QEC Teacher Data Visualization and Prediction

by

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im|sciences

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QEC Teacher Data Visualization and Prediction

This final year project is submitted in partial fulfillment of requirements for the degree of
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QEC Teacher Data Visualization and Prediction

it is to be certified that we have studied this final year Project submitted by you in very details.Now we conclude that this Project full fill all the standards to give acceptance by Institute of Management Sciences for the award of degree of BS Software Engineering

External Examiner 1

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    Designation: _____

    Institute: _____

External Examiner 2

    Signature: _____

    Name: _____

    Designation: _____

    Institute: _____

Internal Examiner

    Signature: _____

    Name: _____

    Designation: _____

    Institute: _____

I want to dedicate this work of mine to my Parents who were always there for me, My family who have always supported me, My friends to motivate me, and My repected teachers who always helped me in mya academics.

Acknowledgements

For the sake of Allah Almighty, the most Merciful, Gracious and Compassionate. His endowments and approvals empowered me to achieve this assignment. I am grateful to my folks who helped me in my thick and thin, I might want to thank all my relatives and companions for supporting me in my life. Toward the end I need to say thanks to Dr. Tamleek Ali who helped me a great deal and empowered me with respect to every last phase of my last year venture.

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Chapter 1

Introduction

We consider this era as information era but if we consider it truly then we canâĂŹt call it as information era. Actually it is data age. Every day tone of data is collected and stored. These data are very in few cases converted into efficient information. One of the efficient way to convert this data is by visualizing it. This can be further be utilized by making future precise prediction on the basis of previous data collected.

1.1 Why Python?

Python is the most trending language these days around the globe. Many big firms prefer python over other tools as its simple to use and has huge base of libraries developed and updated regularly. Libraries in python are very much helpful for the scope of this project.

1.2 Scope

The software will be implemented within institute. As the QEC data is confidential making it accessible only to management. The ERP department will share some basic data with us. Using that data, we will make the whole model.

1.3 Problem Statement

The problem with current viewing system is that its very much difficult and time consuming. Currently the QEC data is in a raw form/tabular form which is not as useful as it should be. Also a data in visualized form is much easier to extract information compared to data in raw form. Thus increasing the efficiency and increasing chances of identifying the problem.

1.4   Chapter Summary

In this part of report or chapter we have discuss some basics about the project. We have discussed The scope of the project. In addition we have discuss what is the problem which have to be solved with the help of our application.

Chapter 2

Background Theory

I have done a deep background analysis for this project. Currently all the record of evaluation is in tabular form, which is quiet time consuming and difficult to analyze. I am going to provide them with a spectacular application which will do all that analysis and give them clear cut information in visual forms.

2.1 Functional Requirements

Functional requirements describes the functionality on the basis of which this application has been developed, these are functional features users can have while using this application.

2.1.1 User Log-in

Administrator will have to authenticate himself before accessing this application as it is must because of the data which is confidential..

2.1.2 Menu/Home Screen

After log in administrator will have access to a dashboard which will consists of different visualizations as well as some predictions.

2.1.3 User Profile

Administrator can view his profile as well as edit it.

Name of Admin
Department
Email
Phone Number

2.1.4 Registration

An administrator must register before using the service. He will have to fill all the required fields for registration.

2.1.5 Visualize record

Administrator will be able to visualize teachers record in a specific way he wants.

2.1.6 Predict

Administrator will be able to predict teachers future performance.

2.1.7 Log out

When administrator clicks on the logout button he will be taken back to login page which will immediatly stop all his services.

2.2 Non-Functional Requirements

The software should be secure.
Unconcerned person should not be able to access the data.
The prediction should be made on all previous records.
While making prediction all uncertainties should be considered such as illness.
The software should also consider subjectâĂŹs difficulty level as a factor.
Easy to use.
Reliability.
Better Responsiveness.

2.3   Proposed Languages

We have a lot of languages related to this project but my choice is python as its simple and easy to use. Plus Python has huge base of libraries which were help full for my project.

Also i have used some wob languages for front end these include HTML, PHP and CSS.

2.4   Proposed Development Software

For development purpose i mainly used Pycharm as it was best option for python development.

2.5   Chapter Summary

In this Chapter i gave some Background knowledge. Additionally requirements were collected both functional and nonfunctional. All the technologies to be used were also discussed in this chapter.

Chapter 3

System Architecture and Design

In this chapter that is System Architecture and Design i have defined some of the Use cases, Use case diagrams as well as some expended use case. I have also defined some sequence diagrams.
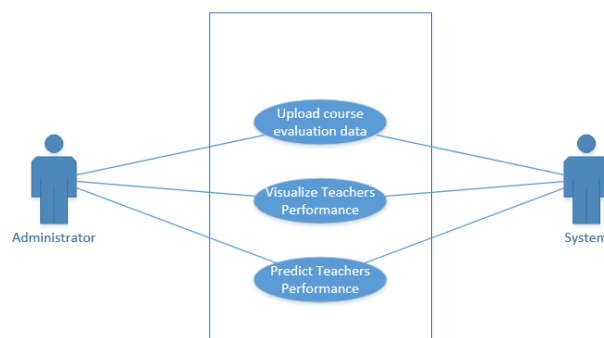

Figure 3.1: Use Case Diagram

3.1 Expanded Use Cases

Use Case UC1: Log-in

UC1	
Name	Log-in
Actors	User.
Purpose	To Authenticate user.
Description	On opening the appliaction user will be shown the login screen. User will have to enter, their username and password in order to use the application
Cross Reference	None
Pre-Conditions	User must be registered
Successful Post Conditions	User Successfully Logged in.
Failure Post-Conditions	Access to user was denied.

Use Case UC2: View Teachers Performance

UC2		
Name	View Teachers performance	
Actors	User.	
Purpose	to check performance of a teacher.	
Description	Administrator opens the system and he select a teacher to view his record or performance.	
Cross Reference	None	
Pre-Conditions	The administrator must be registerd. The teacher must be evaluated by students before.	
Successful Post Conditions	Teachers evaluation record was	viewed.
Failure Post-Conditions	Teachers record or performnece not viewed.	

