IMPACT AND SENSITIVITY ANALYSIS OF SCHOOL AND COLLEGE RESULTS ON UNIVERSITY ADMISSION TEST AND HIGHER STUDIES

MD. KAMRUL HASAN

BACHELOR OF SCIENCE (INFORMATION AND COMMUNICATION ENGINEERING)

NOAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

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MD. KAMRUL HASAN

This Research proposal submitted in fulfillment of the requirements for the award of the degree of Bachelor of Science Information and Communication Engineering

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DECLARATION

I hereby declare that this research report has not been submitted elsewhere for the requirement of any kind of Degree, Diploma or Publication.

(Md. Kamrul Hasan)

Dept of ICE

Class roll: ASH1711012M

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ACCEPTANCE

This research proposal is submitted to the Department of Information & Communication Engineering, Noakhali Science & Technology University, Sonapur, Noakhali in partial fulfillment of the requirements for having the B.Sc. degree in ICE.

Dr. Md Ashikur Rahman Khan

Professor

Department of Information and Communication Engineering

Noakhali Science & Technology University

Sonapur, Noakhali-3814

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ABSTRACT

This research study will conduct statistical data analysis techniques to observe university student's results impact and sensitivity based on their pre-university academic results. To determine student's performance there will be used two different analysis. One is 'impact analysis' and another one is 'sensitivity analysis'. In this research, it is observed how pre-university academic results keep influence on university results. Besides, it will be determined what is the sensitivity of university results according to pre-university academic results. In sensitivity analysis, we can find how much the university results are dependent on the previous results. Here the results of sensitivity analysis will come into percentage form. This study will be conducted on a huge amount of data. For statistical analysis different software will be used as Microsoft office excel, mintab, matlab etc. The fundamental goal is to find the relationship between honors and previous academic results and determine the effectiveness of previous results on university results to show the relation. Finally, this paper showed some significant relationship between previous results and university results. Even master's results is also dependent on the pre-university results. After all, this study might be recommendations for implementing different regression models and several considerations for the analysis of academic performance in higher education.

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INTRODUCTION

1.1 BACKGROUND STUDY

Today's era is called era of technology and modern science. Successively human are facing various problems and with the help of modern technology and artificial intelligence they find the way out of the problems. All the knowledge regarding technology and AI can be gained by proper education. Now education for any nation is a very basic need. Education served across a nation in a systematic way and this system is named as education system. Education system divided the education into several parts such as primary, intermediate and higher studies. People receive the educational knowledge step by step from primary to higher studies. And the education is getting complex from lower step to upper step.

The term "data" refers to information about units of analysis or observations. Individuals (micro), corporations or political parties (meso), or nations (macro) are examples of these units (macro). Data can be organized into geographic units such as cities, counties, or states, or it can be used to depict relationships such as elite networks. Units of analysis and units of observation are frequently interchangeable. However, if the household is the unit of analysis, some units of observation, such as all family members in a household, can be aggregated[1].

In our study we will learn about impact analysis and sensitivity analysis. These two analysis are very common and important analyzing method in data science.

- **Impact Analysis**

The effect analysis of an anomaly entails determining the adjustments that must be done during the realization's descending phase (impact on documents, impact on code, influence on the description and implementation of tests).

The goal of non-regression testing is to establish the V&V activities that will be implemented to verify that the change was properly implemented. In some circumstances, the non-regression is stated to be total, necessitating the re-execution of all phase verification (reviews, tests, etc.). However, using effect analysis and non-regression, the only tasks that are required can be

identified. In general, non-regression is divided into two parts: systematic verifications of change-related activities and non-regression. The goal of non-regression testing is to keep the expense of a new version as low as possible[2].

Impact analysis is used in various sectors. Such as management of software applications, information security risk assessment and so on.

In our study, we analyze the impact of previous academic results on university results such as university admission test, honors results and master's results. We will show here that, what is the impact of previous academic results on university results.

- **Sensitivity Analysis**

Every risk assessment, both quantitative and qualitative, requires sensitivity analysis. Assumptions, probability distributions, expert opinion, best guesses, and some other strategies are used to fill in the gaps in our knowledge. Sensitivity analysis is a methodical examination of how assessors bridge these gaps in knowledge. It comprises a "what if" examination of uncertain model parameters and inputs, as well as all major assumptions. Sensitivity analysis is used to determine how sensitive model outputs are to changes in inputs, as well as how this sensitivity may effect decisions. A good sensitivity analysis boosts overall risk assessment confidence.

It's also known as what-if or simulation analysis, and it's most typically employed by financial analysts and economists. It can be used to figure out how interest rates affect bond values and make forecasts about publicly traded company share prices.

Analysts can use this technique to determine which variables are more important than others in influencing a decision. As a result, it gives investors an understanding of how many variables can affect their potential investment returns. The analyst will examine how the variables change, as well as how the input variable affects the target. Sensitivity analysis enables predicting based on previous data, allowing for crucial commercial, economic, and financial decisions to be made.

For example, Barry is the sales manager for a small garden business that offers everything from plants and gardening supplies to home goods, furniture, and even pet supplies. He understands that revenue rises in the summer as more consumers visit during the warmer months and focus on garden maintenance. This year, though, he wants to know exactly how much sales will increase as a result of increasing client traffic percentages.

A top-of-the-line outdoor BBQ set costs £500. During the months of May, June, and July last year, the garden center made a profit of £50,000 by selling 100 outdoor BBQ sets.

Barry determines that a 10% increase in customer visits over the summer will result in a 4% increase in the number of BBQs sold after conducting a sensitivity study.

With this data, he can forecast how much money will be produced from certain customer visit characteristics. As a result, if the percentage of client visits increases by 10%, 25%, or 50%, he

can expect sales to grow by 4%, 10%, or 20%. For more information, see our cash flow projection guide.

Because the sensitivity analysis shows that sales are particularly sensitive to variations in customer visits, Barry will ensure that adequate extra stock is purchased to handle increased foot traffic over the summer.

1.2 PROBLEM STATEMENT

From the literature review part, we come to learn that there are many research papers related to impact analysis and sensitivity analysis. But there are no such research papers found that show relationship between previous academic results and university results. There are a huge number of students who secured good results in the secondary and higher secondary level. But some of them can not make good results at the university level. There is some reason behind this problem. One is being inattentive and the other is the wrong selection of department. Very few people are good at all the subjects in the higher secondary level. Different students are good at different types of subjects. They should choose departments in university as their own decision. Such as, a student is good at mathematics and physics. He should choose engineering faculty subjects to study. If he took a biological subject in his study there is a possibility to be a sufferer in the future. That's why we tried to show the relationship between previous academic results and university results. For this, we analyze the impact and sensitivity of the previous academic results and subject-wise results on the university results.

1.3 LITERATURE REVIEW

In this section, some related works are explained shortly with their performance and lackings.

Andres Gonzalez-Nucamendi, Julieta Noguez , Luis Neri, Víctor Robledo-Rella, Rosa María Guadalupe García-Castelán and David Escobar-Castillejos used regression model to predict engineering students final academic performance based on their profile. They used self-regulation, learning and affective strategies(SRLAS), and multiple intelligence(MI) as student profiles. Here used different types of parameter from both MI and SRLAS. With the mathematical form of these parameters they operates regression model. In this study they found anxiety is a very important factor to predict students academic performance. Anxiety keeps a great impact on the desired predicted outcomes.[1]

Imad Bou-Hamad showed how academic performance is varied by social media usage and lifestyle habits with applying regression model. He used linear regression and logistic regression to show the impact of social media usage and lifestyle habits on academic performance. In this study he found some significant stuffs. Social media, smoking, any type of romantic relationship

always have a negative impact on academic result. The negative impact of social media usage is very high. The accuracy of the prediction of the results comparing with the real results is 70.1% . However in this study the others important lifestyles such as sleeping, physical activity, mobile usage in class etc were not observed. And the findings may not be generalizable due to the convenience sample approach used though it is a valid sampling tool [2].

Sandra Dietrich, Brigitte Latzko here investigate whether action orientation is a valid measure of diversity in self-regulation in pre-service teachers. For this purpose, two studies with students in academic teacher training programs were reported. In study one author classified students depending on whether they showed action orientation or state orientation after experiencing failure, or in decision-making. In study two they replicated the classification with an independent sample of students. For further validation, data on action control disposition was correlated with self-regulation measures. Data on academic success and progress as well as life satisfaction were compared across the groups in order to evaluate prognostic validity of the classification. For study purpose data consist of 35.7% primary school teachers, 10% secondary school teachers, 40% academic track secondary school teachers, 14.3% education special teachers [3].

Eve Sarah Troll, Malte Friese, David D. Loschelder all worked together to find out how student's self-control and smartphone use explain their academic performance. Participants were 454 students from Germany 344 students, from Switzerland 81 students, and from Austria 29 students. They were recruited through an online research participation system at different online platforms (e.g., facebook), and scientific networks. Descriptive statistics and correlations with trait self-control supports their prediction that lower trait self-control is linked to higher levels of self-reported distraction(via the smartphone) while studying [4].

Diana Selmeczy* , Simona Ghetti , Lucy R. Zheng , Tenelle Porter, Kali Trzesniewski, conducted two studies (study 1 and study 2). Each study was conducted two time, first with a relatively easy puzzle and second with a relatively harder puzzle. Studies were conducted to people of three age groups. Study 1 compared information seeking efficiency in 8- and 9- year-olds, 11- and 12- year-olds, and 16- and 17- year-olds during puzzle-solving task, and found that 8- and 9-year-olds were less efficient in their information-seeking, as they were more likely than other age groups to seek help after a correct response. Study 2 compared the information-seeking following an error to academic achievement, as measure of GPA and found a positive relationship between them [5].

Jelena Jovanović et al. examined a comprehensive set of features covering several aspects of students' online learning behavior. It was based on a sample of 15 blended courses (50 course editions) that were homogeneous in terms of institutional settings, discipline, nominal learning design, and course size. They only examined online component of course, we were not able to account for offline behavior and thus might have missed some important predictors [6].

Carlos Felipe Rodríguez-Hernandez , Mariel Musso , Eva Kyndt , Eduardo Cascallar showed the implementation of artificial neural networks (ANN) to predict academic performances. They used 162030 student's data for their study. They develop different ANNs model and train these models and implemented the models on the data set. Besides they used some statistical analysis regarding regression models. Their highest accuracy was 82% and lowest accuracy was 71%. Though it was a fine work, it also have some limitations. In this study high school grade point average was not counted in the calculation and some data needed to be tested by SABER PRO but it didn't happen. they used SABER 11 test. By doing this there could have been some change in their accuracy. Overall in this research paper it was recommended that artificial neural networks can be used to predict academic performance [7].

Table 1.1: Related previous work

Serial no	**Title**	**Methodology**	**Contributions**	**Limitations**	**Difference to us**
1.	The prediction of academic performance using engineering student's profiles	Used different regression model to pre-dict. Used various elements from students profile as parameters. Such as MI, SRLAS .	Showed the academic performance dependency on the various student profile elements.	Some limited parameters were used to predict but there are others parameters also which can be used as predictor.	We will use previous results to predict university result. They didn't use any previous result to do this.
2.	The impact of social media usage and lifestyle habits on academic achievement: Insights from a developing country context	Used different regression model to show the impact of social media usage and lifestyles on academic performance.	Finds that social media usage and some lifestyles have negative impact on academic performance. And some lifestyles age progressive.	There are many more social activity and lifestyles exist on which academic performance is dependent but they were not used.	They show the impact of social media usage and different lifestyles on academic performance but we will use previous results to predict academic performance.

Table 1.1: Related previous work(continued)

3.	Action orientation in novice pre-service teachers—A predictor for academic success and academic progress	They used two studies to do this research work. In both studies they used sampling method to show their desired work.	Presentation and theoretical framing of action orientation in the context of academic performance and professional teacher development.	For using two studies there are slight differences in the replication of the cluster solution.	They normally show some relation in theoretical manner but we will use statistical analysis.
4.	How students' self-control and smartphone-use explain their academic performance	They used 3 studies to show, how a student should use smartphone in such a way that it will not affect to their academic performance. There they used	they way out some fantastic techniques. How a student should use smartphone very smartly that it will not have any negative impact on their study.	It's a very concerning issue they have researched. So, if there were more participants it would be more effective as my point of view.	There were no prediction in their research article but in our study we will show the predicted value of the academic performance.
5.	Help me understand: Adaptive information-seeking predicts academic achievement in school-aged children	There used two studies to understand the relation between information seeking and academic achievement. Both studies were conducted two times each.	Found that the students who are interested to seek information are positively related with their academic performance.	Here this research was conducted on only school category students but this information seeking is also related to higher education.	It a theoretical study where they have shown a positive relation but our study will conduct a prediction of result.

