agree that you get good value for the money you pay?
26. What is the name of your current internet service provider?
27. Do you have any question or comments to add?

1.5 Problem Statement

I have faced problem during data collection. Many people do not know what ISP is and which ISP they are using right now. Besides, some people are thinking these google form as a scam.

1.6 Social Impact

We can not think of a single day without internet right now. Students of school, university are doing their online classes regularly by the internet. When Corona happens, every office and institutions are off for 2 years, then employers do their jobs in online from office and students continues their classes and online exams through internet. So, this survey will help to improve the internet service as per their requirements.

1.7 Report Layout

The remaining of the report is organized as follows:

CHAPTER 2: This chapter discusses the related research works, scope of the problem and challenges.

CHAPTER 3: In the chapter I discussed about purposes for the study and why it is highly needed to our society development.

CHAPTER 4: This chapter describes the system architecture and methodology for survey questionnaire and reasons behind it for deep analyzing the data to achieve the purposes.

CHAPTER 5: This chapter discusses about the result I have got from the survey briefly with related figures.

CHAPTER 6: Finally, this chapter concludes with a discussion on the future.

CHAPTER: 2

LITERATURE REVIEW

Author [1] had said about, perceived trust, overall satisfaction, and loyalty intention in the ISP industry. The result of his research showed that why free internet access became very popular while the service quality is low. This paper is purposed to test the consumer loyalty toward the ISPs. Confirmatory Factor analysis (CFA) was used to test the reliability and validity of the measurement model and the structural equation modeling technique were used to evaluated the casual model. An internet survey was performed in Taiwan, this study showed that perceived value is very important in generating overall customer satisfaction and loyalty intention toward an ISP, and that perceived trust of an ISP enhances perceived value, overall satisfaction, and loyalty intention. However, the study demonstrated that future ISP technology expectancy exerted a negative influence on a consumer's overall satisfaction and loyalty intention toward their ISP. Author [2] had said about users' satisfaction level examine through implementing different kinds models like as expectations-disconfirmation model, the attribution model, and an affective model. Author [3] had said about the development of service quality dimensions for internet service providers by detail explaining customer feedback and their using patterns. In this paper he examined the relationship between the ISP and users on perspective of ISP's value for money, trust and commitment. He had taken 1507 data for this project. Author [4] had said her study was to determine whether there is difference in satisfaction of male and female youngsters in Bangladesh regarding wireless internet service in respect of 14 variables. Author [5] had said his survey is about the internet usage among the university students coming from Business Studies, Science & Arts disciplines at University of Dhaka. His main purpose was to understand how much the internet was used by the students for study purposes. Result showed that the percentage of internet usage among the students coming from Business Studies, Science and Arts disciplines is 100%,92% and 90% respectively. Author [6] showed the impact of internet to our economic growth in our country, which is very important. Author [7] had showed the reason behind the adoption of broadband to the users. [8] Internal management practice toward the employees is very important because if the commination lacks then the service will be go down. Internal marketing policy should

be improved. What emerges is that though there are internal marketing activities to sell the brand to the employees, there is no structured approach to turn every internal communication activity to internal branding which could increase the brand identity to the employees. This in turn could result in better consumer perception to the ISP firm brand as they get better service from the staffs. These can contribute to enrich the brand equity which could be used for introductory speeches to the new employees and in marketing communications. [9] The most effective tool for promotion is sale promotion tool. Another important tools are direct marketing and personal selling for ISP firms to get more customers for household broadband internet services. [10] Internet service assurance becomes very important to the consumers because day by day. The best way to get customer loyalty is to enhance the service quality. For the betterment of technology to this generation there is no alternative of internet. Finding the reasons for internet lacking will help to solve and make an uninterrupted network. [11] Author has been done a survey on internet users' satisfaction and utilize the dataset using data mining. This research approach was to help for the betterment of the internet service and also the internet service provider companies in Bangladesh to find out the lacking. The random forest classifier has provided the best accuracy in this survey. The problems can be solved after finding the issues that is facing by the people. Internet is now helping us in many ways, so the betterment of this service is now become very necessary. A lot of foreign money has come to our country through freelancing, outsourcing. If the freelancer cannot the internet service properly, it will ruin their work efficiency and the productivity will become very low. So, the after analyzing the issues it can be said that how much the internet has been creates the importance to our regular life and how much it is related to our country's economy. The freelancer needs more upload speed than download, because they use the internet globally, it is more needed to ensure the bandwidth and the connection that they are using. [12] In this study, author tried to figure out which causes are affecting the broadband adoption in Bangladesh. The technology of broadband enables a range of communication and internet services. This research presents one of the initial efforts towards understanding the adoption and usage behavior of internet consumer in developing country perspective for this instance Bangladesh. The internet service provider companies and the policy makers will be benefited from this research and the finding. [13] this paper contains the customer satisfaction and system quality. Author

said the mobile operator should make efforts on offering advanced system quality and improving customer satisfaction. The important findings are that those users who perceive positive net benefits likely tend to continue subscribing the mobile broadband services offered by the operators. The reason behind not getting proper bandwidth from the internet service provider companies are very necessary to find out. The ISP companies should take of this issue and the government should take necessary step to betterment of this issue, because it is very important now to provide the proper bandwidth to the users. If this step is not taken then it will definitely hamper the economy of this country. Now a days, online business is everywhere, they buy and sell products though internet such as Facebook. The internet service companies need to provide their best service by make sure giving the proper speed and the connect fee, service charge should be bearable to the consumers. The review's findings will serve as a roadmap for the government, educational institutions, researchers and also ISP companies will be benefited. It's aims to provide the consistent bandwidth toward the clients with their satisfaction. Here, I deeply analysis the finding with the questions that is given in the survey form. This data will help to analysis the needed action.

CHAPTER: 3

RESEARCH METHODOLOGY

3.1 Introduction

After analysis necessary and most relevant questions, I have collected data from several persons from various districts through the google form with the qualitative questions. So that I can deeply analysis the subject. I have been collect data from several groups of Facebook, telegram groups, messenger groups, go to individual person to fill up the form. I have got 166 responses, all of them are answered these types of qualitative questions. Before the question has been question, it has need to lots of analysis for the most relevant solution. The data were collected in online form. In this google form, that were collected as soon as they were completed. Among 166 responses, they have faced various types of ISP relevant questions, and some questions has been skipped by the responder.

3.2 Implementation Requirement

1. Laptop
2. Microsoft PowerPoint
3. Google Form
4. Microsoft
5. Windows 10
6. 8 GB RAM
7. 256 GB SSD

In this project work, some software and hardware that I have used to do deep analysis and brief study of ISP's services on consumers.

Hardware:

1. Processor: Core i5
2. Mouse, Keyboard
3. Ram: 8 GB

Software:

1. Windows 10

2. Microsoft Word
3. Google Form
4. Weka

3.3 Workflow

Primary 4 Steps:

1. Data Collection
2. Data Preprocessing
3. Implement algorithm
4. Performance Evaluation

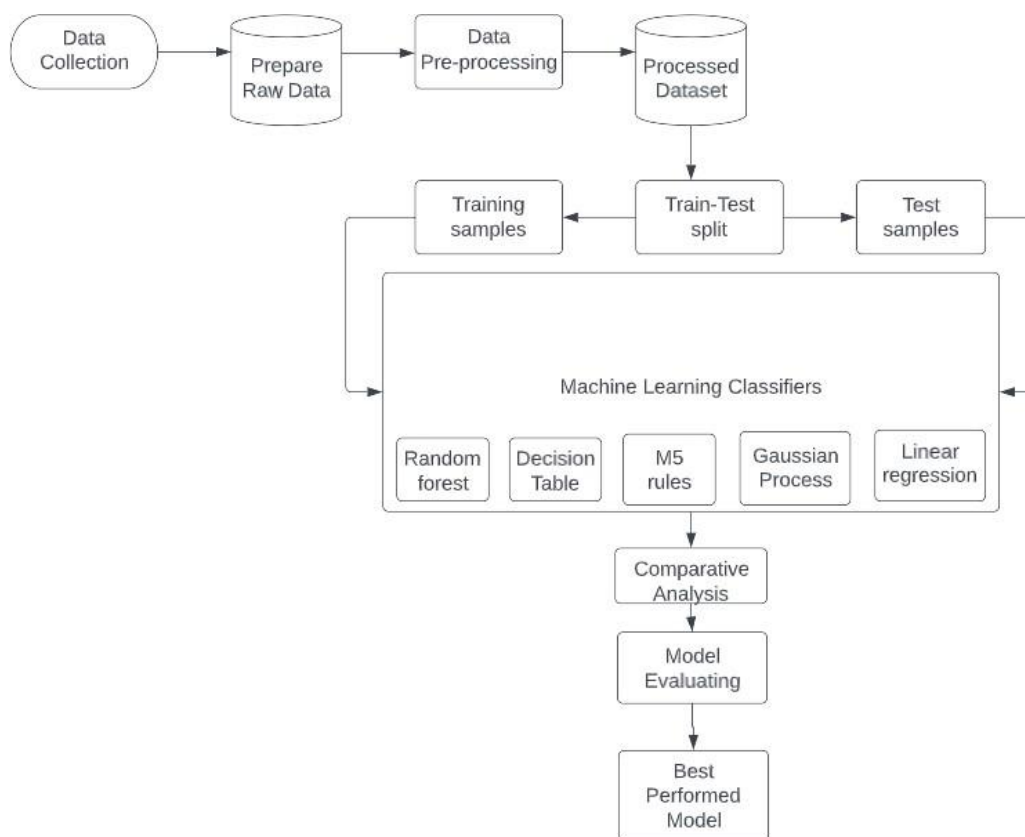


Figure 1: Working procedure of an ISP based survey using machine learning technique.