Use Case UC3: Predict Teachers Performance

UC3	
Name	Predict teachers performance
Actors	Administrator
Purpose	To predict teachers performance in current or next semester
Description	Administrator opens the system and he select teacher to predict his performance. System displays his performance.
Cross Reference	None
Pre-Conditions	Teacher must be evaluated before by students.
Successfully Post Conditions	Teachers performance was predicted.

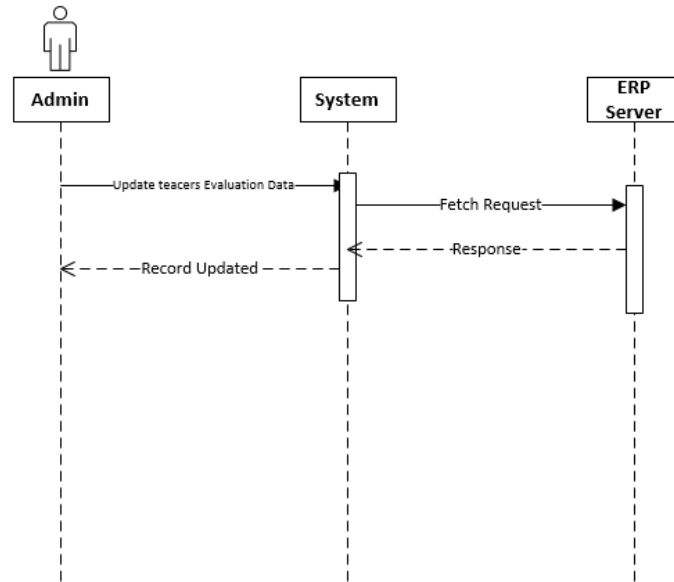## 3.2   System Design Sequence Diagram

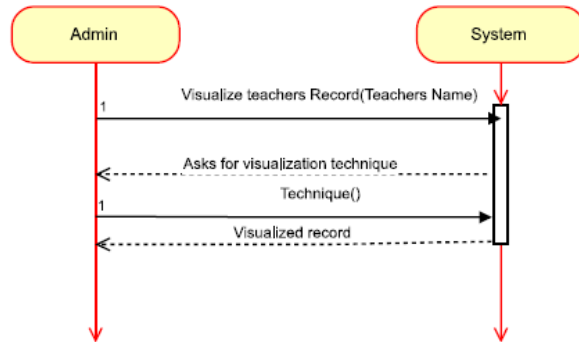Figure 3.2: SSD Update records

Figure 3.3: SSD Visualize records
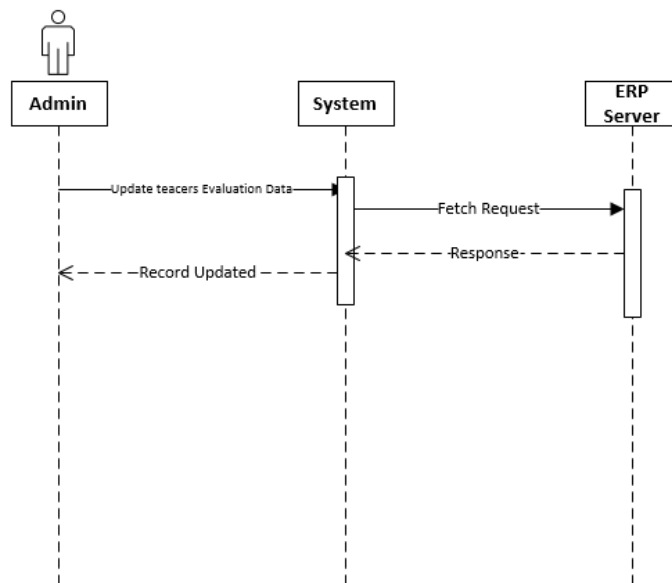
Figure 3.4: SSD Update records

3.3   Data Flow Diagram (DFD)

These are my data flow diagrams. I have only designed only 2 level of DFD as my project was almost covered in these 2 levels. These data flow diagrams shows the main data flow between various components of my project.
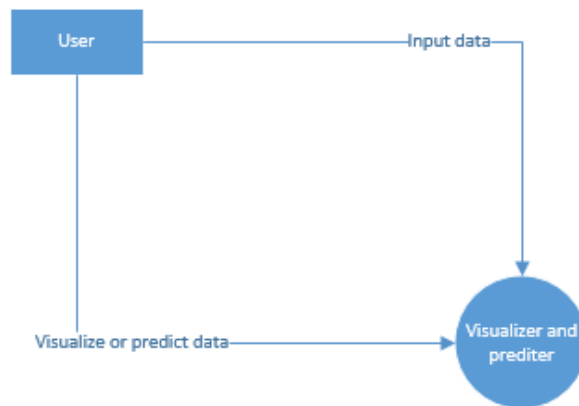
Figure 3.5: Data Flow Diagram Level 0
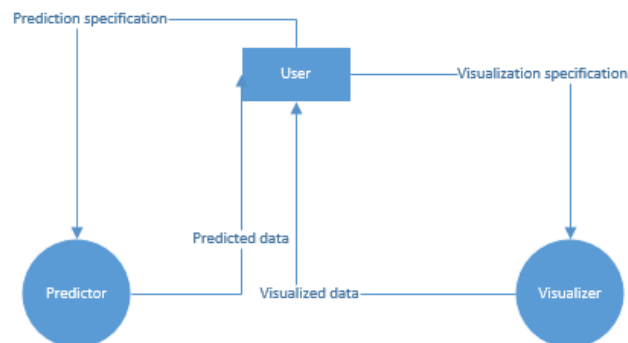
Figure 3.6: Data Flow Diagram Level 1

3.4   Chapter summary

In this chapter i gave details of all the working i had done related to system architectures and designing. Use cases were discussed as well as sequence diagrams.