Table 1.1: Related previous work(continued)

6.	Students matter the most in learning analytics: The effects of internal and instructional conditions in predicting academic success	There used theoretical and statistical analysis for predicting academic performance. In ther linear regression model were used for statistical analysis.	They showed clearly in online system there are some internal and instructional conditions to predicting academic success.	They only used online students and elements related with online but there are many predictors in offline. These were ignored.	This research is also related with prediction of result but there is difference in parameters used with our research.
7.	Artificial neural networks in academic performance prediction: Systematic implementation and predictor evaluation	Different artificial neural networks algorithms and linear regression model were used to show that academic performance can be predict by implementing ANN.	They proved that in case of result predict-tion artificial neural network can be applied. Their accuracy was highest 82 % and lowest 71%.	In this study high school grade point average was not counted in the calculation. If counted the accuracy could have been changed.	Their main focus was artificial neural networks in prediction but our focus is to implement regression model to predict.

- **SUMMARY**

We searched a lot of papers related to our study. But till now no such paper is found. Some papers which are done over different students and institutions are reviewed there. By reading these papers we found out some limitations of these. No work is done before as our study. There are huge papers which is written about students performances but the pre-university result's relation with university admission test and higher studies is not shown anywhere. In the above reviews in maximum papers machine learning and artificial neural network is applied to determining various analysis.

1.4 OBJECTIVE

In our study, we will try to find the impact of previous academic results on the university results. Such as university admission test, honors results and master's results. It will show us the connectivity between these results. After that, we will try to find the sensitivity of the university results with the previous academic results. From the sensitivity analysis, we can learn how university results change in percentage according to the changes of previous academic results. After these analyses, in the future new research can be done related to the datasets. Other parameter's impact and sensitivity can also be determined. It will open new scopes to do some other research related to this field. There are many other parameters which can be used for the research. Our major objectives are as follow:

- ✓ To find out the impact analysis of pre-university results on university results.
- ✓ To find out the sensitivity analysis of pre-university results on university results.
- ✓ To determine the relation between the two stages.
- ✓ Showing the comparison between them.

1.5 RESEARCH SCOPE

Different type of tools will be used in this research work. Some are listed below.

1. **Hardware requirement:** A **desktop** or a **laptop** with minimum core i5, 8 GB RAM, 4GB graphics card.
2. **Software requirement:**
    I. **Matlab:** Matlab is a high level programming language which is used in research work broadly all over the world. We will use Matlab R2018a version.
    II. **Mintab**: it will be used for data analysis and statistical analysis
    III. **Microsoft office 2010**: It will be used for data processing and storing. Any version can be used.

CHAPTER 2

METHODOLOGY

2.1 INTRODUCTION

Data analysis is a very important part of modern science. Depending on data every decision is taken now a days. For future world data will be the biggest weapon. With data many things can be done which people can't even think. In this research paper we tried to show the impact of pre-university academic result on the admission test, honors result and masters result. Besides impact we will try to show the sensitivity of these parameters over the honors result and masters result. For this work we need to proceed through some steps. These are explained as follow.

2.2 RESEARCH DESIGN

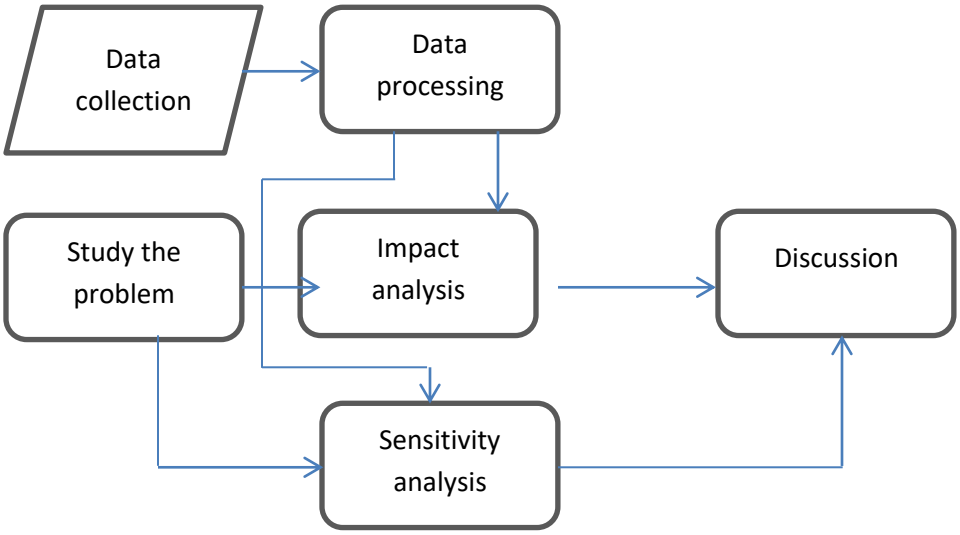


Figure 2.1: overall system overview

In figure 2.1 it is shown that how is the design of the system. All the process will be described shortly. Firstly, we need to collect raw data from register section of a university. Then the data need to be preprocessed. It means to remove unclear, duplicate and missing values. After preprocessing data we will design a model for our work. Different algorithms and performance measure technique will be applied. We divided the dataset into different category as per our need. After that we do our analysis individually for each of the datasets. The flowchart of this research work is given below.

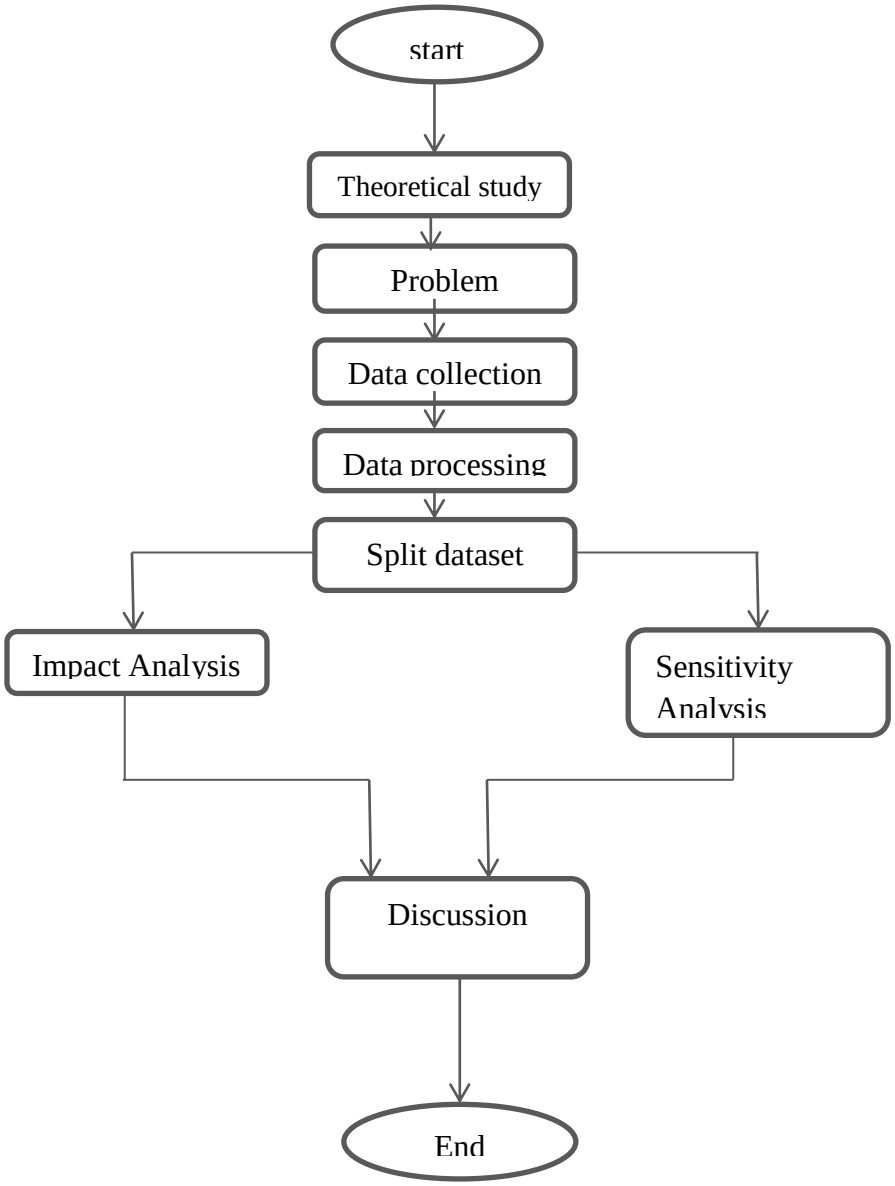


Figure 2.2: workflow diagram

2.3 DATA COLLECTION PROCESS

There are several steps in collection of data. First, we select the parameters we will use. Then based on it we collected our data from the university. Whole steps are as follow:

2.3.1 PARAMETERS

From the data set we will use some specific data as our parameters. These are given below:

Table 2.1 parameters and their type

Variable name	type	value
SSC_gpa	Numerical	1-5
HSC_gpa	Numerical	1-5
HSC_phy	Numerical	1-5
HSC_che	Numerical	1-5
HSC_math	Numerical	1-5
HSC_bio	Numerical	1-5
Honors_cgpa	Numerical	1-4
Admisson_score	Numirecal	100-200

2.3.2 DATA COLLECTION

For this research work data are the most precious and fundamental element. For predicting students final result based on their pre university academic result we need to collect all the data regarding their past academic result. There are different ways to collect data. We collected our desired data from the register section of a university. In this research we will use 1000 student's data to predict desired result. We collected various information from students. We use their SSC gpa, HSC gpa, physics gp, chemistry gp, math gp and biology gp as variable. If needed others information can be applied such as gender, age, department etc. There we used 3501 student's data who are from 2011-12 session in Noakhali science and technology university. We used data of session 2008-09, session 2009-10, session 2010-11, session 2011-12 and session 2020-21. Specially from session 2020-21 we only use their GST admission results.

hsc_math_gp	hsc_chem_gp	hsc_phy_gp	hsc_bio_gp	hsc_gpa	ssc_gpa	hon_cgpa	ms_cgpa
5	3.5	3.5	5	4.5	4.56	3.8	3.94
4	4	4	4	4.5	4.81	3.6	3.86
5	4	4	5	4.7	5	3.76	3.94
5	4	3.5	5	4.7	5	3.6	3.88
4	5	4	5	4.8	5	3.86	3.9
5	5	4	5	4.9	5	3.87	3.92
5	5	5	5	5	5	3.93	3.98
5	5	5	5	5	5	3.58	3.95
5	5	5	5	5	5	3.87	3.94
5	5	5	5	5	5	3.78	3.93
5	5	5	5	5	5	3.83	3.92
5	5	5	5	5	5	3.77	3.92
5	5	5	5	5	5	3.79	3.9
5	4	4	5	5	5	3.65	3.9
5	5	5	5	5	5	3.96	3.9
5	5	5	5	5	5	3.74	3.89
5	5	5	5	5	5	3.57	3.89
5	5	5	5	5	5	3.83	3.86
5	4	5	5	5	5	3.41	3.84
4	5	5	5	5	5	3.62	3.82
5	5	5	5	5	5	3.17	3.8

Figure 2.3: sample of datasets

2.3.3 DATA PROCESSING

Data processing is an another important work in research. Because while collecting data we collected huge number of data. It is called actually raw data. In this raw data there could have been anomaly and corrupted data. We have to clean this data and make it ready for our research work. After processing data we have to split this data for training model and test.