3.4 Algorithm Description

3.4.1 Random Forest

Random forest mostly in machine learning algorithm that is used in machine learning algorithm that is used for combing the output of different decision trees into single result. Random forest algorithm is a extension of bagging method because it uses

bagging and feature both randomly to get a decision. For this kind of randomness, it is called as bagging or “the random space method”. There are three hyperparameter which teaches what set should get first priority. It has the node size, number of trees and number of features. By this, the random forest is used to solve classification and regression problems. The random forest is made by the collected samples and every single tree contains the data which compared with the testing set and this is considered as bootstrap sampling. From the sample data collection, one third of data are used for testing purposes and this is called out-of-bag. Randomness is another example, after that feature bag adds more diversity. Depending on the problem, the prediction will vary. There are a lot of benefits of random forest algorithm which are: less overfitting risks, decision trees take overfitting risks because they strongly fit the sample data to the testing set. When the forest has a lot of random trees, then it will not make the classifier model overfit, because the rate of random trees reduces the overall diversity and future risks. The final feature importance, at the Random Forest level, is its average over all the trees. The sum of the feature's importance value on each tree is calculated and divided by the total number of trees: $RFF_i = \frac{\sum_{t=1}^T \text{importance}_t(i)}{T}$ the importance of feature i calculated from all trees in the Random Forest model.

3.4.2 Decision Table

Data is stored inside the decision tables using columns and rows. A decision table contains condition entry, condition stubs, action entry and action stubs. Decision table is summarized presentation on the basis of given conditions. This contains a set of output. In a decision table the given data are considered as a tree, in programming language this can be expressed as if-then-else and switch case. Every decision can be changed, relation pre-determination with considered values are listed into it. Every single action with a method can be solved and the entries will specify that what should be possible actions are need to be performed. To make is summarized, various decision table contains a don't care symbol. Besides making four quadrants, the alternative condition of decision table and action entries depended on which way these are presenting. Some decision table contains true/false values and it can be considered as a alternative values and some table can be contained unclear logic to represent. By this way, action entries can be defined whether it should take an action or do some advanced decision tables, the sequencing action to perform. Steps for

decision table: analyze the necessity and write down the first column, add columns, reduce the table, determine conduct, write test cases.

3.4.3 M5 Rules

M5 model is basically for conducting the regression task as a decision tree learner which is used to predict numerical values, a binary tree having a linear regression function, which consistently can predict the numeric variables. M5 model tree can imitate hundreds of attributes with very high dimensionality. This ability creates the difference from the other regression trees. A model tree generation has two different steps. In the first step includes utilizing a split test to build a decision tree. The M5 model tree algorithm's partitioning test is establishing considering the predictable difference of class principles that reach a node as a mistake measure at that node and manipulative the predicted devaluation in this place error on account of analyzing each feature at that node. By dividing process, the date child node takes lower predictable difference principles in comparison to the parent node. After figuring out all available split that maximizes the predicted wrong devaluation, The deviation frequently produces a abundant tree-like construction that grant permission cause overfitting. Consequently, the tree must be pruned back. So, the second stage would include trimming the dense tree and replace the sub-trees with uninterrupted regression functions. This method of creating the model tree splits the limit space into subspaces and builds a linear regression model each of ruling class.

3.4.4 Gaussian Processes

Gaussian processes are a effective algorithm for both classification and regression. A Gaussian process is a group of random variables, some fixed number of that have(constant) joint Gaussian distributions. A Gaussian process is sufficiently particularized by its mean function $m(x)$ and covariance function $k(x, x_0)$. This is a normal standard of the Gaussian distribution whose mean and covariance is a direction and matrix, particularly. The Gaussian classification is over vectors, while the Gaussian process is over functions. We will create: $f \sim GP(m, k)$, (1) signification: "the function f is distributed as a GP accompanying mean function m and covariance function k ". Although the generalization from distribution to process is straight forward, we will be some more specific about the analysis, cause possibly in experienced to few scholars. The individual random variables in direction from a

Gaussian distribution are ordered by their position in the heading. For the Gaussian process, it is the debate x (of the chance function $f(x)$) that plays the duty of index set: for each recommendation x skilled is a joined random variable $f(x)$, that is the value of the (theory of probability) function f at that location. For reasons of notational availability, we will count the x principles of interest apiece open numbers, and use this index as if they were indexes of the process is x_i , that we have preferred to index by i .

3.4.5 Linear Regression

Linear regression is one of the easiest and most well-known machine learning algorithms. It is a mathematical method specifically used for predictive finding. Linear regression makes predictions for constant/real or numerical variables like marketing, salary, age, fruit price, etc. Linear regression algorithm shows a linear connection between a dependent(Y) and individual or more independent(X) variables, therefore named as linear regression. Since linear regression shows the linear connection, that means it finds how the profit of the dependent variable is changeful according to the value of the independent variable. The linear reversion models support a sloped straight line delineating the connection between the variables. Mathematically we can represent a linear regression as: $a_0 + a_1x + \varepsilon = Y$. Here, Y =Dependent Variables, X = Independent Variable, a_0 =intercept of the line, a_1 = Linear regression coefficient, ε = Random error. There are two types of linear regressions: (1) Simple Linear Regression: if a single independent variable is used to predict the value of a numeric dependent variable, then such a Linear Regression algorithm is called Simple Linear Regression. (2) Multiple Linear Regression: if more than one independent variable is used to predict the value of a numerical dependent variable, then such a Linear Regression algorithm is called Multiple Linear Regression.

CHAPTER:4

EXPERIMENTAL RESULTS AND DISCUSSIONS

4.1 Introduction

The survey conducts by providing a google form. The google form contains various types of analytical qualitative questions. To solve a problem, we must know the issues and the questions are raised for this purpose. In this chapter, here is all the questions and its output and the result discussions are also provided.

4.2 Experimental Results & Analysis

How long have you been a user of the internet?

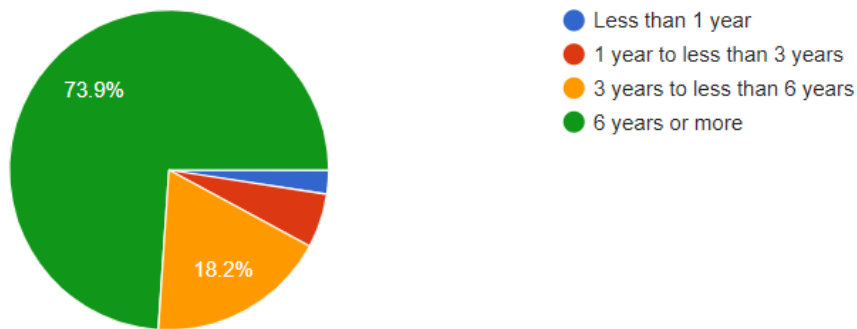


Figure 2: Pie chart of how long user has been using internet.

Here, 165 persons are voted, among them 122 persons said that they use internet from 6 years or more than this. 30 persons are in between 3 to 6 years. 9 persons are in between 1 year to 3 years. So here we can easily understand the value of internet towards our life.

TABLE 1: TIME PERIOD OF INTERNET USING

Time Period	Votes	Percentages
Less Than 1 Year	4	2.4%
1 year to less than 3 years	9	5.5%

3 years to less than 6 years	30	18.2%
6 years or more	122	73.9%

Here, 122 voters are using internet for 6 years or more, the percentage is 73.9%. 30 persons are using internet for 3 years to less than 6 years, the percentage is 18.2%. 9 persons are using internet for 1 year to less than 3 years. The percentage is 5.5% and 4 persons vote for less than a year, the percentage is 2.4%.

How long have you been using current internet service provider?

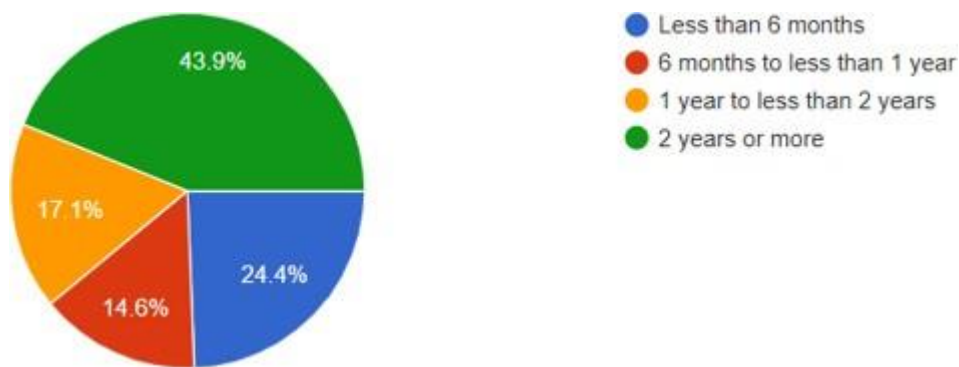


Figure 3: Pie chart of how long user has been using current internet service provider.