Chapter 4

Implementation

In this chapter i had noted and highlighted all the implementations done. Here all the screen shots are given along with minute details.

4.1   Screen Shots

Log-in Screen.
Home Screen.
User Profile.
Visualization Forms.
Real Visualizations.

Figure 4.1: Log-in Screen

This is the first screen a user will see here he will have to enter his username and password in order to log in himself.
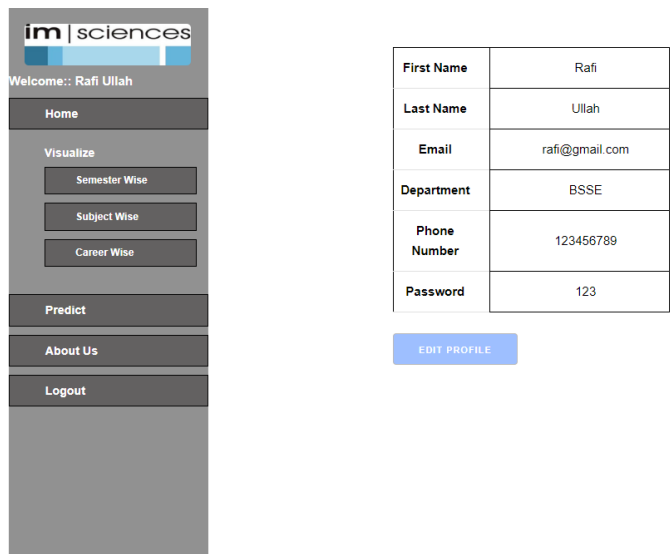
Figure 4.2: Registration

If a user is not registered he will register himself through this section. He will have to enter his Email, Password, Department, Contact number for registration.
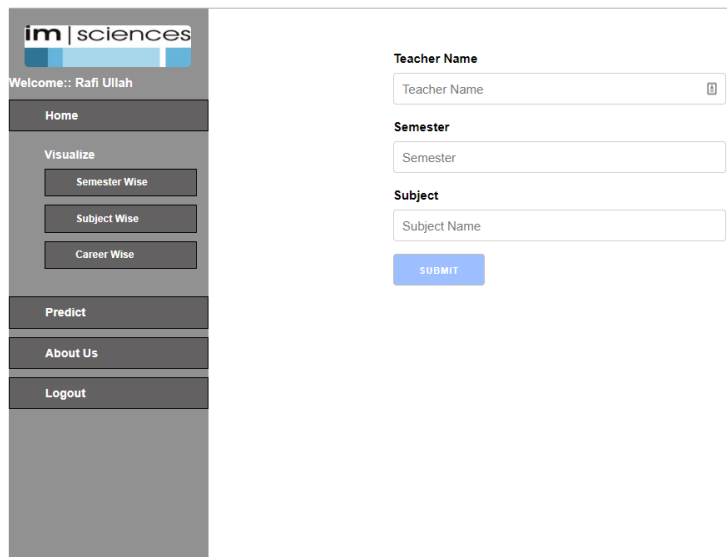
Figure 4.3: User Profile

A user can view his profile information. In this section he will have an option to edit it too.

Figure 4.4: Subject wise Visualization Form

A user can view visualization subject wise for this he is require to enter subject name, Teacher name and semester for that.

Figure 4.5: Semester wise visualization form

A user can also view an entire semester visualization. For that he is required to enter teacher name and semester name.