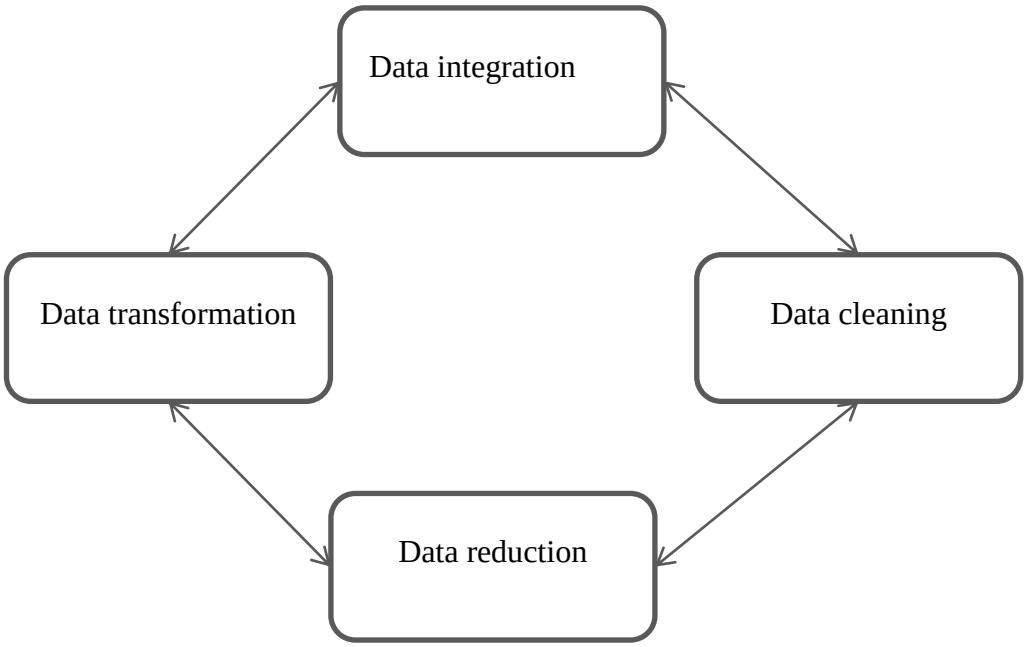


Figure 2.4: Data preprocessing cycle.

Form the data preprocessing cycle we use data cleaning method. Because in our datasets there are many attributes. All of them are not necessary. The unnecessary data will be removed.

2.4 ANALYSIS OVER ADMISSION TEST

For admission test results we will mainly find out the impact analysis. Impact analysis refers that, what is the effect of output according to input. Output is dependent on input or not, it can be clear by impact analysis. In our research work, firstly we do impact analysis of pre-university result over admission test and masters result.

2.4.1 Impact Analysis Over Admission Test

Here, we work over a huge amount of datasets. Those who participated in the admission test and scored the minimum required number are enlisted in the dataset. At first, we determine the impact of HSC and SSC data over A unit admission result. We use 3501 students data to determine the impact of their SSC , HSC and HSC subject-wise result on university admission test. Firstly we sort all the rows according to the respective data column.

At first, we sort the dataset according to the SSC-GPA column. Then using matlab and different functions we plotted scatter plot of admission test score. In the same plot we also plotted the SSC result of the students. using matlab we also apply the mean function to determine the average mark of admission score. In case of HSC-GPA we follow the same procedure but the sorting. In this case we sort the dataset by the HSC-GPA column. Here, we will show the scatter plot and the HSC-GPA in the same figure. After that with the same method we create individual figure for hsc-math-gp, hsc-chem-gp, hsc-phy-gp and hsc-bio-gp. From all the procedure mentioned above we get 6 plots which describe the impact of pre-university academic result on admission test result.

2.4.2 Impact Analysis Over GST Admission Test

Recently, in Bangladesh for university admission GST(General and Science Technology) admission procedure is operated. There 20 different universities took part in this system. In this system, primarily, a screening test happened. There about 160000 students were selected for the admission test. They gave a admission exam of 100 marks. After publishing their result, it was their responsibilities to select their desired university. A student could apply several universities. we used data of one university named Noakhali Science and Technology University. There we used science unit's data to determine the impact of SSC, HSC and HSC subject-wise results on admission test result.

Firstly, we sort the whole dataset according to SSC GPA column. After that we will apply scatter plot function on GST total score to plot a graph. In the same graph we will plot the SSC GPA. After that it will be easier to compare the both results and determine the effect. For making the comparison easy we will show the average GST score on the same plot.

Secondly, The entire dataset is sorted by the HSC GPA column. After that, we'll plot a graph using the scatter plot function on the GST total score. The HSC GPA will be plotted on the same graph. After then, comparing the two findings and determining the effect will be much easy. We'll put the average GST score on the same plot to make comparisons easier.

Thirdly, we will create plot showing effect of hsc mathematics gp, hsc physics gp and hsc chemistry gp on the GST admission score. We will sort the dataset accordingly hsc mathematics gp, hsc physics gp and hsc chemistry gp. After that we will create three individual plots showing the impact or effect of these results on GST admission test score. In each plot the individual HSC subject-wise GP and the average value of GST admission test score will be plotted

2.5 ANALYSIS OVER HONORS RESULT

For honors section we will do mainly sensitivity analysis. Sensitivity analysis is a very popular term in statistical research area. The Sensitivity Analysis (SA) is a method in a numerical (or otherwise) model that examines how the influence of uncertainties in one or more input variables can lead to uncertainties in the output variables. This analysis is useful because it increases or decreases the model's prediction accuracy by evaluating qualitatively and/or quantitatively the model's response to changes in input variables, or by better comprehending the phenomenon examined via the examination of interactions between variables. The goal of interest, however, must be the question that the model has been asked to answer, not the model output per se.

In other words, the expected values of various parameters can be used to assess the robustness, or 'sensitivity,' of the results as a result of these changes, and to determine the values beyond which the results change dramatically. SA finds the most pressing knowledge gaps. Indeed, this analysis minimizes the uncertainty of the assessment parameters, allowing conclusions to be made concerning the phenomenon under investigation.

In this study we find out the sensitivity of SSC, HSC and HSC subject-wise result on university honors result and master's result.

2.5.1 Method of Sensitivity Analysis

To determine the sensitivity in our study we followed some formulas .

$$P = \frac{x2-x1}{x1} * 100\% \quad \text{.....2.1}$$

Where P is the change of gp in percentage, and x1,x2 are different values of input parameters. This equation is used to determine the changes of SSC, HSC and HSC subject-wise GPA in percentage.

$$Q = \frac{y2-y1}{y1} * 100\% \quad \text{.....2.2}$$

Where Q is the change of CGPA in percentage, and y1, y2 are different values of input parameters. This equation is used to determine the changes of output parameters in percentage.

$$S_n = \frac{Q}{P} * 100\% \quad \text{.....2.3}$$

Where S_n is the n^{th} sensitivity of the input over output.

$$S = \frac{\sum_1^n Sn}{n} \quad \text{.....2.4}$$

Where S is the average sensitivity.

The above equations are used to determine the sensitivity of different parameters on certain responses.

2.5.2 Sensitivity Analysis For Engineering Faculty

We determined the sensitivity of SSC, HSC and HSC subject-wise results on honors results of engineering faculty of Noakhali Science And Technology University. For this, we used 282 student's data who have successfully completed their Bsc honors from the engineering faculty.

Firstly, we sort the dataset in ascending order according to SSC GPA column. After that, we find the averages of the same GPA's and the respective honors CGPA's. Then we find out the changes of averages GPA's in percentage by using equation (2.1). At the same time we find out the changes of averages honors CGPA's in percentage by using equation (2.2). After that we find the individual sensitivity by using equation 2.3. After getting all the individual sensitivity we will find out the final average sensitivity for the SSC GPA over honors results.

With these same equations, we will find the sensitivity of HSC GPA and HSC subject-wise results on the honors results of engineering faculty. In case of HSC subject-wise gp we took hsc mathematics gp, hsc physics gp, hsc chemistry gp and hsc biology gp. We determined the sensitivity of each of them on honors results of engineering faculty.

2.5.3 Sensitivity Analysis For Science Faculty

Here we used 347 student's data to find the sensitivity of SSC, HSC and HSC subject-wise result on honors results of science faculty. We sort the dataset in ascending order by the parameters which sensitivity will be determined over honors results.

For SSC, HSC and HSC subject-wise GPA we applied the equation (2.1) for finding the change of averages of GPA's in percentage and applied the equation(2.2) for finding the change of averages of respective honors CGPA's in percentage. After getting these two parameters we will find out the individual sensitivity applying equation(2.3) and after all we will determined the final average sensitivity for SSC, HSC and HSC subject-wise GPA on honors results of science faculty.

2.5.4 Sensitivity Analysis For All Faculties

We used data from 629 students to determine the sensitivity of SSC, HSC, and HSC subject-wise results on all faculties honors results. We arrange the dataset by the parameters whose sensitivity will be calculated over honors findings in increasing order.

We used the equation (2.1) to discover the change in averages of GPAs in percentage for SSC, HSC, and HSC subject-wise GPA, and the equation (2.2) to find the change in averages of respective honors CGPA's in percentage for SSC, HSC, and HSC subject-wise GPA. After obtaining these two parameters, we will use equation (2.3) to determine individual sensitivity, and finally, the final average sensitivity for SSC, HSC, and HSC subject-wise GPA on honors results of all faculties.

2.6 ANALYSIS OVER MASTER'S RESULT

In case of master's result we will find out the impact of pre-university result on masters result. After thar we will find out the sensitivity of master's results on pre-university admission test.

2.6.1 Impact Analysis Over Master's Result

In education every step is connected to its previous steps. Each and every result or success is somehow related to the previous works or results. From this thought we decided to check the impact of SSC ,HSC and HSC subject-wise results on the master's result. We wanted to show that, is there actually any relation or not. For this purpose we have followed the below procedure. For determining impact for master's we had to separate the data set from all categories students to master's done students. after separating the master's students we will apply our procedure to the dataset to determine the impact of pre-university academic results on the master's result.

Firstly, we sort the newly modified dataset according to SSC GPA column and in matlab we apply the scatter plot function to master's results to plot the master's result in a graph. In the same plot we plotted the SSC GPA and the average value of master's results. This will help us to compare and determine the effectiveness of both results.

Secondly, we sort the newly adjusted dataset by the HSC GPA column, and then use the scatter plot tool in Matlab to plot the master's results on a graph. We put the HSC GPA and the average value of master's results on the same graph. This will allow us to compare and evaluate the efficacy of both outcomes.

Thirdly, we sort the dataset by the HSC subject-wise results individually at a time. We sort by hsc mathematics gp and plotted a scatter plot and show the hsc mathematics gp in the same plot. Than we sort the dataset according to HSC physics gp and plotted another graph. After that we sort the dataset according to HSC chemistry gp and plotted a graph. At last we sort the dataset according to HSC biology gp to plot a graph.

2.6.2 Sensitivity Analysis For Masters

Here we used 148 student's data for sensitivity analysis for Masters. We begin by sorting the data in ascending order by the SSC GPA column. The averages of the same GPA's and the associated master's CGPA's are then calculated. Then, using equation(2.1), we calculate the changes in average GPAs in percentage. At the same time, we use equation(2.2) to calculate the changes in averages master's CGPA's in percentage. The individual sensitivity is then determined using equation (2.3). We'll calculate the final average sensitivity for the SSC GPA over master's results after we've gathered all of the individual sensitivity.

The sensitivity of HSC GPA and HSC subject-wise outcomes on master's results will be determined using the same equations.

2.7 PERFORMANCE ANALYSIS

With the methods and procedures mentioned above, we applied to our study to determine the impact and sensitivity analysis. The performance of impact analysis is excellent. Before doing the analysis, what we assume about the impact the observation is quite similar to our previous thought. Individual subject of HSC label is important for the university admission test result and

so on. The performance of sensitivity analysis is also very well. No anomaly or invalid situation happened. Overall in our study the total performance is very well. Everything is done as pre plan.

CHAPTER-3

RESULT AND DISCUSSION

3.1 INTRODUCTION

In education system everything is dependent on examination. A examination is partially dependent on its pervious examination. In this paper we tried to show that how university result and university admission result are connected to pre-university results and is there any relation or not. Impact and sensitivity of pre-university result's on honor's and master's results. For determining these parameters all the methods and functionality described in the previous chapter are used. In this chapter we will analyze the results and discuss its impact and relativity.

3.2 ANALYSIS OVER ADMISSION TEST

We see that SSC and HSC result of a student is measured as a parameter in university admission test. Here we tried to find the impact of HSC and SSC examination and their individual subject's results impact on the admission test result. We discuss and analyze the impact over admission candidate students of a university. We have two lists of students. One of them carry the data of previous admission results of 3501 students of science unit. The other one carries the data of recently happen GST admission data of 9419 students of science unit. At this stage, we will show the connectivity of SSC and HSC result with the university admission test score. Here we used 3501 students data for determining the impact of SSC, HSC and HSC subject-wise result on admission test result of a university.

3.2.1 Impact Analysis Of Admission Result

In this section, we find the impact of SSC, HSC and HSC subject-wise result on previous admission result. Here we used 3501 student's data for impact observation.