Here, this pie chart shows that 72 persons are using their current internet service provide for 2 years or more, 28 persons are using for 1 year to less than 2 years, 24 persons are using for 6 months to less than 1 year. 40 persons are using for less than 6 months.

TABLE 2: TIME PERIOD OF USING CURRENT ISP

Time Period	Votes	Percentages
2 years or more	72	43.9%
1 year to less than 2 years	28	17.1%
6 months to less than 1 year	24	14.6%
Less than 6 months	40	24.4%

Here, 164 persons are voted. 43.9 % people are staying in the current internet service provider for 2 years or more, 17.1% people are using for 1 year to 2 years. 14.6% are 6 months to 1 year, 24% are less 6 months.

Around how much hours your family use internet on an average in a week?

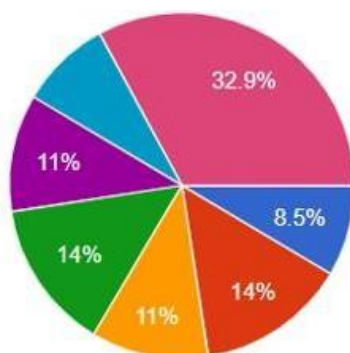


Figure 4: Pie chart of how much hour's user's family members are spending time on internet.

Here, 54 persons use internet for 50 hours or more, 14 persons use for 40 hours to less than 50 hours, 18 persons use for 30 hours to less than 40 hours, 23 persons use for 20 hours to 30 hours, 18 persons use for 10 hours to less than 20 hours, 23 persons use internet for 10 hours to less than 20 hours.

TABLE 3: TIME PERIOD OF HOW MUCH TIME USERS' FAMILY MEMBERS ARE SPENDING ON INTERNET IN A WEEK

Time Period	Votes	Percentages
50 hours or more	54	32.9%
40 hours to less than 50 hours	14	8.5%
30 hours to less than 40 hours	18	11%
20 hours to less than 30 hours	23	14%
10 hours to less than 20 hours	18	11%
5 hours to less than 10 hours	23	14%
Less than 5 hours	14	8.5%

We got 164 responses here, 32.9% people use 5 hours and more, 14% people use 5 hours to less than 10 hours. 11% people use 10 hours to less than 20 hours. 14% people use 20 hours to less than 30 hours. 11% people use 30 hours to less than 40 hours. 8.5% people use 40 hours to less than 50 hours.

How would you rate the importance of the following factors when you choose an internet service provider? Please check one circle for each factor ranging from "Not important at all" to "Extremely important".

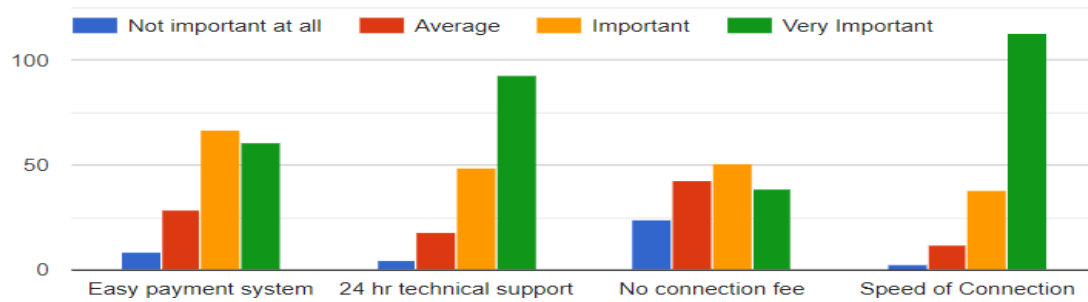


Figure 5: Pie chart of importance of the provided factor of ISP

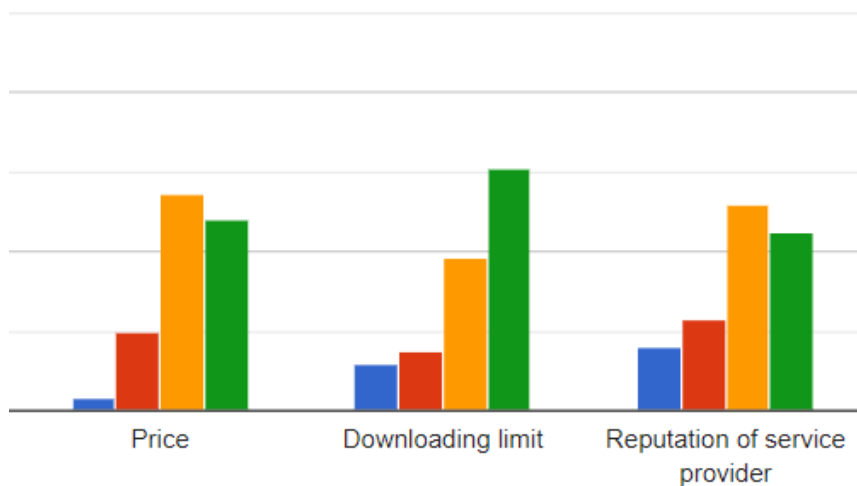


Figure 6: Pie chart of importance of the provided factor of ISP.

TABLE 4: IMPORTANCE OF PROVIDED FACTOR OF ISP

	Not important at all	Average	Important	Very Important
Easy payment system	9	29	67	61
24 hours technical support	5	18	49	93

No connection fee	24	43	51	39
Speed of connection	3	12	38	13
Price	4	25	68	60
Downloading limit	15	19	48	76
Reputation of service	20	29	65	56

We can see here 24-hour technical support, speed of connection, downloading limit is too much important for the users.

What is your level of satisfaction with your current ISP? Please check one circle for each factor ranging somewhere between "Not satisfied" and "Very satisfied"

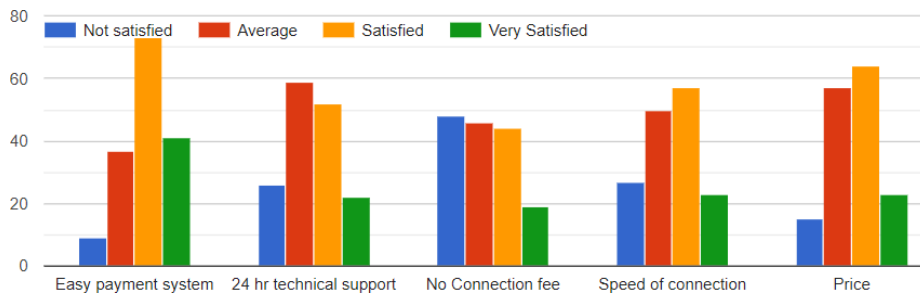


Figure 7: Pie chart of satisfaction level of users using the current ISP.

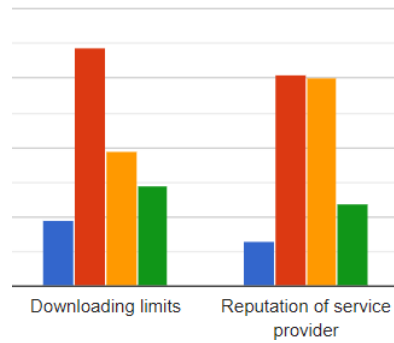


Figure 8: Pie chart of satisfaction level of users using the current ISP.

TABLE 5: SATISFACTION LEVEL OF USER USING THE CURRENT ISP

Satisfaction level of user	Not satisfied	Average	Satisfied	Very satisfied
Easy payment system	9	37	73	41
24 technical support	26	59	52	22
No connection fee	48	46	44	19
Speed of connection	27	50	57	23
Price	15	57	64	23
Downloading limit	19	69	39	29
Reputation of service	13	61	60	24

We can see here; people are very disturbed for their connection fees and other 27 persons are not satisfied with their speed of connection. 26 persons are not satisfied with the technical support; 19 persons are not satisfied with downloading limit.

Most users are satisfied because they are getting easy payment system. 64 persons are satisfied with their price, 60 persons are satisfied with the reputation of the service. 52 persons are satisfied with 24-hour technical support.

Does your current internet service provider give good value for money?

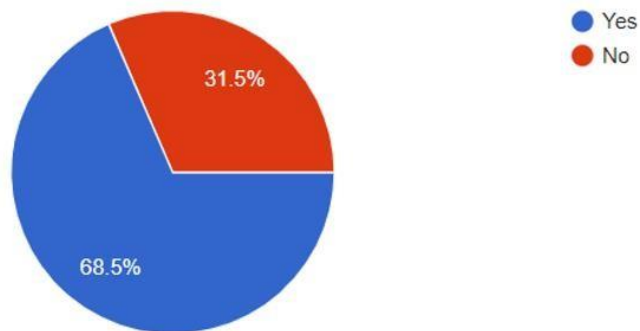


Figure 9: Pie chart is showing how much the ISP companies provide the value for money.