Figure 4.6: Career wise visualization form

A user can also view a teachers career performance. He just have to enter the teachers name.
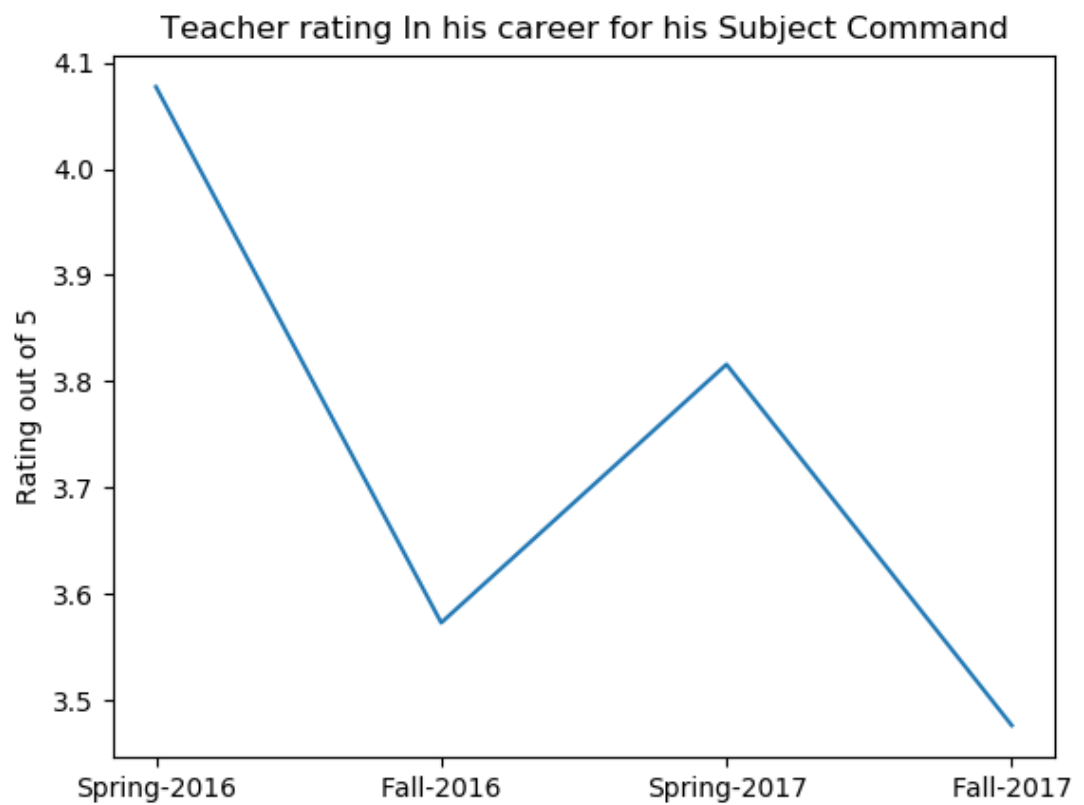
Figure 4.7: Teachers performance throughout his career with regard to subject taught categorized to his subject command
This is a teachers performance throughout his career for the subjects he taught categorized to his subject command.
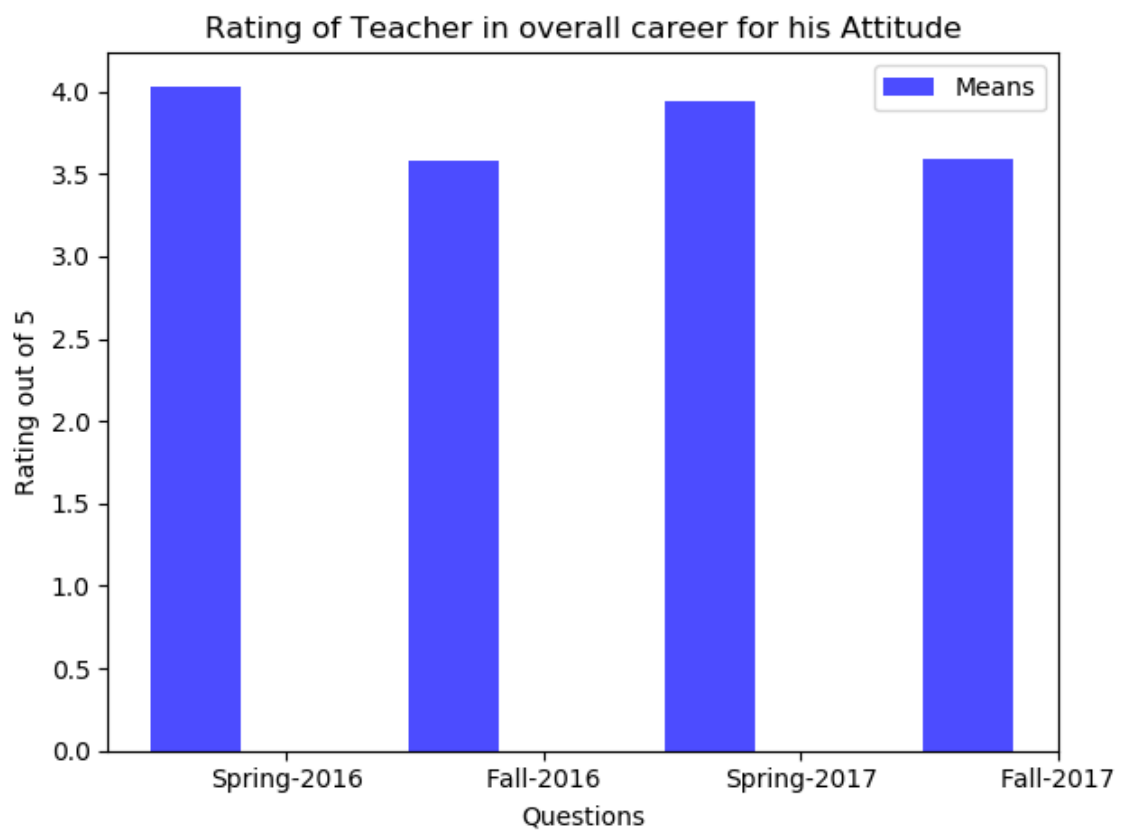
Figure 4.8: Teachers performance for category of his attitude towards students in his career
This is teachers performance for category of his career categorized to his attitude towards students.
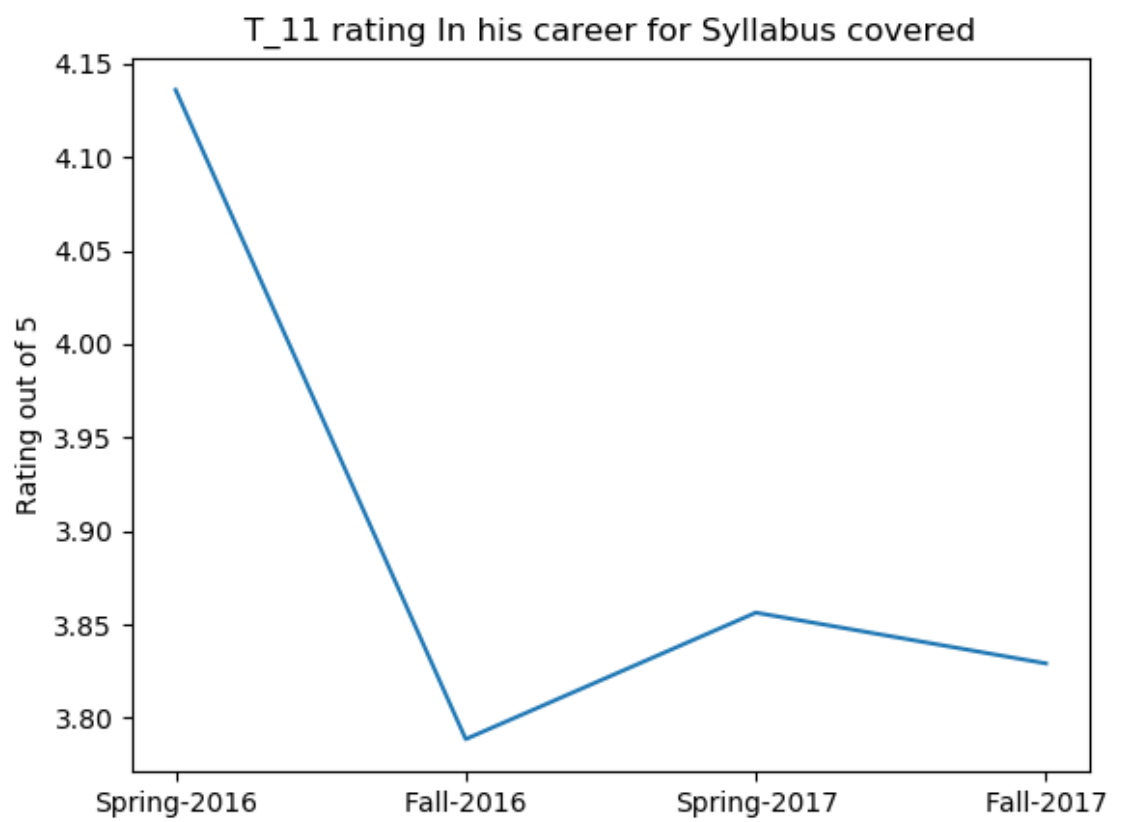
Figure 4.9: syllabus covered by teacher in his career