- **Impact Of SSC Result On Admission Score.**

Here we will show how admission result is influenced by SSC. Is there any connectivity not.

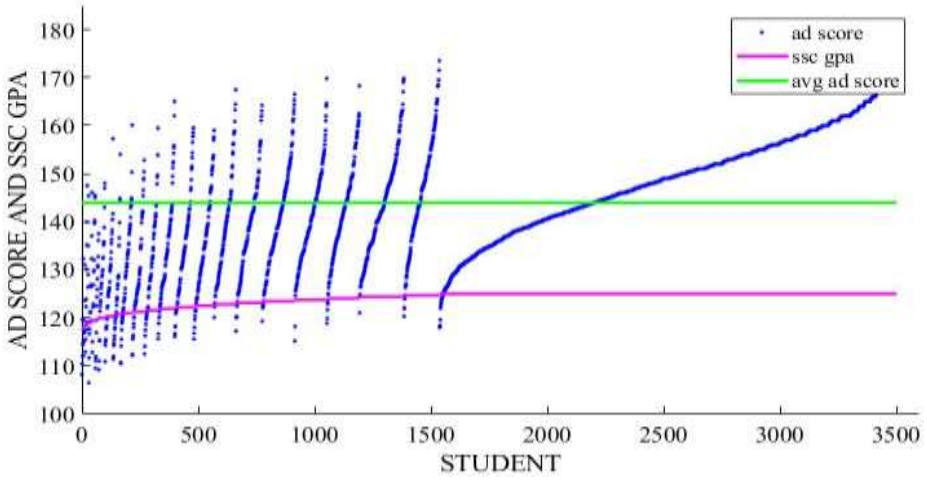


Figure 3.1: Effect of GP of SSC on admission test result

From the above figure we see that, lowest score in admission test is 106.42 and the highest score is 180. Those who got highest GPA in HSC and SSC they got full marks in the second part. Total score is 200. We also see from the figure the average admission score is around 144. The number of students who got GPA-5 in SSC examination is 1964.From them 1759 students secured above average marks. The number of students who got GPA below 5 is less in case of good admission scorer. So we can say that, GPA of admission score is lightly proportional to the SSC result.

- **Impact Of HSC Result On Admission Score**

Now we see the relationship between HSC result and university admission test score. In A unit all the participants are from science background.

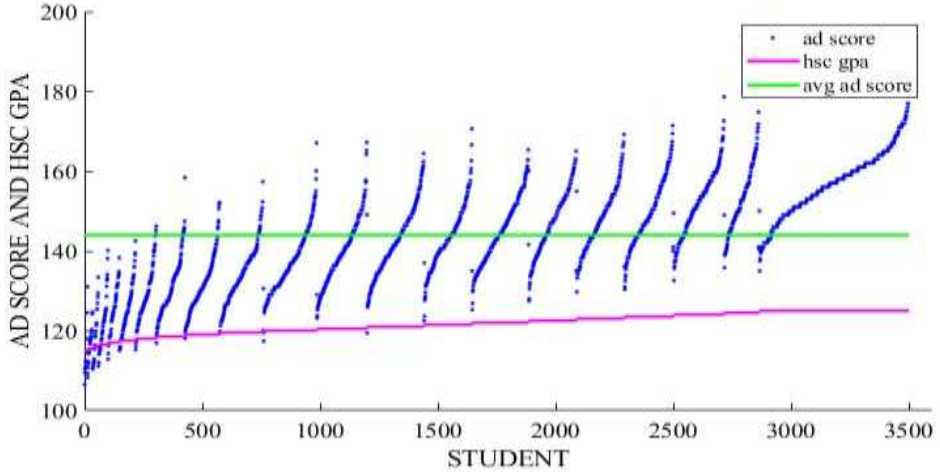
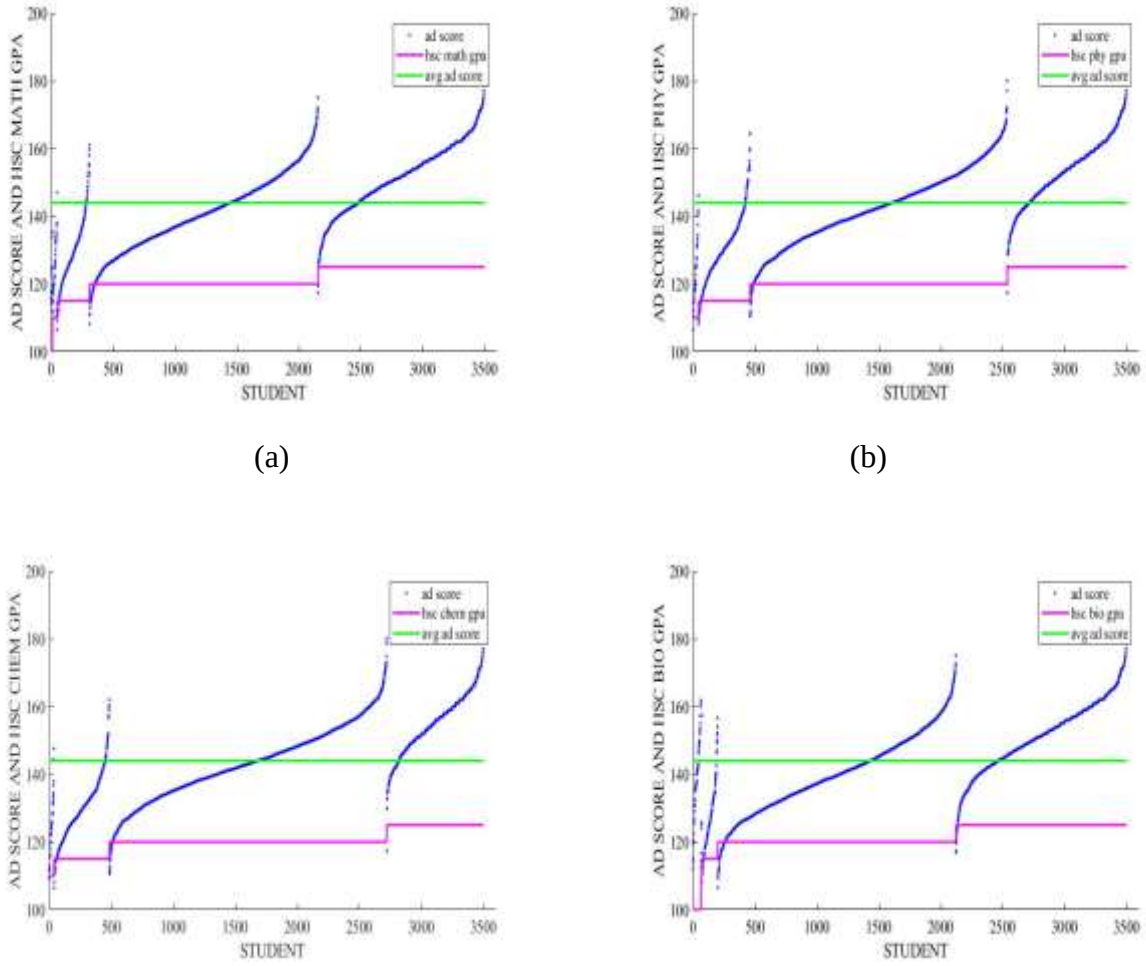


Figure 3.2: Effect of GPA of HSC on admission test result

From the above figure we see that, 529 students got GPA-5 among 3501 students. 494of them secured above average score in admission test result. Other students who got below GPA-5, from them about half of the students scored more than average score. We see significant changes according to the GPA of HSC. Higher the GPA in HSC, higher the admission test score.

- **Impact Of HSC Subject-Wise Results On Admission Result**

After observing the effect of SSC and HSC results on admission score now we will see the effect of HSC subject-wise results on admission score.



(a) (b)

(c) (d)

Figure 3.3: Impact of HSC subject-wise result on admission score.(a) Impact of HSC mathematics. (b) Impact of HSC physics (c) Impact of HSC chemistry (d) Impact of HSC biology.

From the above figure, we come to reach a certain decision that, the GP of math, physics, chemistry and biology are proportional to the admission score of university admission test. In

HSC math 1345students got GP-5 and 1019 of them secured above average marks in admission test result. In physics 964 got GP-5 and 788 of them secured above average marks. In chemistry 781 students got GP-5 and 683 of them secured above average marks. In biology 1379 students got GP-5 and 1037 of them secured above average marks in admission test result. Those who have lower GP in math, physics, chemistry and biology their number are less in good admission scorer list. Those who have higher GP in these subjects majority of them secured more than average marks of admission test score.

3.2.2 Impact Of SSC And HSC Results On GST Admission Test

Here we will see the impact of SSC and HSC results on GST admission score for science unit. We determined different parameters impact on the admission score. There we used about 9419 student's data to determine the impact. The highest GST score is 125.5 and the lowest score is 43.94. The average score is 87.1.

- **Impact analysis for SSC result**

At first we will discuss the impact of SSC result on the GST admission test results.

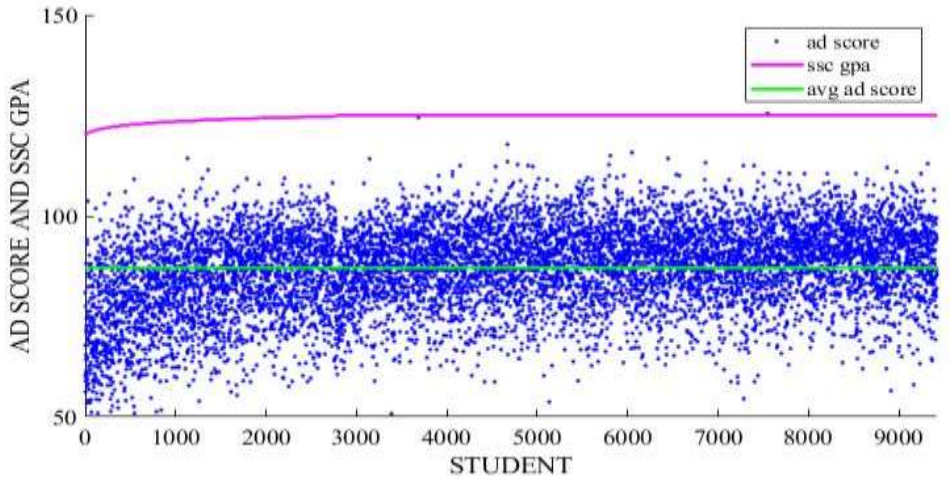


Figure 3.4: Effect of SSC result on GST admission test result

From the above figure, we can see that, from 9419 students 6647 got GPA 5 in SSC examination. From all GPA-5 holders 4298 students secured above average score of GST admission test, which is 64.58% of total GPA 5 participants. From above figure 3.13 we can observe that average admission score is slightly correlated to SSC GPA.

- **Impact Analysis For HSC Result**

Now we check the effect for the HSC result over the admission test result.

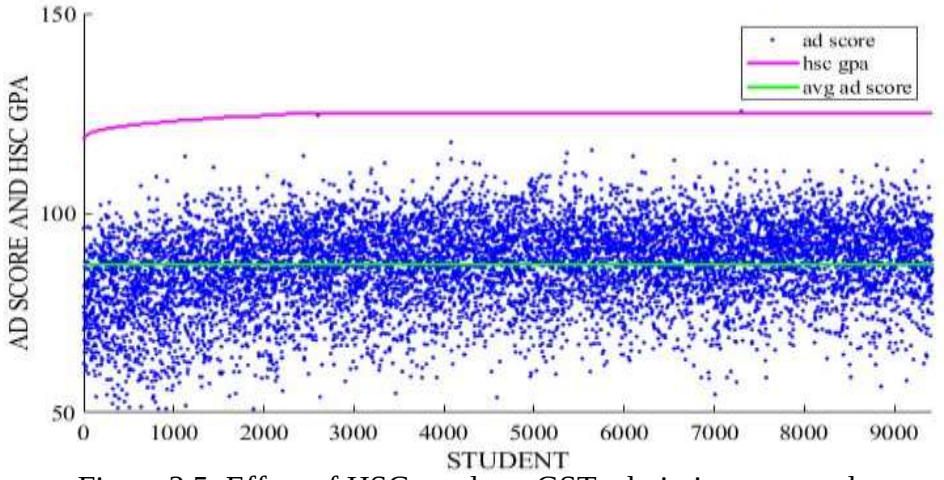


Figure 3.5: Effect of HSC result on GST admission test result

From above figure we can see that, about 7176 students from 9419 got GPA-5 in the HSC examination. But 4293 of them secured above average marks in the GST admission test. In percentage it is 59.82%. They have good possibilities to get admitted themselves into universities. So, it can be said that, HSC result has a good impact on admission score.