162 persons are responds here, 68.5% of them are satisfied with their ISP and other 31.5% people are not satisfied.

TABLE 6: TABLE CONTAINS HOW MUCH THE ISP COMPANIES PROVIDE THE VALUE FOR MONEY

ISP provides value for money	Votes	Percentages
Yes	111	68.5%
No	51	31.5%

68.5% people are voted that they are getting good value for money internet from their current ISP. But the other 31.5% people thinks that they are not getting value for money internet.

Do you agree that your current ISP provides you 24-hour technical support?

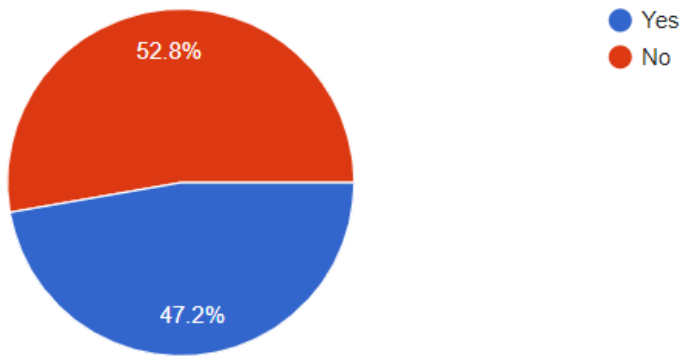


Figure 10: Pie chart is about 24 hours' technical support from ISP.

163 persons are responds here, 52.8% of them are getting 24 hours' technical support and other 47.2% are not getting these services from their ISP.

TABLE 7: 24 HOURS TECHNICAL SUPPORT

ISP provides 24 hours' technical support	Votes	Percentages
Yes	77	47.2%
No	86	52.8%

77 persons agreed that they are getting 24 hours' technical support from the ISP & other 86 persons are not getting 24 hours' technical support from their current ISP.

If you have used more than one internet service provider, what would you like to change?

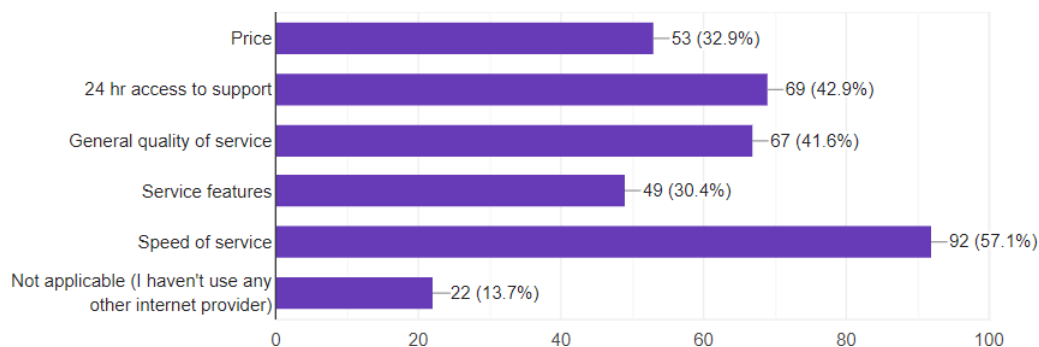


Figure 11: Pie chart of which part should be modified of ISP in users' opinion.

Maximum of the people here changed their ISP because of speed of service. We can easily understand how much important the speed of connection is.

TABLE 8: WHICH PART SHOULD BE MODIFIED OF ISP IN USERS' OPINION

	Votes	Percentages
Price	53	32.9%
24 hours access to support	69	42.9%
General quality of service	67	41.6%
Service features	49	30.4%
Speed of service	92	57.1%
Not applicable (I haven't use any other internet provider)	22	13.7%

53 persons has given their opinion that the price should be reduced of internet monthly packages and the 69 persons said that the ISP companies should provide 24 hours technical support. 67 persons said that ISP companies should increase the general quality of the service. 49 people voted to service feature, 92 persons voted for the speed of the service.

Do you intend to change your internet service provider in the near future?

161 responses

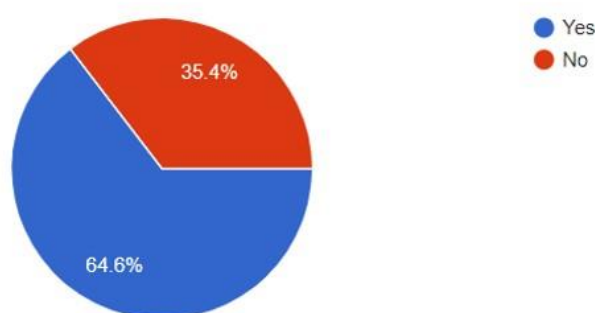


Figure 12: Pie chart shows that how much users want to change the ISP.

TABLE 9: HOW MUCH USERS WANT TO CHANGE THE ISP

Intend to change ISP	Votes	Percentages
Yes	104	64.6%
No	57	35.4%

104 persons said that they wanted to change their internet service provider company and switch to another one. Other 57 people want to stay in their current ISP.

What are the difficulties you have face while changing the ISP?

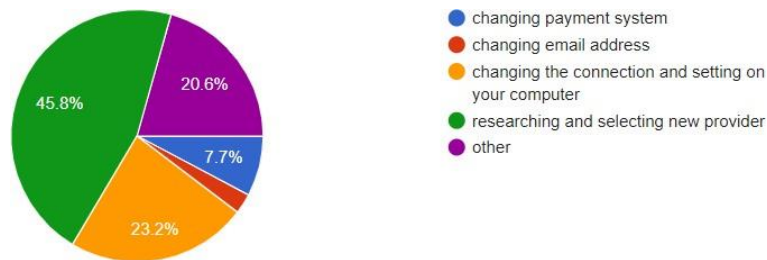


Figure 13: Pie chart shows the reason behind not changing the ISP.

TABLE 10: THE REASON BEHIND NOT CHANGING THE ISP

Difficulties in changing ISP	Votes	Percentages
Changing payment system	12	7.7%
Changing email address	4	2.6%
Changing the connection and setting on your computer	36	23.2%
Researching and selecting new provider	71	45.8%

Other	32	20.6%
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155 persons responds here, 45.8% persons think that it hard to switch ISP lines because of researching and selecting new providers.

What is your gender?

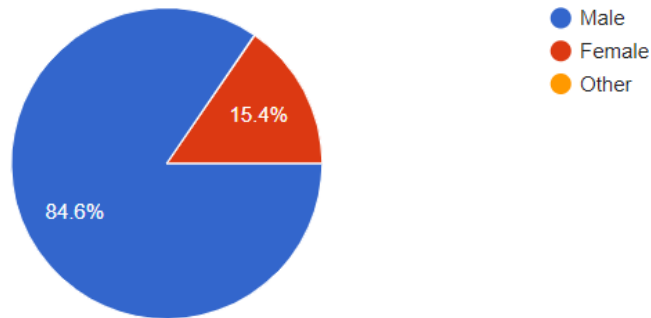


Figure 14: Pie chart is showing gender percentage of users.

162 responds, we have got here. 84.6% are male and remaining are females.

TABLE 11: GENDER OF USERS

Gender	Votes	Percentages
Male	137	84.6%
Female	25	15.4%

In this survey, 137 persons are male and other 25 persons are female. The percentage of male is 84.6% and the percentage of female participators is 15.4%.

What is your marital status?

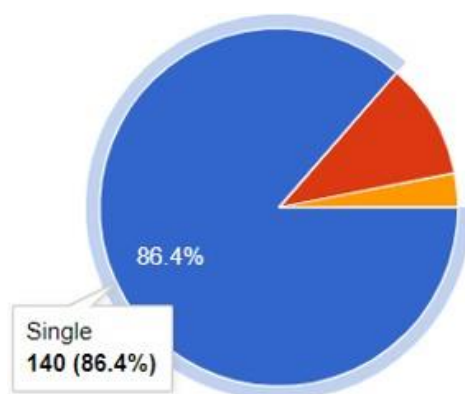


Figure 15: Pie chart shows the marital status of participators.

We have got 162 responses, 140 people are singles, 17 persons are married, 5 people others.

Table 12: The marital status of participators

Marital Status	Votes	Percentages
Single	140	86.4%
Married	17	10.5%
Other	5	3.1%

140 persons are single, the percentage is 86.4%. 17 persons are married and 5 persons belong to others.

What is your education qualification?