This visualization is for teachers career categorized for the syllabus he covered.
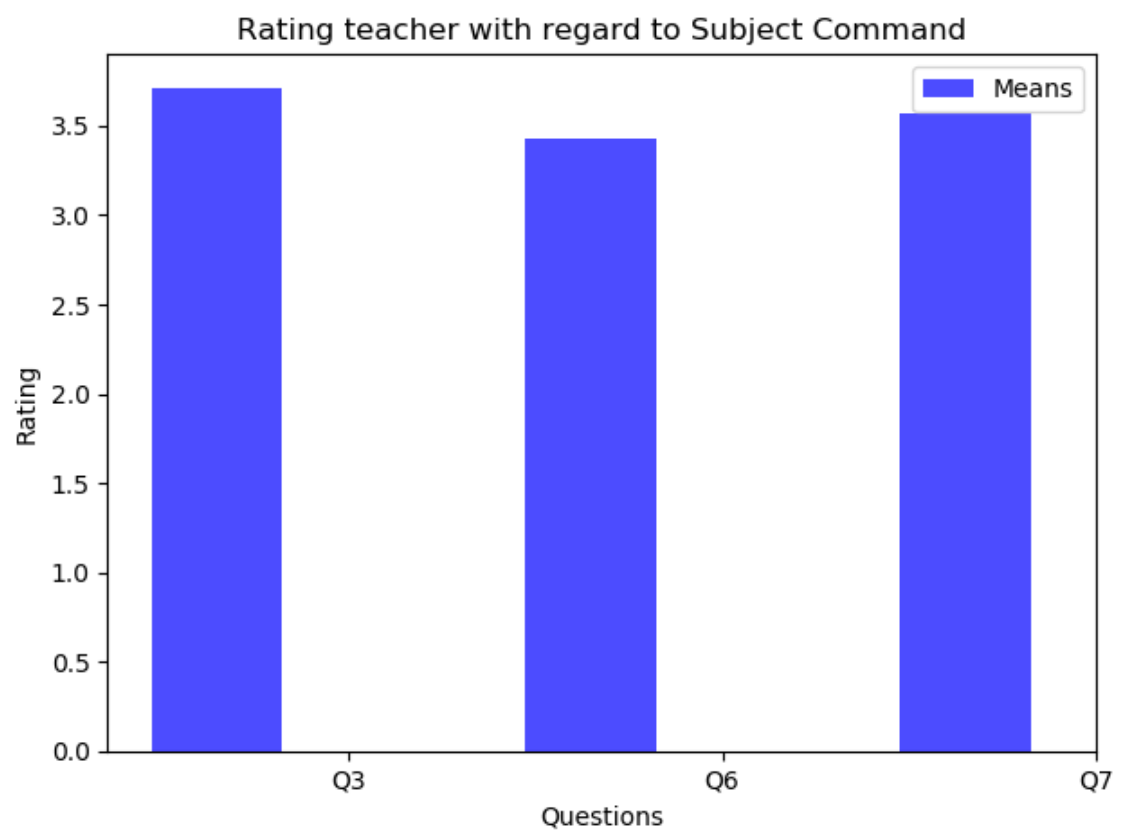
Figure 4.10: Command on subject the teacher had throughout his career
This visualization is for teachers career for the subject command teacher has.
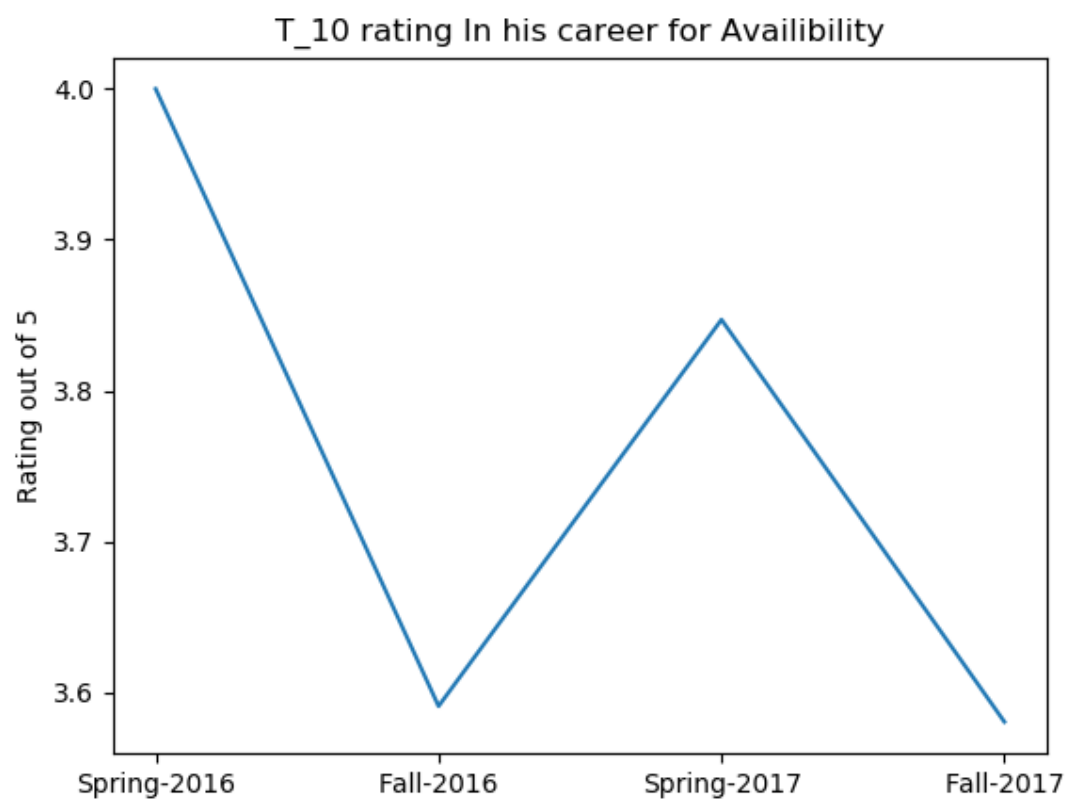
Figure 4.11: Teachers availability in campus throughout their career
This is for the teachers availability in campus for through out his career.
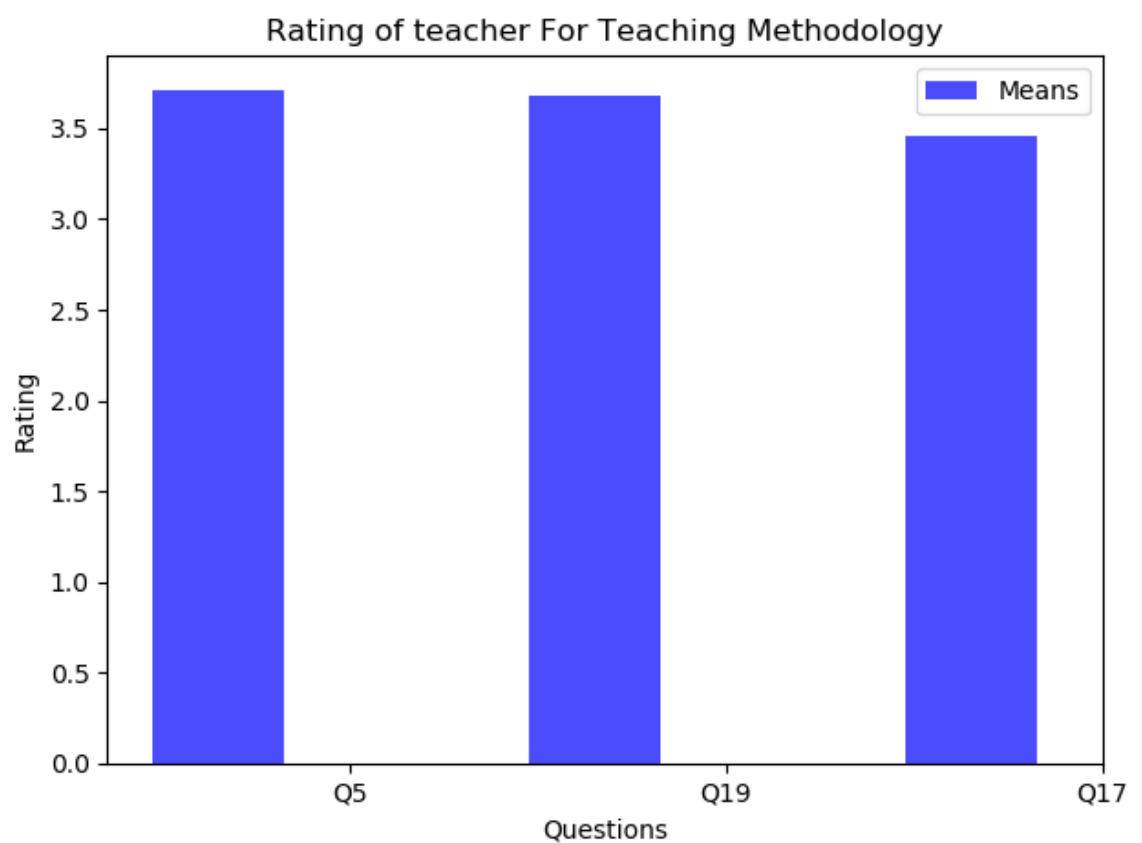
Figure 4.12: Teachers methodology used to teach a subject
This visualization highlights the teaching methodology of a teacher for their entire career.
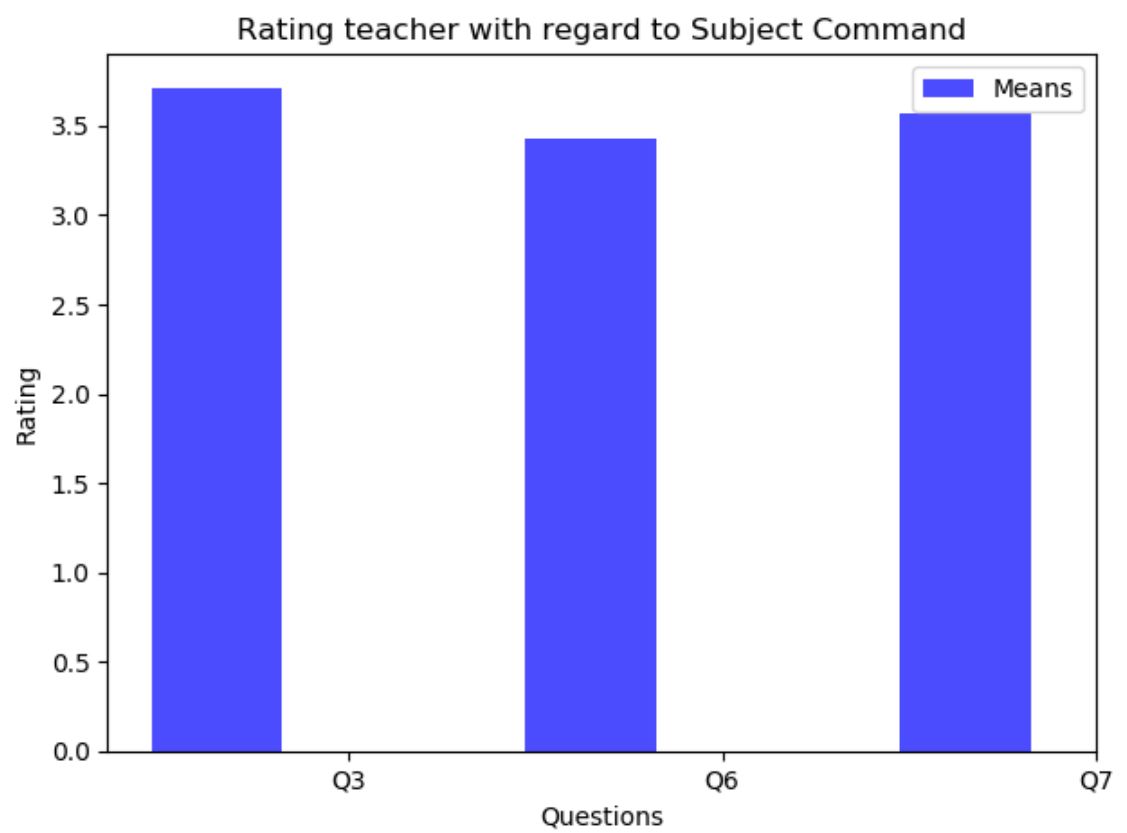
Figure 4.13: The command teacher had on a subject