- **Impact Analysis For HSC Math Result**

Here we showed the effect of HSC math result on the GST admission test result.

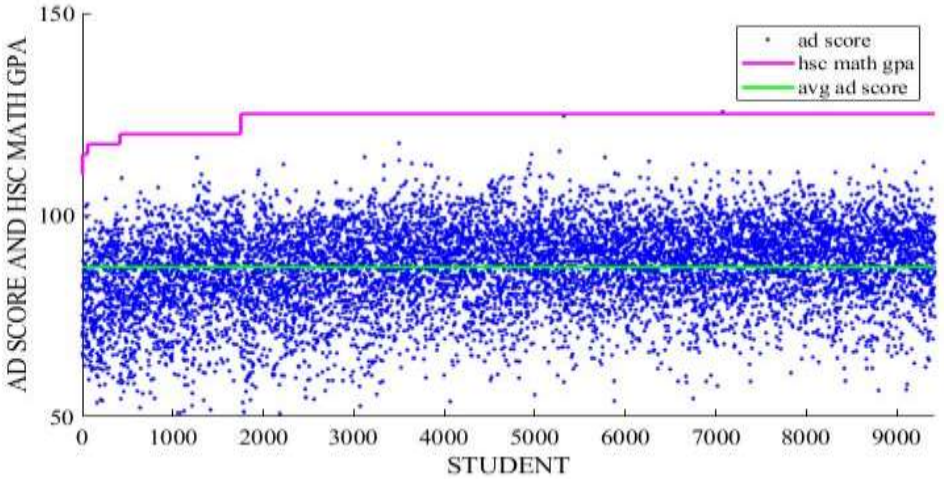


Figure 3.6: Effect of HSC math result on GST admission test result

From above figure we can see that, about 7668 students from 9419 got GPA-5 in the HSC math examination. But 4436 of them secured above average marks in the GST admission test. In percentage it is 57.85%. They have a good possibilities to get admitted themselves into universities. So, it can be said that, HSC result has a good impact on admission score.

- **Impact Analysis For HSC Physics Result**

Here we showed the effect of HSC physics result on GST admission test result.

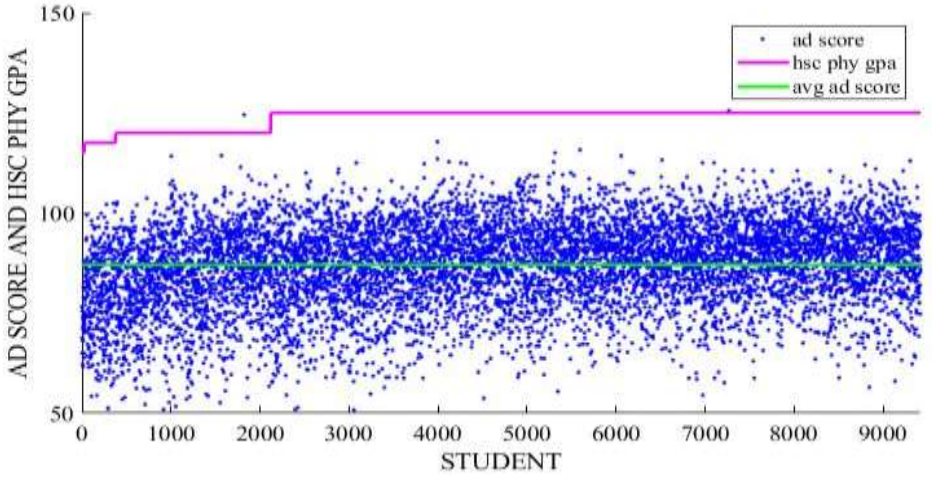


Figure 3.7: Effect of HSC physics result on GST admission test result

From the above figure, we can see that, from 9419 students 7299 got GPA 5 in HSC physics examination. From all GPA-5 holders 4280 students secured above average score of GST admission test, which is 58.63% of total GPA 5 participants. From above figure 3.13 we can observe that average admission score is slightly correlated to HSC physics GPA.

- **Impact Analysis For HSC Chemistry Result**

Here we showed the effect of HSC chemistry result on GST admission test result.

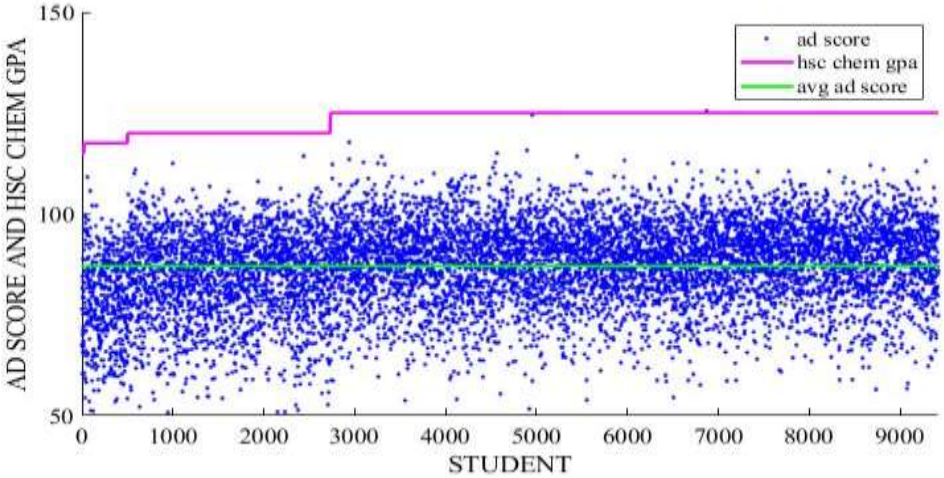


Figure 3.8: Effect of HSC chemistry result on GST admission test result

From the above figure, we can see that, from 9419 students 6688 got GPA 5 in HSC physics examination. From all GPA-5 holders 4003 students secured above average score of GST

admission test, which is 59.85% of total GPA 5 participants. From above figure 3.13 we can observe that average admission score is slightly correlated to HSC physics GPA.

3.3 ANALYSIS OVER HONORS RESULT

In this section first, we do sensitivity analysis over honors result. Sensitivity analysis is a test where it is determined that how output changes according to the changes of input. It is calculated in percentage. Here in this section of our study we will show how honors result changer according to HSC subject-wise GPA changes.

3.3.1 Sensitivity Analysis For Honors Level

Here we will determine sensitivity in three phase. (a) For engineering faculty, (b) For science faculty and (c) For overall students. We will check individual HSC subject-wise sensitivity for honors result.

- **Sensitivity Of Honors Result For Engineering Faculty.**

we will describe here the sensitivity of honors result for engineering faculty's students. In this faculty following departments are listed. Computer science and telecommunication engineering, Applied chemistry and chemical engineering, Information and communication engineering, Applied mathematics. Here we will show HSC subject-wise sensitivity of honors result

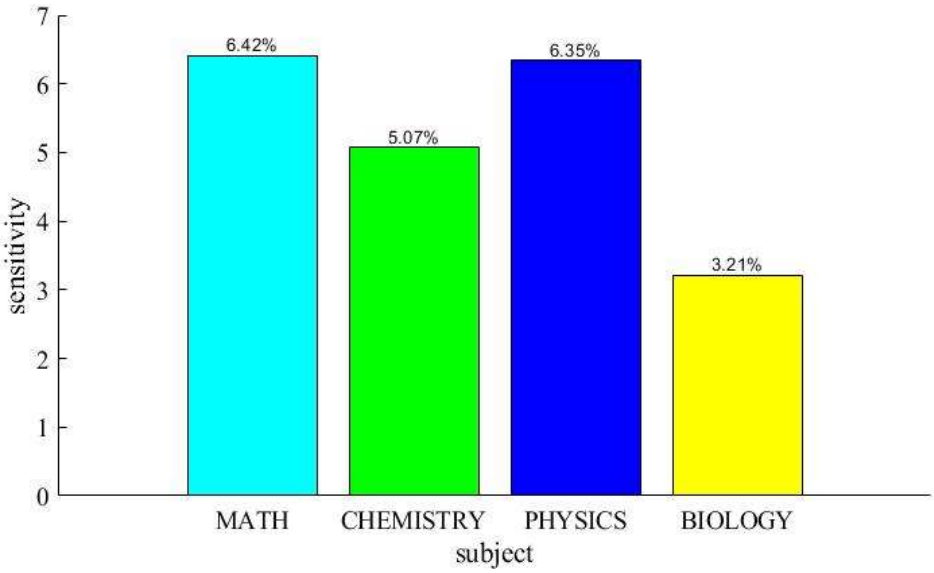


Figure 3.9: Sensitivity of honors result for engineering faculty

Here it is shown that, how the honors result of engineering faculty changes with the changes of HSC math, chemistry, physics and biology result. Sensitivity of math, physics, chemistry and biology over honors result of engineering faculty is successively 6.42%, 6.34%, 5.06% and 3.21%.

Table 3.1: sensitivity table for engineering faculty

Subject	Sensitivity
MATH	6.4154%
CHEMISTRY	5.0697%
PHYSICS	6.3457%
BIOLOGY	3.21%

- **Sensitivity Of Honors Result For Science Faculty.**

We do experiment to find the sensitivity analysis of honors result for science faculty over 347 students. Here all biological departments are included. They are Pharmacy, Fisheries and marine science, Food technology and nutrition science, Microbiology, Environment and disaster management.

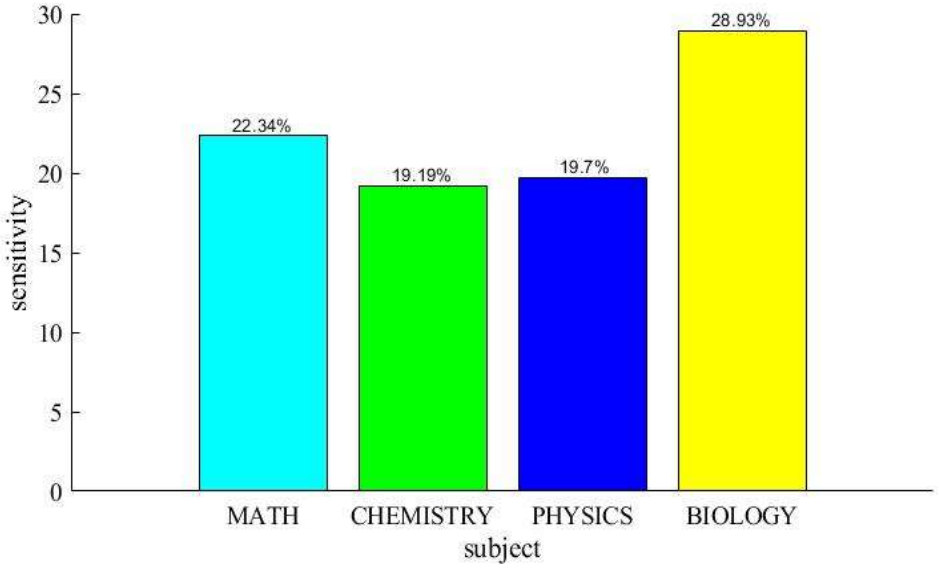


Figure 3.10: Sensitivity of honors result for science faculty

From the above figure we see that, sensitivity of honors result of science faculty is greater with respect to biology. Other math, physics and chemistry have a little bit lower sensitivity than biology. The sensitivity of biology is maximum among them. It is 28.93% and the rest of math, physics and chemistry are successively 22.34%, 19.69%, 19.19%.

Table 3.2: sensitivity table for science faculty

Subject	Sensitivity
MATH	22.34%
CHEMISTRY	19.19%
PHYSICS	19.69%
BIOLOGY	28.93%

From the table we see that, sensitivity of physics and chemistry are quite equal. Biggest of honors result of science faculty is with biology is.

- **Sensitivity Of Honors Result For All Faculty.**

After determining the faculty-wise sensitivity now we will show the sensitivity of honors result for all faculty's students. Here we operate our methodology over 629 students.