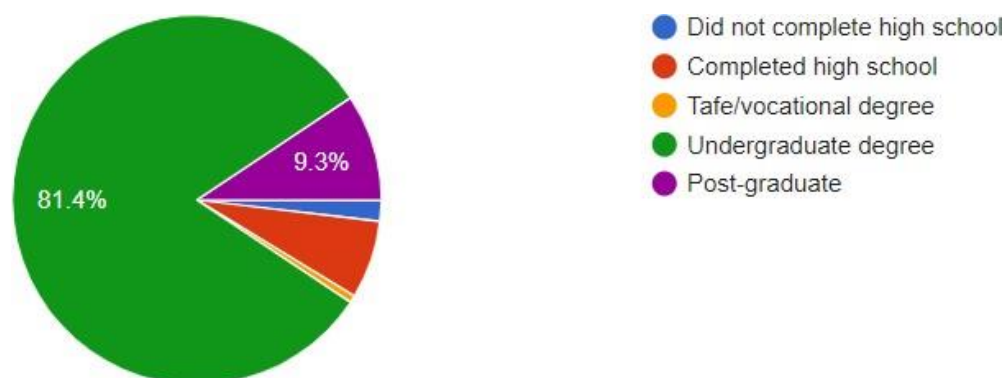


Figure 16: Pie chart shows the educational qualification of participants.

We have got 161 responses, 131 persons are doing undergraduate degree and 9% are post graduate, 0.6% are vocational degree, 11 persons are completed high schools.

TABLE 13: THE EDUCATIONAL QUALIFICATION OF PARTICIPATORS

Highest level of education	Votes	Percentages
Did not complete high school	3	1.9%
Completed high schools	11	6.8%
Tafe/vocational degree	1	0.6%
Undergraduate degree	131	81.4%
Post-graduate	15	9.3%

131 persons are completing their under graduation, 15 persons are post graduate, 1 person is completed vocational degree, 11 persons completed their high schools, 3 persons are not completed high schools yet.

What is your occupation?

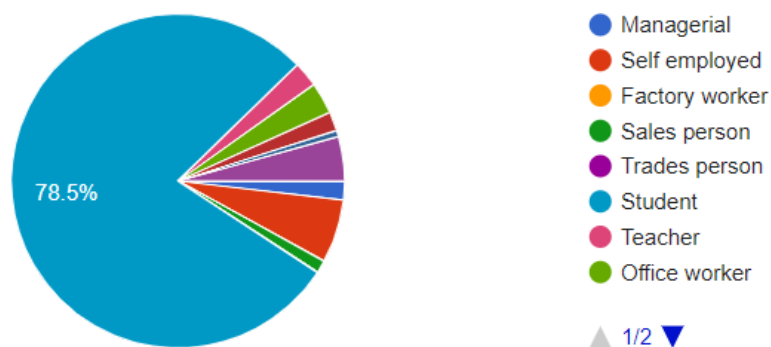


Figure 17: Pie chart shows the occupation of participators.

TABLE 14: THE OCCUPATION OF PARTICIPATORS

Occupation	Votes	Percentages
Student	128	78.5%
Teacher	4	2.5%
Office worker	5	3.1%
Professional	3	1.8%
Home worker	1	0.6%
Unemployed	7	4.3%
Retired	0	0%
Managerial	3	1.8%
Self employed	10	6.1%
Factory worker	0	0%
Sales person	2	1.2%

We have got 163 responses and most of them are students and second most are self-employed.

What is your age belonging to?

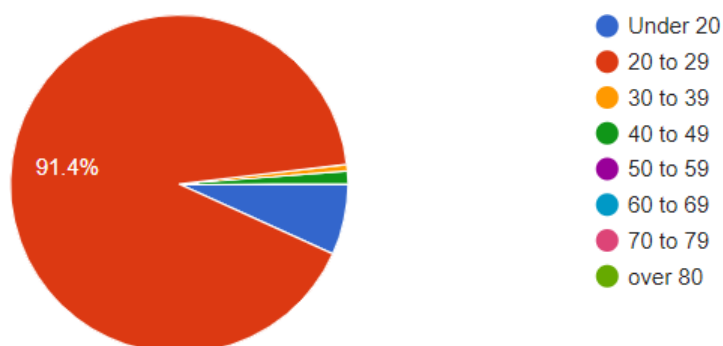


Figure 18: Pie chart is showing the age of participators.

We have got 162 responses here. Most of them are 20 to 29 years old.

TABLE 15: AGE GROUP OF PARTICIPATORS

Age group	Votes	Percentages
20 to 29	148	91.4%
30 to 39	1	0.6%
40 to 49	2	1.2%
Under 20	11	6.8%

148 participators are belonging in 20 to 29 age groups and the percentages is 91.4%.

11 persons are under 11, 2 persons are under 40-49 age group.

Are you satisfied with the reliability of the internet services you currently receive?

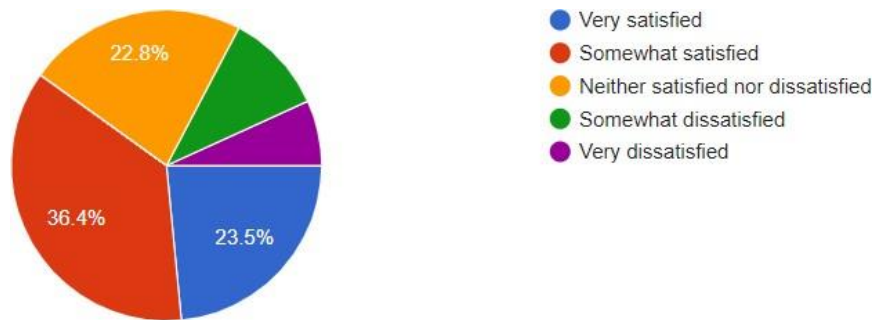


Figure 19: Pie chart shows customer satisfaction of current ISP.

Most of them are selected somewhat satisfied and others opinion in an average stage.

TABLE 16: CUSTOMER SATISFACTION OF CURRENT ISP

Reliability of internet service	Votes	Percentages
Very satisfied	38	23.5%
Somewhat satisfied	59	36.4%
Neither satisfied nor dissatisfied	37	22.8%
Somewhat dissatisfied	17	10.5%
Very dissatisfied	11	6.8%

38 persons are satisfied with their current ISP, 59 persons are somewhat satisfied, 37 persons are neither satisfied nor dissatisfied, we can consider it as average value, 17 persons are somewhat dissatisfied and 11 persons are very dissatisfied with their current internet service provider companies.

To what extent would you agree that the product selection from your current ISP meets the needs of everyone in your household?

160 responses

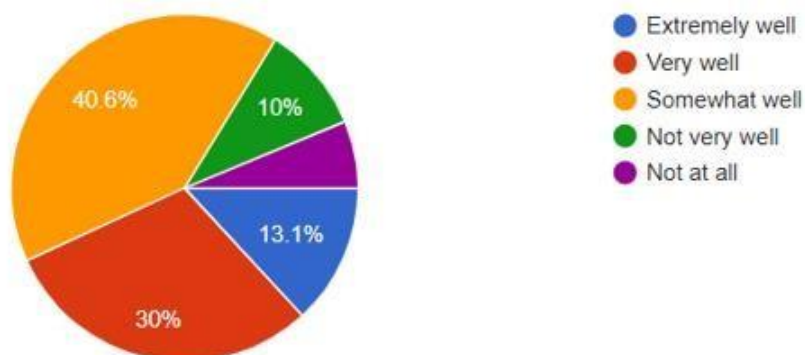


Figure 20: Pie chart of product selection of ISP.

TABLE 17: PRODUCT SELECTION OF ISP

Product Selection	Votes	Percentages
Extremely well	21	13.1%
Very well	48	30%
Somewhat well	65	40.6%
Not very well	16	10%
Not at all	10	6.3%

21 persons agreed that the product selection of their current ISP is extremely well, 48 persons said it is very well, 65 persons said that it is somewhat well, 16 persons are voted to not very well and the other 10 persons voted to not at all that much good.

How would you rate the quality of the service received from your current internet service provider?

160 responses

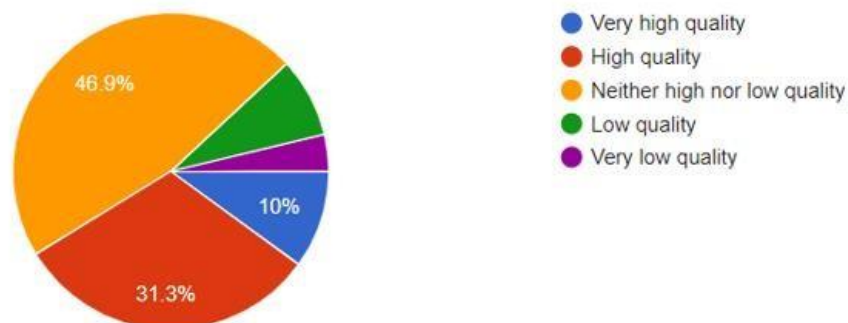


Figure 21: Pie chart of qualities of service from current ISP.

TABLE 18: QUALITIES OF SERVICE FROM CURRENT ISP

Quality of service	Votes	Percentages
Very high quality	16	10%
High quality	50	31.3%
Neither high or low quality	75	46.9%
Low quality	13	8.1%
Very low quality	6	3.7%

16 persons are getting very quality of service from their current ISP, 50 persons are getting high quality, 75 persons are voted to average, 13 persons are getting low quality service and 6 persons are getting very low quality of service from their current ISP.