The command a teacher has on his subject for a single subject only.
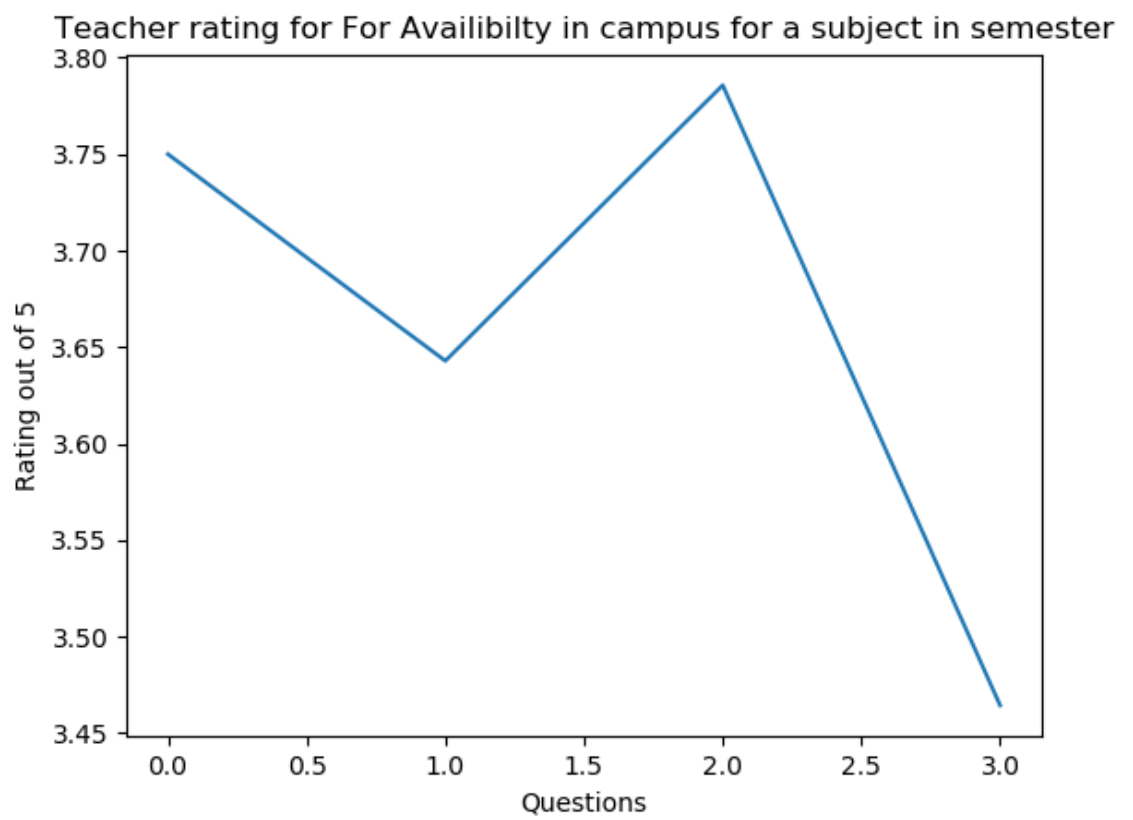
Figure 4.14: The time teacher was available for a subject