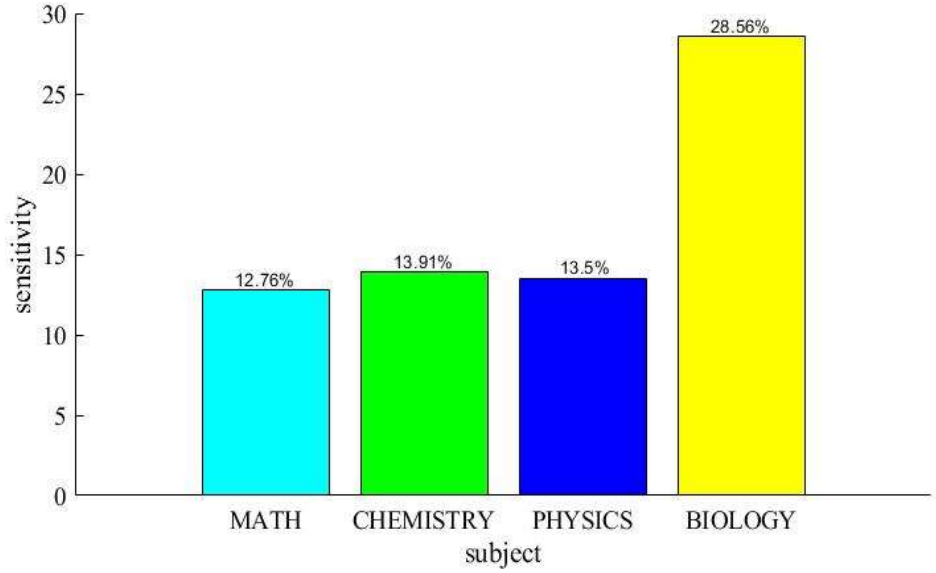


Figure 3.11: Sensitivity of honors result for all faculty

Here we see that, changing rate honors result is high along the result change rate of biology. The sensitivity of biology is 28.56%. Rest of the others are below 15%. The sensitivities of math, physics and chemistry are 12.764%, 13.496% and 13.9144%.

Table 3.3: sensitivity table for all faculty

Subject	Sensitivity
MATH	12.764%
CHEMISTRY	13.9144%
PHYSICS	13.496%
BIOLOGY	28.5616%

From the above table we see the overall scenario of sensitivity of honors result over all faculty's students.

3.4 ANALYSIS OVER MASTER'S RESULT

In this section we will show and explain all types of operation over master's result. Impact analysis over master's result and sensitivity analysis over master's result.

3.4.1 Impact Analysis For Master's Result

We tried to find relationship between SSC, HSC results and Master's result if there is any.

Impact Of SSC GPA On Master's Result

we operate the procedures mentioned in the methodology part over all master's student's results. Here we tried to find out relationship between SSC GPA and master's result if any. SSC result is partially important for taking admission in universities in Bangladesh. So in a word we can say that SSC result helps students to be admitted into universities.

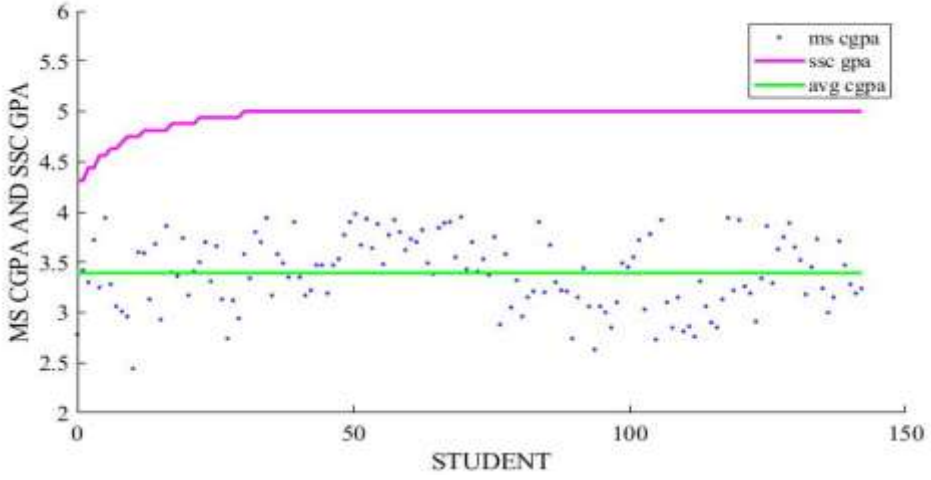


Figure 3.12: Impact of SSC result on master's result

Surprisingly the above figure shows a sound relationship between SSC GPA and master's result. Normally it is not thought. But this research shows something new. Here we can notice that maximum of the students got GPA-5 in the SSC examination. About 75-80% of students secured 3.00 and above master's CGPA. Some students have lower CGPA. This percentage is 20-25%. The average CGPA of master's is 3.49. So it can be said that, SSC GPA has a great impact on the master's result.

- **Impact Of HSC GPA On Master's Result**

Here we showed the impact of HSC GPA on master's result. Here we used different department's students data.

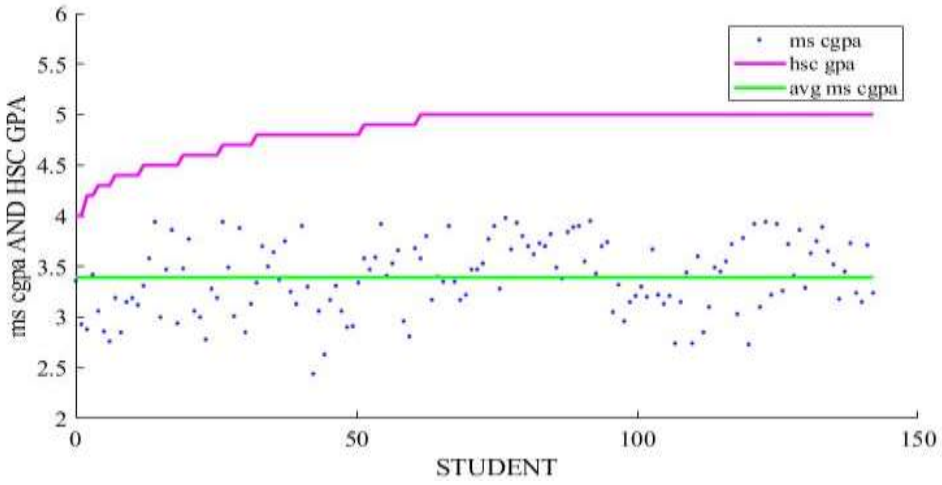


Figure 3.13: Impact of HSC GPA on master's result

Here in the above figure we can see that, master's result is nicely relatable with HSC GPA. About 60% of students secured GPA-5 in the HSC examination and rest of them couldn't. we notice that, about all the students secured above 3.00 CGPA in master's result. The rate of good CGPA is little bit less in case of average GPA holder of HSC examination. Majority of good CGPA holders have highest GPA in HSC examination. So it can be said that HSC GPA has a great impact on master's result.

- **Impact Of HSC Subject-Wise Results On Master's Result.**

Here we showed the impact of HSC subject-wise results on masters result. Here the impact of HSC math, HSC physics, HSC biology and HSC chemistry will be shown in the below.

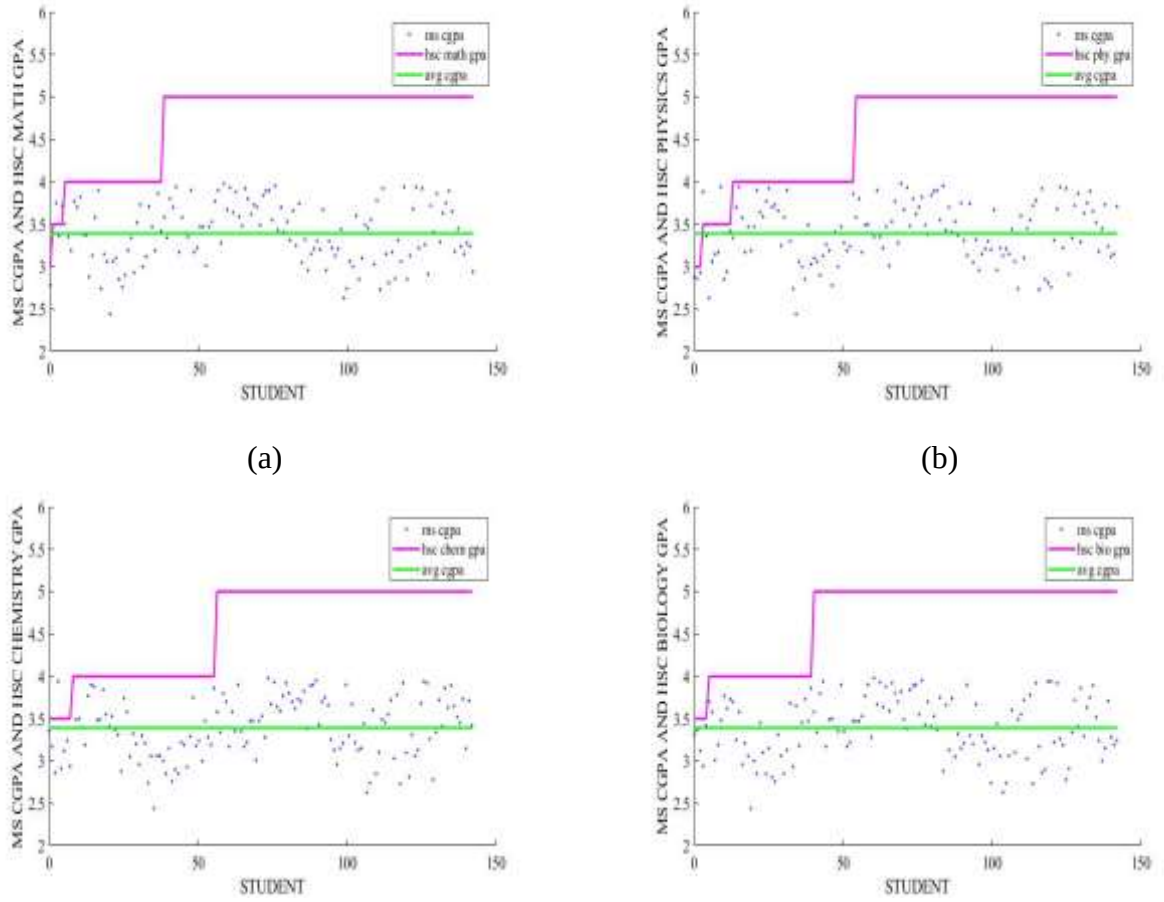


Figure 3.14 : Impact of HSC subject-wise GPA on master's CGPA.(a) Impact of HSC mathematics. (b) Impact of HSC physics (c) Impact of HSC chemistry (d) Impact of HSC biology.

Here the impact of math, physics, chemistry and biology of HSC on the master's result are shown in the above figure. From (a) we see that, those who have highest GPA in HSC math majority of them could secure excellent CGPA in master's. from (b) we see, the density of good CGPA holders are maximum in number who have highest GPA in HSC physics. From(c) we notice that, chemistry of HSC has a great impact on master's result. Maximum of GPA-5 holders secured good CGPA in master's result. From (d) we came to learn that, biology have also a significant influence over master's results. Those who have highest GPA in HSC biology majority of them could secure good CGPA in master's result. Overall we can say that, individually all the subjects from HSC level have significant impact on the master's results. Though it is hard to believe that there is relation between HSC level and master's level but our study shows that there is a sound relationship between them. Some students who didn't secure the highest GPA in the HSC level can also secure the good CGPA in master's level by their continuous hard work. But the statistics shows that, the maximum probabilities for being a good

CGPA holder in master's result one's should have highest GPA in HSC level. So after all it can be told that, individual subjects of HSC have great impact on the CGPA of master's result.

3.4.2 Sensitivity Of Master's Result For All Faculty.

After determining the sensitivity of faculty-wise honors result and overall honors result now our focus is to find the sensitivity of master's result for all faculty. Here we show the subject-wise sensitivity for master's result.