Which website you visit most?

157 responses



Figure 22: Pie chart of which website users visit most.

TABLE 19: WHICH WEBSITE USERS VISIT MOST

Most Visited Websites	Votes	Percentages
YouTube	89	56.7%
Facebook	57	36.3%
Others	11	7%

86 voters watch YouTube most and 57 persons uses Facebook most. 11 persons are visit other websites.

Do you play online games?

160 responses

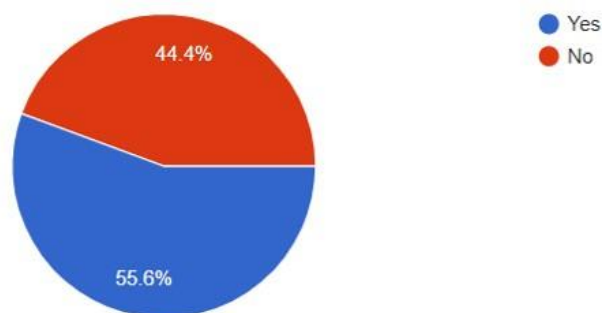


Figure 23: Pie chart of how much users play online games.

TABLE 20: TABLE ON HOW MUCH USERS PLAY ONLINE GAMES

Online games	Votes	Percentages
Yes	89	55.6%
No	71	44.4%

89 persons play online games and other 71 persons are not play online games.

If yes, which game do you play?

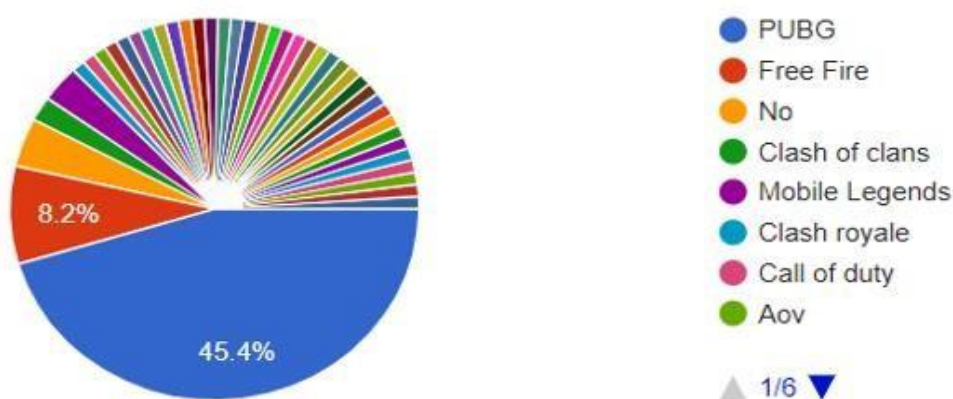


Figure 24: Pie chart of which game do they play most.

TABLE 21: WHICH GAME DO THEY PLAY MOST

Name of games	Votes	Percentages
PUBG	44	45.4%
Free Fire	8	8.2%
Others	45	46.4%

44 online gamers play PUBG, 8 persons play Free Fire and 45 persons play others games.

How satisfied are you with the download and upload speed of your current internet package?

157 responses

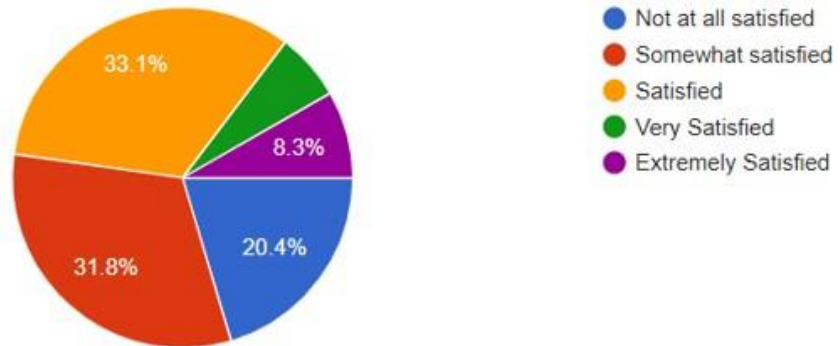


Figure 25: Pie chart about satisfaction level of download and upload speed.

TABLE 22: SATISFACTION LEVEL OF DOWNLOAD AND UPLOAD SPEED

Download and upload speed	Votes	Percentages
Not at all satisfied	32	20.4%
Somewhat satisfied	50	31.8%
Satisfied	52	33.1%
Very satisfied	10	6.4%
Extremely satisfied	13	8.3%

52 persons are satisfied with their download and upload speed that they are getting from the current ISP, 10 persons are very satisfied, 13 persons are extremely satisfied, 50 persons are somewhat satisfied, 32 persons are not at all satisfied.

To what extent would you agree that you get good value for the money you pay for your current internet package?

154 responses

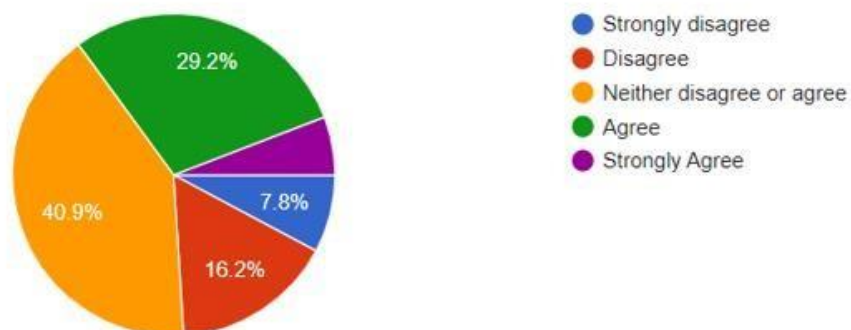


Figure 26: Pie chart is showing that is current ISP provides value for money packages.

TABLE 23: VALUE FOR MONEY PACKAGES

Value for money package	Votes	Percentages
Strongly disagree	12	7.8%
Disagree	25	16.2%
Neither disagree or agree	63	40.9%
Agree	45	29.2%
Strongly agree	9	5.8%

45 persons agreed that they are getting value for money packages, 9 persons strongly agree, 63 persons are neither disagree or agree, 25 persons are agreed, 12 persons are strongly disagreed.

TABLE 24: CONSTRUCTIVE COMMENTS FROM USERS

Users	Comments
1	“Bangladeshi internet service provider companies has no ethics. Because of that, they don’t overcome the customer’s satisfaction level. Their work is not well defined for that; all customers don’t get the services as they said through their media. One should have to know that ultimate profit is the highest satisfactory level of customer, one who don’t believe that he will be soon or letter fall down. Thank you.”
2	“ Some resellers are still out there who gives lower speed connection but cost higher than the actual package they promise to give.... And in some places they make syndicate network among themselves in their area so that other good ISP can't bring their branch in that area and ruin their business.”

TABLE 25: CLASSIFICATION USING TRAINING DATA SET

Algorithms	Correlation Coefficient	Mean absolute Error	Root mean square error	Relative absolute error	Root relative squared error	Total number of instances	Feature Set
Random Forest	0.9764	0.209	0.2536	33.4941%	33.3364%	154	
Decision Table	0.7102	0.3679	0.5356	58.9617%	70.4038%	154	15,32, 39,40
M5 Rules	0.6885	0.4562	0.5522	73.1164%	72.5899%	154	8,13,2 2,34
Gaussian Processes	0.6549	0.4726	0.5756	75.7494%	75.6605%	154	
Linear Regression	0.6184	0.4942	0.5978	79.2057%	78.5875%	154	11,14, 24,39

The data is collected from google spreadsheet, then data is converted to csv file. The data was in a descriptive form, then it is converted to numeric values. 40 attributes have been taken and it is named as topic 1 to topic 40. Then I have used weka for data preprocessing and applied different types of algorithms such as Random Forest, Decision Table, M5 Rules, Gaussian Processes and Linear Regression. This classification has been done using the training dataset.