This is the availability of a teacher in campus for a subject only.
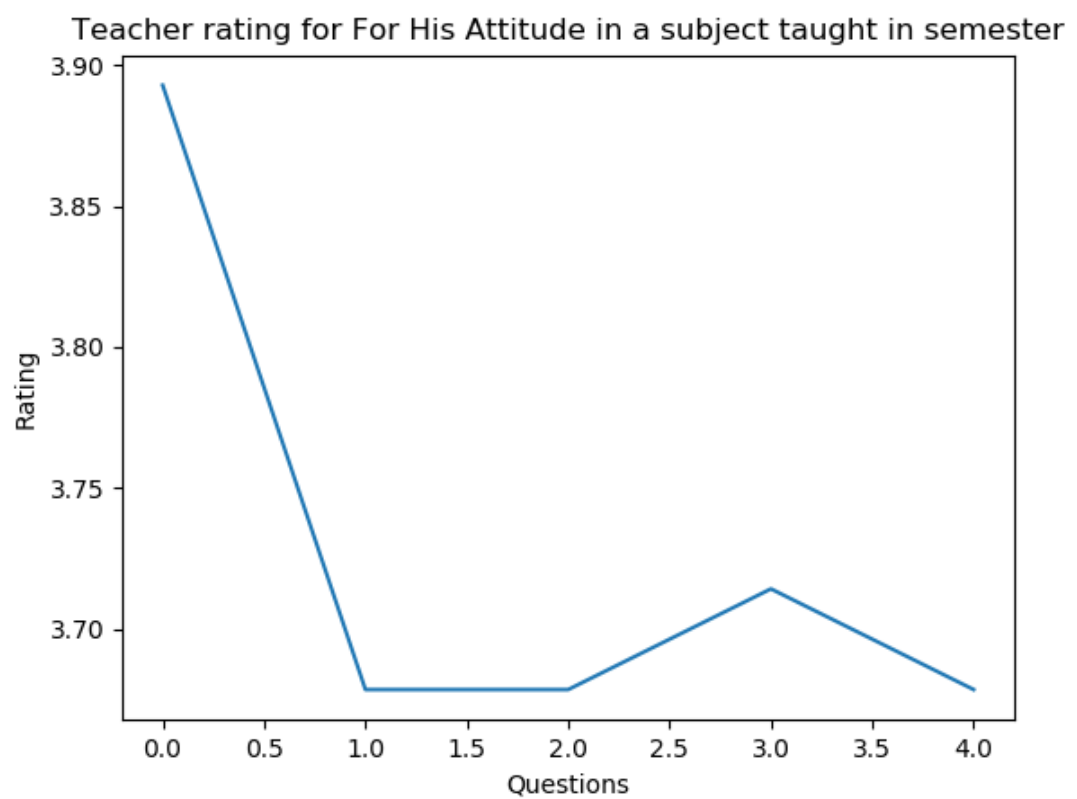
Figure 4.15: Teachers attitude for subject he taught