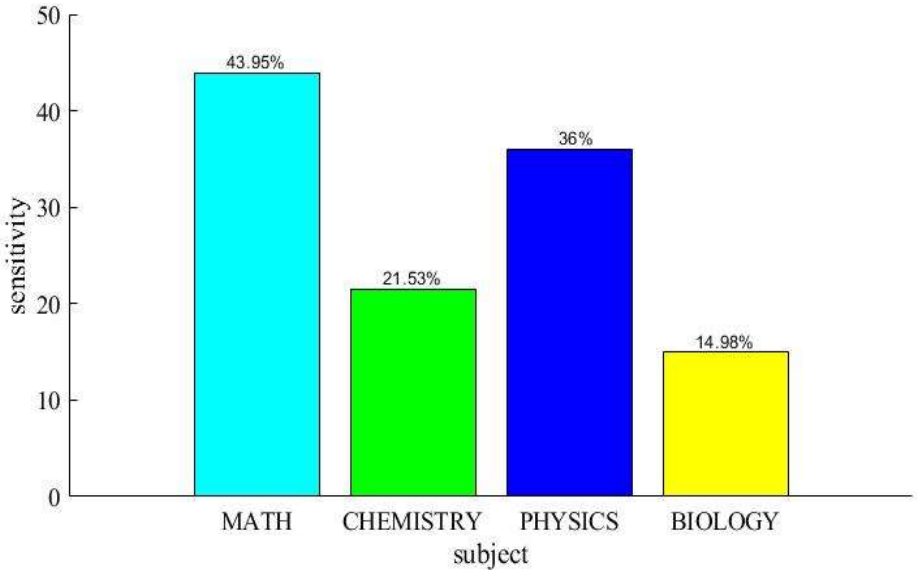


Figure 3.15: Sensitivity of master's result for all faculty

From the above figure we see that sensitivity of master's result is much sensible for the mathematics result. Sensitivity of physics is nearer to Mathematics result. Sensitivity of Chemistry and Biology are somehow nearer.

Table 3.4: sensitivity table for master's result

Subject	Sensitivity
MATH	43.9546%
CHEMISTRY	21.5294%
PHYSICS	35.998%
BIOLOGY	14.9837%

From the above table we can see that, sensitivity of math is 43.95% which is very significant in case of master's result. The second largest sensitivity is 35.99% which belongs to physics over master's result. Rest of the chemistry and biology's sensitivity is 21.53% and 14.98%.

3.5 Discussion:

All the results explained above the whole result can be divided into two category .

- Impact analysis
- Sensitivity analysis

Impact Analysis

In the impact analysis part we determine various parameter's impact on admission test and master's results. As a whole we can fix some issue. Mathematics of HSC has a different types of impact on admission test and master's results. It varies slightly when we measure the impact faculty-wise. But overall mathematics can be told as a vital parameter which has some great significance over university result. Chemistry and Physics have also significant impact on admission test, honors results and master's results. Those who have highest GPA in chemistry and physics, majority of them secured good position in admission test, better CGPA in honors and master's examination. Another great impact is from biology over all the targeted parameters. Surprisingly in engineering faculty, science faculty and the master's results biology kept an important role. Another mater is that those who study in engineering faculty have greater GPA in biology than those who study in science faculty.

Sensitivity Analysis

In the sensitivity analysis part of our study we tried to show how honors result changes according to the changes of individual GPA of HSC group subjects. In this case in engineering faculty sensitivity of math is greater than the others parameters. On the contrary, in science faculty sensitivity of biology is greater than others parameter's sensitivity.

CHAPTER-4

CONCLUSION AND FUTURE SCOPES

4.1 INTRODUCTION

There are numerous analysis can be done in statistical data analysis. Impact analysis and sensitivity analysis are two of them. This procedures or methods are needed in case of feasibility testing. When a big project is going to be run, firstly many factors should be checked. Various analysis could be done for the best output of the project. Impact analysis and sensitivity analysis ensure that how workable the input parameters are. By these analysis we can sure about parameters that how important it is for study.

4.2 CONCLUSION

In our study, we operated all the methods in a single institute. We used its previous students data in case of sensitivity analysis. We added new comer's data to observe the impact. From all the procedures we have done, we get the observation as we assumed. It can be seems valueless before studying. But this study prove that there is very good relationship between previous academic results and university results whatever it is admission test or honors result or master's result. Every previous results have a significance for present future results.

4.3 FUTURE SCOPES

There used only some selected parameters. These operations can be done over various different parameters which are directly connected to an educational institute. With these datasets it could be possible to predict university results based on previous results. With more data and parameters different types of analysis could be done. With data analysis any relation can be shown between two datasets.

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APPENDIX:A

Impact analysis on admisson test

- **For SSC result**

```
clc;
clear all;
Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'ssc_gpa','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.ssc_gpa*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,185])
hold off;
grid on
legend({'ad score','ssc gpa','avg ad score'})
xlabel('STUDENT','fontsize',14)
ylabel('AD SCORE AND SSC GPA','fontsize',14)
grid off
```

- **For HSC result**

```
clc;
clear all;
Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'hsc_gpa','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.hsc_gpa*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,200])
hold off;
grid on
legend({'ad score','hsc gpa','avg ad score'})
```

```
xlabel('STUDENT')
ylabel('AD SCORE AND HSC GPA')
grid off
```

- **For HSC subject-wise**

```
%for math


clc;
clear all;
Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'hsc_math_g','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.hsc_math_g*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,200])
hold off;
grid on
legend({'ad score','hsc math gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC MATH GPA')
grid off
%for physics

Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'hsc_phy_gp','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.hsc_phy_gp*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,200])
hold off;
grid on
legend({'ad score','hsc phy gpa','avg ad score'})
```

```
xlabel('STUDENT')
ylabel('AD SCORE AND HSC PHY GPA')
grid off
%for chemistry

Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'hsc_chem_g','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.hsc_chem_g*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,200])
hold off;
grid on
legend({'ad score','hsc chem gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC CHEM GPA')
grid off
%for biology

Adata = sortrows(Adata,'t_score','ascend');
Adata = sortrows(Adata,'hsc_bio_gp','ascend');
x = linspace(0,3501,3501)
scatter(x,Adata.t_score,'.','b');
hold on;
plot(x,Adata.hsc_bio_gp*5+100,'m','LineWidth',2);
m = mean(Adata.t_score);
disp(m);
hold on;
m1 = linspace(m,m,3501);
plot(x,m1,'g','LineWidth',2);
xlim([0 3600])
ylim([100,200])
hold off;
grid on
legend({'ad score','hsc bio gpa','avg ad score'})
%title('Relation between hsc bio gpa vs ad score of a unit')
xlabel('STUDENT')
ylabel('AD SCORE AND HSC BIO GPA')
grid off
```

APPENDIX: B

Impact analysis for GST admission test

- **For SSC results**

```
clc;
clear all;
agroup = sortrows(agroup,'ssc_gpa','ascend');
x = linspace(0,9419,9419)
scatter(x,agroup.total,'.','b');
hold on;
plot(x,agroup.ssc_gpa*5+100,'m','LineWidth',2);
m = mean(agroup.total);
disp(m);
hold on;
m1 = linspace(m,m,9419);
plot(x,m1,'g','LineWidth',2);
xlim([0 9419])
ylim([50,150])
hold off;
grid on
legend({'ad score','ssc gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND SSC GPA')
grid off
```

- **For HSC results**

```
clc;
clear all;
agroup = sortrows(agroup,'hsc_gpa','ascend');
x = linspace(0,9419,9419)
scatter(x,agroup.total,'.','b');
hold on;
plot(x,agroup.hsc_gpa*5+100,'m','LineWidth',2);
m = mean(agroup.total);
disp(m);
hold on;
m1 = linspace(m,m,9419);
plot(x,m1,'g','LineWidth',2);
xlim([0 9419])
ylim([50,150])
hold off;
grid on
legend({'ad score','hsc gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC GPA')
```

```
grid off
```

- **For HSC subject-wise results**

```
%for math

clc;
clear all;
agroup = sortrows(agroup,'hsc_mat','ascend');
x = linspace(0,9419,9419)
scatter(x,agroup.total,'.','b');
hold on;
plot(x,agroup.hsc_mat*5+100,'m','LineWidth',2);
m = mean(agroup.total);
disp(m);
hold on;
m1 = linspace(m,m,9419);
plot(x,m1,'g','LineWidth',2);
xlim([0 9419])
ylim([50,150])
hold off;
grid on
legend({'ad score','hsc math gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC MATH GPA')
grid off


%for physics

agroup = sortrows(agroup,'hsc_phy','ascend');
x = linspace(0,9419,9419)
scatter(x,agroup.total,'.','b');
hold on;
plot(x,agroup.hsc_phy*5+100,'m','LineWidth',2);
m = mean(agroup.total);
disp(m);
hold on;
m1 = linspace(m,m,9419);
plot(x,m1,'g','LineWidth',2);
xlim([0 9419])
ylim([50,150])
hold off;
grid on
legend({'ad score','hsc phy gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC PHY GPA')
grid off

%for chemistry
```

```
agroup = sortrows(agroup,'hsc_che','ascend');
x = linspace(0,9419,9419)
scatter(x,agroup.total,'.','b');
hold on;
plot(x,agroup.hsc_che*5+100,'m','LineWidth',2);
m = mean(agroup.total);
disp(m);
hold on;
m1 = linspace(m,m,9419);
plot(x,m1,'g','LineWidth',2);
xlim([0 9419])
ylim([50,150])
hold off;
grid on
legend({'ad score','hsc chem gpa','avg ad score'})
xlabel('STUDENT')
ylabel('AD SCORE AND HSC CHEM GPA')
grid off
```

APPENDIX: C

Impact on master's results

- **Impact for SSC results**

```
clc;
 clear all;
msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'ssc_gpa','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b'); hold on;
plot(x,msdata.ssc_gpa,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','ssc gpa','avg cgpa'})
%title('Relation between ssc gpa vs ms cgpa')
xlabel('STUDENT')
ylabel('MS CGPA AND SSC GPA')
grid off;
```

- **Impact for HSC results**

```
clc;
clear all;
msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'hsc_gpa','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b');
hold on;
plot(x,msdata.hsc_gpa,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','hsc gpa','avg ms cgpa'})
%title('Relation between hsc gpa vs ad. merit')
```

```
xlabel('STUDENT')
ylabel('ms cgpa AND HSC GPA')
grid off;
```

- **Impact for HSC subject-wise results**

```
%for math
clc;
clear all;
msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'hsc_math_gp','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b'); hold on;
plot(x,msdata.hsc_math_gp,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','hsc math gpa','avg cgpa'})
%title('Relation between hsc math gpa vs ms cgpa')
xlabel('STUDENT')
ylabel('MS CGPA AND HSC MATH GPA')
grid off;
```

```
%for physics

msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'hsc_phy_gp','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b'); hold on;
plot(x,msdata.hsc_phy_gp,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','hsc phy gpa','avg cgpa'})
%title('Relation between hsc physics gpa vs ms cgpa')
xlabel('STUDENT')
ylabel('MS CGPA AND HSC PHYSICS GPA')
grid off;
```

```
%for chemistry

msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'hsc_chem_gp','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b'); hold on;
plot(x,msdata.hsc_chem_gp,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','hsc chem gpa','avg cgpa'})
%title('Relation between hsc chem gpa vs ms cgpa')
xlabel('STUDENT')
ylabel('MS CGPA AND HSC CHEMISTRY GPA')
grid off;


%for biology

msdata = sortrows(msdata,'Admmerit','ascend');
msdata = sortrows(msdata,'hsc_bio_gp','ascend');
x = linspace(0,142,142)
scatter(x,msdata.ms_cgpa,'.','b'); hold on;
plot(x,msdata.hsc_bio_gp,'m','LineWidth',2);
m = mean(msdata.ms_cgpa);
disp(m);
hold on;
m1 = linspace(m,m,142);
plot(x,m1,'g','LineWidth',2);
xlim([0 150])
ylim([2 6])
hold off;
legend({'ms cgpa','hsc bio gpa','avg cgpa'})
%title('Relation between hsc biology gpa vs ms cgpa')
xlabel('STUDENT')
ylabel('MS CGPA AND HSC BIOLOGY GPA')
grid off;
```