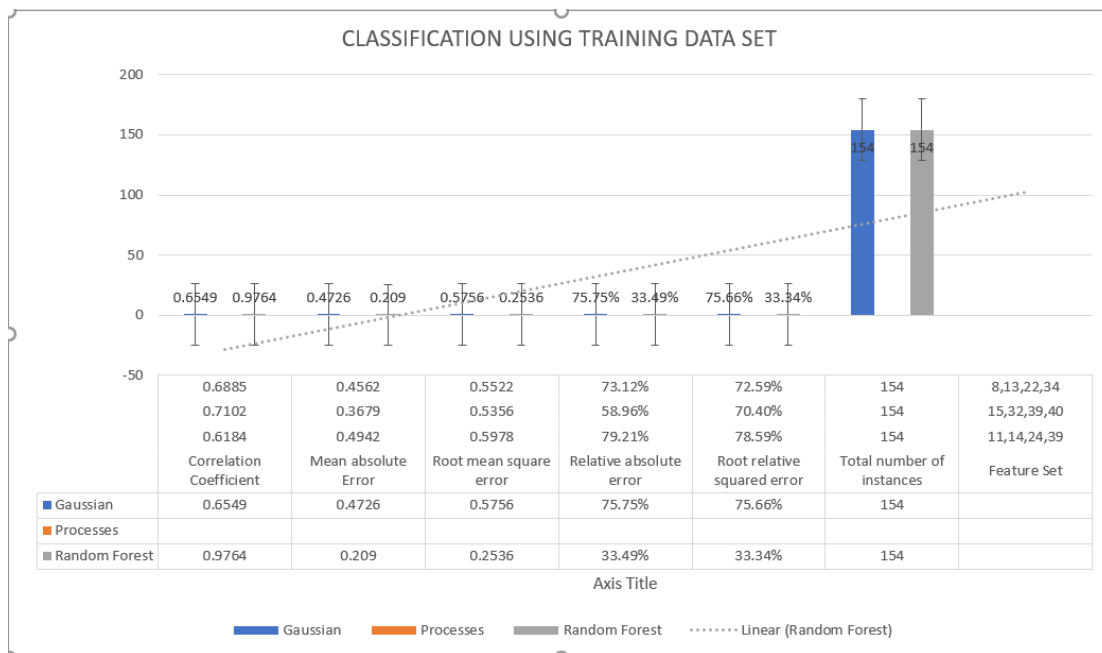


Figure 27: Classification using training data set.

After applying random forest algorithm, I get 0.9764 as correlation coefficient, mean absolute error is 0.209, root mean square error is 0.2536, relative absolute error is 33.4941%, root relative squared error is 33.3364%, total number of instances are 154. After applying decision table algorithm, I get 0.7102 as correlation coefficient, mean absolute error is 0.3679, root mean square error is 0.5356, relative absolute error is 58.9617%, root relative squared error is 70.4038%, total number of instances are 154 and the feature set values are 15,32,39,40. After applying M5 rules algorithm, I get 0.6885 as correlation coefficient, mean absolute error is 0.4562, root mean square error is 0.5522, relative absolute error is 73.1164%, root relative squared error is 72.5899%, total number of instances are 154 and the feature set values are 8,13,22,34. After applying gaussian processes algorithm, I get 0.6549 as correlation coefficient, mean absolute error is 0.4726, root mean square error is 0.5756, relative absolute error is 75.7494%, root relative squared error is 75.6605%, total number of instances are 154. After applying linear regression

algorithm, I get 0.6184 as correlation coefficient, mean absolute error is 0.4942, root mean square error is 0.5978, relative absolute error is 79.2057%, root relative squared error is 78.5875%, total number of instances are 154 and the feature set values are 11,14,24,39.

TABLE 26: CLASSIFICATION USING CROSS VALIDATION DATA SET

Algorithms	Correlation Coefficient	Mean absolute Error	Root mean square error	Relative absolute error	Root relative squared error	Total number of instances	Feature Set
Random Forest	0.4582	0.5635	0.6766	89.6836 %	88.356 3 %	154	
Decision Table	0.1668	0.6472	0.8173	97.009 %	99.729 %	154	15,32,3 9,40
M5 Rules	0.3791	0.6043	0.7304	96.1821 %	95.380 8%	154	8,11,22 34
Gaussian Processes	0.3212	0.6303	0.7714	98.3137 %	97.732 5%	154	
Linear Regression	0.3639	0.606	0.7502	96.4453 %	97.960 5%	154	11,14,2 4,39

This classification has been done using cross validation data set. After applying random forest algorithm, I get 0.4582 as correlation coefficient, mean absolute error is 0.5635, root mean square error is 0.6766, relative absolute error is 89.6836%, root relative squared error is 88.356%, total number of instances are 154.

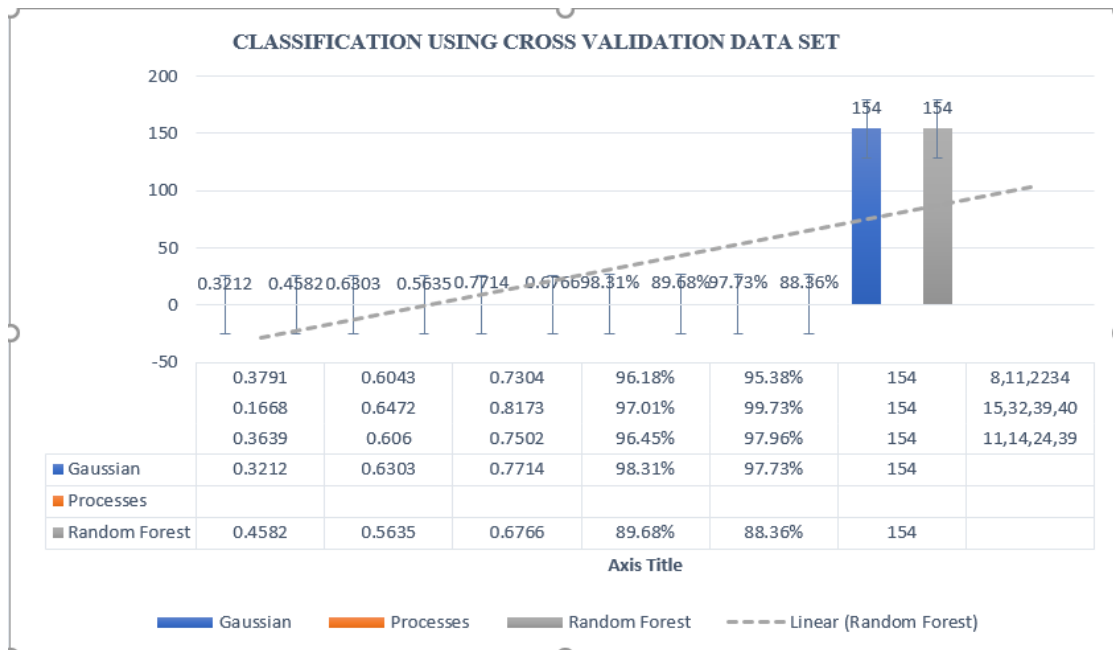


Figure 28: Classification using cross validation data set.

After applying decision table algorithm, I get 0.1668 as correlation coefficient, mean absolute error is 0.6472, root mean square error is 0.8173, relative absolute error is 97.009%, root relative squared error is 99.729%, total number of instances are 154 and the feature set values are 15,32,39,40. After applying M5 rules algorithm, I get 0.3791 as correlation coefficient, mean absolute error is 0.6043, root mean square error is 0.7304, relative absolute error is 96.1821%, root relative squared error is 95.380%, total number of instances are 154 and the feature set values are 8,13,22,34. After applying gaussian processes algorithm, I get 0.3212 as correlation coefficient, mean absolute error is 0.6303, root mean square error is 0.7714, relative absolute error is 98.3137%, root relative squared error is 97.732%, total number of instances are 154. After applying linear regression algorithm, I get 0.3639 as correlation coefficient, mean absolute error is 0.606, root mean square error is 0.7502, relative absolute error is 96.4453%, root relative squared error is 97.960%, total number of instances are 154 and the feature set values are 11,14,24,39.

TABLE 27: CLASSIFICATION USING 80 PERCENTAGE SPLIT DATA SET

Algorithms	Correlation Coefficient	Mean absolute Error	Root mean square error	Relative absolute error	Root relative squared error	Total number of instances	Feature Set
Random Forest	0.5957	0.4875	0.6144	83.7966 %	84.251 %	30	
Decision Table	0.4035	0.5576	0.6909	95.8509 %	94.733 %	30	15,32,39,40
M5 Rules	0.5223	0.4661	0.6318	80.1284 %	86.641 %	30	8,11,2234
Gaussian Processes	0.6549	0.4726	0.5756	75.7494 %	75.660 %	30	
Linear Regression	0.6184	0.4942	0.5978	79.8359 %	79.208 %	30	11,14,24,39

This classification has been done using 80 percentage split data set. After applying random forest algorithm, I get 0.5957 as correlation coefficient, mean absolute error is 0.4875, root mean square error is 0.6144, relative absolute error is 83.7966%, root relative squared error is 84.251%, total number of instances are 30.

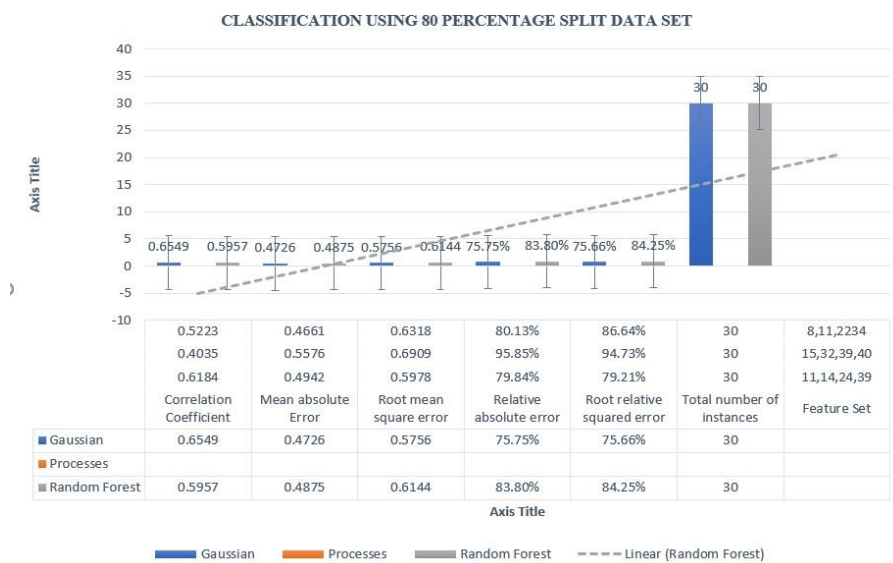


Figure 29: Classification using 80 percentage split data set.

After applying decision table algorithm, I get 0.4035 as correlation coefficient, mean absolute error is 0.5576, root mean square error is 0.6909, relative absolute error is 95.8509%, root relative squared error is 94.733%, total number of instances are 30 and the feature set values are 15,32,39,40. After applying M5 rules algorithm, I get 0.5223 as correlation coefficient, mean absolute error is 0.4661, root mean square error is 0.6318, relative absolute error is 80.1284%, root relative squared error is 86.641%, total number of instances are 30 and the feature set values are 8,13,22,34. After applying gaussian processes algorithm, I get 0.6549 as correlation coefficient, mean absolute error is 0.4726, root mean square error is 0.5756, relative absolute error is 75.7494%, root relative squared error is 79.208%, total number of instances are 30. After applying linear regression algorithm, I get 0.6184 as correlation coefficient, mean absolute error is 0.4942, root mean square error is 0.5978, relative absolute error is 79.8359%, root relative squared error is 79.208%, total number of instances are 30 and the feature set values are 11,14,24,39.

4.3 Description of features

The most relevant and effective attributes of dataset are considered as feature set. When a dataset contains a huge number of attributes, then perhaps not all data are significant for the analysis. Then it become very important to remove the attributes from the dataset. The feature set of decision table is 15,32,39,40. Topic 15 is considered as feature 15 and others are similar like that. So, topic no 15,32,39,40 are the feature set for the decision table. The feature set of M5 rules is 8,11,22,34. The feature set of linear regression is 11,14,24,39. In the random forest algorithm, 12 instances are ignored and the total instances are 154. So, the considered instances are 142. Gaussian process and linear regression follow the same rule about ignoring the instances.

TABLE 28: TABLE ON FEATURES, QUESTIONS AND PARAMETERS

Features	Question	Parameter
8	How would you rate the importance of the following factors when you choose an internet service provider? Please check one circle for each factor ranging from "Not important at all" to "Extremely important". [Price]	Average, Important, Very Important
11	How would you rate your level of satisfaction with your current internet service provider on the following factors? Please check one circle for each factor ranging somewhere between "Not satisfied" and "Very satisfied" [Easy payment system]	Not Satisfied, Average, Satisfied, Very Satisfied
14	How would you rate your level of satisfaction with your current internet service provider on the following factors? Please check one circle for each factor ranging somewhere between "Not satisfied" and "Very satisfied" [Speed of connection]	Not Satisfied, Average, Satisfied, Very Satisfied
15	How would you rate your level of satisfaction with your current internet service provider on the following factors? Please check one circle for each factor ranging somewhere between "Not satisfied" and "Very satisfied" [Price]	Not Satisfied, Average, Satisfied, Very Satisfied
22	How likely are you to switch to another internet service provider based on the following factors? Please mark one circle in the range from very likely to very unlikely	Likely, Neutral, Unlikely, Somewhat unlikely, Very Unlikely

	for each factor. [Increase in downloading limit]	
24	How likely are you to switch to another internet service provider based on the following factors? Please mark one circle in the range from very likely to very unlikely for each factor. [Overall, how likely are you to switch to another Internet provider]	Likely, Neutral, Unlikely, Somewhat unlikely, Very Unlikely
32	Which best describes your occupation?	Student, Teacher, Office worker, Sales person, Factory worker, Managerial, Self-employed, professional, home worker, unemployed, Retired
34	Are you satisfied with the reliability of the internet services you currently receive?	Very satisfied, Somewhat satisfied, Neither satisfied nor dissatisfied, somewhat dissatisfied, Very dissatisfied
39	How satisfied are you with the download and upload speed of your current internet package?	Not at all satisfied, somewhat satisfied, satisfied, very satisfied, Extremely satisfied
40	To what extent would you agree that you get good value for the money you pay for your current package?	Strongly disagree, disagree, neither disagree or agree, agree, strongly agree.

4.4 Result Discussion

In this paper, five algorithms have been applied and these are random forest, decision table, M5 rules, gaussian process and linear regression. Besides this, I have applied three types of classification using these five algorithms, such as classification using training data set, classification using cross validation data set, classification using 80 percentage split data set. Classification of training data set of random forest is much higher accuracy than other, the value is 0.9764. As like that, the decision table value is 0.7102, M5 rule value is 0.6885, gaussian processes value is 0.6549, linear regression is 0.6184. Classification using cross validation data set using random forest is 0.4582, which higher as compared to others in the table, linear regression comes with second highest accuracy in the table with 0.3639 value, M5 rules value is 0.3791, gaussian process value is 0.3212, decision table value is 0.1668. Classification using 80 percentage split data set using gaussian processes is much higher than other algorithms in the table, the value is 0.6549, second highest accuracy comes with linear regression, the value is 0.6184. The random forest value is 0.5957, the M5 rules value is 0.5957. The M5 rules value is 0.5223. The decision table value is 0.4035. As compared to all the algorithm in between these three-classification random forest using training data set is much higher.

CHAPTER: 5

IMPACT ON SOCIETY

5.1 Impact on Society

In our daily life, the importance of internet is huge. Before the invention of internet, it was hard to send data, message to others and it needed a lot of courage and money also. But now a days. We can transfer data one place to another in the blink on an eye. For education and research purpose, books are really important, but it is not available in our bookshelf always. But with the help of internet we can gather information from various libraries and collect eBooks. Through internet the medical system is improved to another level, more readily available and less costly. If a treatment can't be done in a country, it is easy to communicate other to doctors of different countries. If any one needed law help, he can easily get help. When we are determined to solve a problem, it becomes very necessary to analysis the problem. The qualitive questions have been raised to know the problem. 122 persons said that they are using internet for more than 6 years. So, we can know the importance of internet on our daily life. 32.9% people use 5 hours and more, 14% people use 5 hours to less than 10 hours.11% people uses 10 hours to less than 20 hours.14% people use 20 hours to less than 30 hours. 11% people use 30 hours to less than 40 hours. 8.5% people use 40 hours to less than 50 hours. By the survey it is very easy to identify the improvement scopes of internet. In today's world, a huge amount of people works from home. Freelancer are playing a important role to our economy using internet. Student are benefited in gaining knowledge from different sources all over the world. Email and instant message can be sent through internet within a millisecond, it helps to save the time and help to be more productive in the work, it also helps to build the relationships with client and partners by providing easy communication. Online shopping and online banking help to make our lives easier. Millions of books and journals are available for the learners. It motivates the educators; many online courses are also available in internet. Professional are now using internet to communicate and the job are easier to find through internet now-a-days. Betterment of internet service will definitely give a better result in our country's economy, education, medical treatment.

CHAPTER: 6

SUMMARY AND CONCLUSION

5.1 Conclusion

The questions of the survey have made from a lot of analysis and dedications. These questions are qualitative because it will help to gather deep knowledge for the research. There is no alternative of internet in today's world for the progress of technology, especially for a developing country like Bangladesh. From this survey, it will help researchers, government and the ISP companies to understand what people demands and what is their lacking and what should they do for the betterment of the services. After researching and reading a lot of paper I have raised some question for this project that is purpose of my study, to find out the ISP users, getting their positive areas, their negative feedback about which individual part, how to solve the issue, why is this happening, how many people are facing the issue, user's satisfaction level. After collecting the data, I have applied five algorithms such as random forest, decision table, M5 rules, gaussian processes linear regression. Applying the algorithms, I have got correlation coefficient, mean absolute error, root mean square error, relative absolute error, root relative squared error, total number of instances, feature set. The classification has been done in three ways such as using training data set, using cross validation, using 80 percentage split data set. I have found random forest as most accurate and suitable algorithm, because the correlation coefficient value is about 0.9764. The goal of this study is to find the problem and arise the question how to solve the problem and why we need to solve this and how it is affecting to our people's life and our country.

5.2 Future Work

In this work we work with 167 raw data, so that firstly we collect a large number of datasets. And apply different types of classifiers on datasets. In our work we apply five classifiers, and we work with 40 instances. So that, in the future, we will work with more qualitative questions with more attributes and we apply more classifier and machine learning techniques. After all we can say that in future, we will continue our work to make this work as best work.

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