APPPENDIX: D

Sensitivity analysis for engineering faculty

```
clc;
clear all;
Engineering = sortrows(Engineering,'hsc_math_gp','ascend');
a=mean(Engineering.hsc_math_gp(1:3,:));
b=mean(Engineering.hsc_math_gp(4:5,:));
c=mean(Engineering.hsc_math_gp(6:67,:));
d=mean(Engineering.hsc_math_gp(68:282,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(Engineering.hon_cgpa(1:3,:));
i=mean(Engineering.hon_cgpa(4:5,:));
j=mean(Engineering.hon_cgpa(6:67,:));
k=mean(Engineering.hon_cgpa(68:282,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_math =mean([s1,s2,s3]);
display(sensitivity_of_math);
Engineering = sortrows(Engineering,'hsc_chem_gp','ascend');
a=mean(Engineering.hsc_chem_gp(1:3,:));
b=mean(Engineering.hsc_chem_gp(4:115,:));
c=mean(Engineering.hsc_chem_gp(116:282,:));
e = (b-a)*100/a;
display(e);
f = (c-b)*100/b;
display(f);
h=mean(Engineering.hon_cgpa(1:3,:));
display(h);
i=mean(Engineering.hon_cgpa(4:115,:));
display(i);
j=mean(Engineering.hon_cgpa(116:282,:));
display(j);
l = (i-h)*100/h;
m = (j-i)*100/i;
s1=l*100/e;
s2=m*100/f;
sensitivity_of_chem =mean([s1,s2]);
display(sensitivity_of_chem);
Engineering = sortrows(Engineering,'hsc_phy_gp','ascend');
a=mean(Engineering.hsc_phy_gp(1:4,:));
b=mean(Engineering.hsc_phy_gp(5:7,:));
c=mean(Engineering.hsc_phy_gp(8:118,:));
```

```
d=mean(Engineering.hsc_phy_gp(119:282,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(Engineering.hon_cgpa(1:4,:));
i=mean(Engineering.hon_cgpa(5:7,:));
j=mean(Engineering.hon_cgpa(8:118,:));
k=mean(Engineering.hon_cgpa(119:282,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_phy =mean([s1,s2,s3]);
display(sensitivity_of_phy);
Engineering = sortrows(Engineering,'hsc_bio_gp','ascend');
a=mean(Engineering.hsc_bio_gp(1:1,:));
b=mean(Engineering.hsc_bio_gp(2:72,:));
c=mean(Engineering.hsc_bio_gp(73:282,:));
e = (b-a)*100/a;
display(e);
f = (c-b)*100/b;
display(f);
%h=mean(Engineering.hon_cgpa(1:1,:));
i=mean(Engineering.hon_cgpa(2:72,:));
j=mean(Engineering.hon_cgpa(73:282,:));
%l = (i-h)*100/h;
%display(l);
m = (j-i)*100/i;
display(m);
%s1=l*100/e;
%display(s1);
sensitivity_of_bio=m*100/f;
display(sensitivity_of_bio);
%sensitivity_of_bio =mean([s1,s2]);
%display(sensitivity_of_bio);
color = ['c','g','b','y']
label = {'MATH','CHEMISTRY','PHYSICS','BIOLOGY'}
figure, hold on
y=[sensitivity_of_math,sensitivity_of_chem,sensitivity_of_phy,sensitivity_of_bio]
;
for k = 1:length(y)
    h = bar(k,y(k))
    set(h,'FaceColor',color(k))
end
text(1:length(y),y,strcat(num2str(round(y,2)'),'%'),'vert','bottom','horiz','cent
er');
set(gca,'Xtick',1:length(label),'XTickLabel',label)
%title('SENSITIVITY CHART FOR ENGINEERING FACULTY')%
```

```
xlabel('subject')
ylabel('sensitivity')
```

APPENDIX: E

Sensitivity analysis for science faculty

```
clc;
clear all;
lifescience = sortrows(lifescience,'hsc_math_gp','ascend');
a=mean(lifescience.hsc_math_gp(1:1,:));
b=mean(lifescience.hsc_math_gp(2:6,:));
c=mean(lifescience.hsc_math_gp(7:98,:));
d=mean(lifescience.hsc_math_gp(99:347,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(lifescience.hon_cgpa(1:1,:));
i=mean(lifescience.hon_cgpa(2:6,:));
j=mean(lifescience.hon_cgpa(7:98,:));
k=mean(lifescience.hon_cgpa(99:347,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_math =mean([s1,s2,s3]);
display(sensitivity_of_math);
lifescience = sortrows(lifescience,'hsc_chem_gp','ascend');
a=mean(lifescience.hsc_chem_gp(1:3,:));
b=mean(lifescience.hsc_chem_gp(4:9,:));
c=mean(lifescience.hsc_chem_gp(10:157,:));
d=mean(lifescience.hsc_chem_gp(158:347,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(lifescience.hon_cgpa(1:3,:));
i=mean(lifescience.hon_cgpa(4:9,:));
j=mean(lifescience.hon_cgpa(10:157,:));
k=mean(lifescience.hon_cgpa(158:347,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_chem =mean([s1,s2,s3]);
display(sensitivity_of_chem);
lifescience = sortrows(lifescience,'hsc_phy_gp','ascend');
a=mean(lifescience.hsc_phy_gp(1:4,:));
b=mean(lifescience.hsc_phy_gp(5:15,:));
c=mean(lifescience.hsc_phy_gp(16:136,:));
```

```
d=mean(lifescience.hsc_phy_gp(137:347,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(lifescience.hon_cgpa(1:4,:));
i=mean(lifescience.hon_cgpa(5:15,:));
j=mean(lifescience.hon_cgpa(16:136,:));
k=mean(lifescience.hon_cgpa(137:347,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_phy =mean([s1,s2,s3]);
display(sensitivity_of_phy);
lifescience = sortrows(lifescience,'hsc_bio_gp','ascend');
a=mean(lifescience.hsc_bio_gp(1:7,:));
b=mean(lifescience.hsc_bio_gp(8:112,:));
c=mean(lifescience.hsc_bio_gp(113:347,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
h=mean(lifescience.hon_cgpa(1:7,:));
i=mean(lifescience.hon_cgpa(8:112,:));
j=mean(lifescience.hon_cgpa(113:347,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
s1=l*100/e;
s2=m*100/f;
sensitivity_of_bio =mean([s1,s2]);
display(sensitivity_of_bio);
color = ['c','g','b','y']
label = {'MATH','CHEMISTRY','PHYSICS','BIOLOGY'}
figure, hold on
y=[sensitivity_of_math,sensitivity_of_chem,sensitivity_of_phy,sensitivity_of_bio]
;
for k = 1:length(y)
    h = bar(k,y(k))
    set(h,'FaceColor',color(k))
end
text(1:length(y),y,strcat(num2str(round(y,2)'),'%'),'vert','bottom','horiz','cent
er');
set(gca,'Xtick',1:length(label),'XTickLabel',label)
xlabel('subject')
ylabel('sensitivity')
```

APPENDIX: F

Sensitivity analysis for all faculties

```
clc;
clear all;
DataS2 = sortrows(DataS2,'hsc_math_gp','ascend');
a=mean(DataS2.hsc_math_gp(1:4,:));
b=mean(DataS2.hsc_math_gp(5:11,:));
c=mean(DataS2.hsc_math_gp(12:165,:));
d=mean(DataS2.hsc_math_gp(166:629,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(DataS2.hon_cgpa(1:4,:));
i=mean(DataS2.hon_cgpa(5:11,:));
j=mean(DataS2.hon_cgpa(12:165,:));
k=mean(DataS2.hon_cgpa(166:629,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_math =mean([s1,s2,s3]);
display(sensitivity_of_math);
DataS2 = sortrows(DataS2,'hsc_chem_gp','ascend');
a=mean(DataS2.hsc_chem_gp(1:3,:));
b=mean(DataS2.hsc_chem_gp(4:13,:));
c=mean(DataS2.hsc_chem_gp(14:272,:));
d=mean(DataS2.hsc_chem_gp(273:629,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(DataS2.hon_cgpa(1:3,:));
i=mean(DataS2.hon_cgpa(4:13,:));
j=mean(DataS2.hon_cgpa(14:272,:));
k=mean(DataS2.hon_cgpa(273:629,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_chem =mean([s1,s2,s3]);
display(sensitivity_of_chem);
DataS2 = sortrows(DataS2,'hsc_phy_gp','ascend');
a=mean(DataS2.hsc_phy_gp(1:8,:));
b=mean(DataS2.hsc_phy_gp(9:22,:));
c=mean(DataS2.hsc_phy_gp(23:255,:));
```

```
d=mean(DataS2.hsc_phy_gp(256:629,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(DataS2.hon_cgpa(1:8,:));
i=mean(DataS2.hon_cgpa(9:22,:));
j=mean(DataS2.hon_cgpa(23:255,:));
k=mean(DataS2.hon_cgpa(256:629,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_phy =mean([s1,s2,s3]);
display(sensitivity_of_phy);
DataS2 = sortrows(DataS2,'hsc_bio_gp','ascend');
a=mean(DataS2.hsc_bio_gp(1:8,:));
b=mean(DataS2.hsc_bio_gp(9:184,:));
c=mean(DataS2.hsc_bio_gp(185:629,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
h=mean(DataS2.hon_cgpa(1:8,:));
i=mean(DataS2.hon_cgpa(9:184,:));
j=mean(DataS2.hon_cgpa(185:629,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
s1=l*100/e;
s2=m*100/f;
sensitivity_of_bio =mean([s1,s2]);
display(sensitivity_of_bio);
color = ['c','g','b','y']
label = {'MATH','CHEMISTRY','PHYSICS','BIOLOGY'}
figure, hold on
y=[sensitivity_of_math,sensitivity_of_chem,sensitivity_of_phy,sensitivity_of_bio]
;
for k = 1:length(y)
    h = bar(k,y(k))
    set(h,'FaceColor',color(k))
end
text(1:length(y),y,strcat(num2str(round(y,2)'),'%'),'vert','bottom','horiz','cent
er');
set(gca,'Xtick',1:length(label),'XTickLabel',label)
%%title('SENSITIVITY CHART FOR ALL FACULTY')%
xlabel('subject')
ylabel('sensitivity')
```

APPENDIX: G

Sensitivity analysis for master's

```
clc;
clear all;
ms = sortrows(ms,'hsc_math_gp','ascend');
a=mean(ms.hsc_math_gp(1:1,:));
b=mean(ms.hsc_math_gp(2:5,:));
c=mean(ms.hsc_math_gp(6:38,:));
d=mean(ms.hsc_math_gp(39:142,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(ms.ms_cgpa(1:1,:));
i=mean(ms.ms_cgpa(2:5,:));
j=mean(ms.ms_cgpa(6:38,:));
k=mean(ms.ms_cgpa(39:142,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_math =mean([s1,s2,s3]);
display(sensitivity_of_math);
ms = sortrows(ms,'hsc_chem_gp','ascend');
a=mean(ms.hsc_chem_gp(1:8,:));
b=mean(ms.hsc_chem_gp(9:56,:));
c=mean(ms.hsc_chem_gp(57:142,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
h=mean(ms.ms_cgpa(1:8,:));
i=mean(ms.ms_cgpa(9:56,:));
j=mean(ms.ms_cgpa(57:142,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
s1=l*100/e;
s2=m*100/f;
sensitivity_of_chem =mean([s1,s2]);
display(sensitivity_of_chem);
ms = sortrows(ms,'hsc_phy_gp','ascend');
a=mean(ms.hsc_phy_gp(1:3,:));
b=mean(ms.hsc_phy_gp(4:13,:));
c=mean(ms.hsc_phy_gp(14:54,:));
d=mean(ms.hsc_phy_gp(55:142,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
g = (d-c)*100/c;
h=mean(ms.ms_cgpa(1:3,:));
```

```
i=mean(ms.ms_cgpa(4:13,:));
j=mean(ms.ms_cgpa(14:54,:));
k=mean(ms.ms_cgpa(55:142,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
n = (k-j)*100/j;
s1=l*100/e;
s2=m*100/f;
s3=n*100/g;
sensitivity_of_phy =mean([s1,s2,s3]);
display(sensitivity_of_phy);
ms = sortrows(ms,'hsc_bio_gp','ascend');
a=mean(ms.hsc_bio_gp(1:5,:));
b=mean(ms.hsc_bio_gp(6:40,:));
c=mean(ms.hsc_bio_gp(41:142,:));
e = (b-a)*100/a;
f = (c-b)*100/b;
h=mean(ms.ms_cgpa(1:5,:));
i=mean(ms.ms_cgpa(6:40,:));
j=mean(ms.ms_cgpa(41:142,:));
l = (i-h)*100/h;
m = (j-i)*100/i;
s1=l*100/e;
s2=m*100/f;
sensitivity_of_bio =mean([s1,s2]);
display(sensitivity_of_bio);
color = ['c','g','b','y']
label = {'MATH','CHEMISTRY','PHYSICS','BIOLOGY'}
figure, hold on
y=[sensitivity_of_math,sensitivity_of_chem,sensitivity_of_phy,sensitivity_of_bio]
;
for k = 1:length(y)
    h = bar(k,y(k))
    set(h,'FaceColor',color(k))
end
text(1:length(y),y,strcat(num2str(round(y,2)'),'%'),'vert','bottom','horiz','cent
er');
set(gca,'Xtick',1:length(label),'XTickLabel',label)
%title('SENSITIVITY CHART OF MS FOR ALL FACULTY')%
xlabel('subject')
ylabel('sensitivity')
```