This is for the teachers attitude towards a student in a particular subject.

4.2   Chapter summary

As i can conclude this chapter with this sort note. In this chapter all the screen shots related to implementation were highlighted. Screen shots related to visualizations which are from back end and that related to website which is our front end were highlighted.

Chapter 5

Project Components and tools

This project was developed in different components consisting of many languages. For the back end we used Python with support of its libraries such as matplotlib, Pandas and numpy. For the front end we developed a web based interface using HTML, CSS and PHP.

5.1   Python

Python is the most trending language these days with a high demand. Every one wants their applications to be developed in python as well as every developer try to develop it in python if they can. There are many reasons behind this hype. Python is a language which has easy syntax which make it easy for developers to learn. In return these easy syntax helps alot in testing and debugging which become quite easy.Also Python has a huge number of libraries updated and developed regularly. These libraries are accessible easily and can be used with little effort. The benefit of these libraries is that it reduces our line of code. Which reduces our precious time. In this project I have used different libraries but the main task was done through the following: MatPlotLib, NumPy, Pandas.

In this project python along with its libraries was used to produce different visualizations. We visualized the data semester wise then semester wise a subject and finally for a teacher career wise. Further we predicted teachers performance for the next semester.

We all the visualizations were also performed for different categories as follow.
Availability and fairness
Subject Command
Syllabus
Teaching Methodology
Attitude
Course

These categories were used for semester wise visualization, subject wise visualization career wise visualization as well as for the prediction.

5.1.1 Pandas

Term pandas is derived from two differnt words combination panl data. Pandas is a software library written for python which provides easy data manipulation and analysis. Python is good for various data structures and time series. Pandas uses dataframes for data manpulation which is very much easy to use. In this project i have derived my data into data frames and then further applied different operations on it.

5.1.2 NumPy

Numpy or we can call it numeric python is a software programming library for Python. Numpy is best for applying complicated numeric operations on multidimensional arrays. These operations when done throgh regular programing will be very much tough and time consuming but with numpy it becomes very much easy. In this project i have used its methods such as mean and average to analyze my data.

5.1.3 MatPlotLib

Matplot lib is a python library for 2d plotting. It is hugely compared with matlab but are not always the same. It has many different type of visualizations such as line plot,bar plot, Histograms scatter and many more. These plots can be easily used with just a few line of codes.

5.2 HTML

HTML is a web based language which is supported by all the browsers. It can be abbreviated as hyper text markup language. HTML is a tag based language. Developers develop webpages by using different tags. Html program is stored in .html extention file. HTML is executed on the browser and it dosent require to be sent to server for execution.

Here are some examples of tags <img /> <input />

A typical HTML page consists of similar body coding

<!DOCTYPE html>

```
<html>
<head>
<title>This is a title</title>
</head>
<body>
<p>Hello world!</p>
</body>
</html>
```

5.3   CSS

CSS is abbreviated as Cascading style sheet is a styling language used to enhance html scripts. it can be stored in separate file saved with .css extension as well as using in line coding. Overall css reduces the line of codes thus making our pages more quick and efficient.

5.4   PHP

PHP is a server scripting language. PHP is easy to learn as it resmbles alot to c and c++. So programmers can learn it very much easily.

Chapter 6

Software Testing

In programming software testing is considered as an integral part of development. A considerable time should be devoted to testing phase in order to insure a smooth and steady delivery of the final product. Testing involve many different phases and methodologies. We have testing for inputs as well as outputs. All the corresponding values are required to be according to the requirement specified before in requirement document as well as according to standards. Testing I done with two approaches known as black box testing and white box testing. Our focus will be mainly on black box testing as well as we have some unit tests. As our product was developed in components as after its integration we have also performed integration testing.

6.1 Black Box

In black box testing we have performed with different test cases. We have test cases with correct input , in correct inputs, some out of bound inputs, high boundry values low boundry values. We then checked these inputs with their corresponding outputs and their expected outputs.

6.1.1 Log-in Test Case

For log in testing we had test case in which we provided input with wrong user name and password and checked the result or reaction. In another test case we had correct user name and password and checked the result. I the third test case we had correct user name but incorrect password and then we checked the result. In the last test case we had incorrect user name and correct password and then we checked the results.

Result: Pass

6.1.2 Registration

User enters all the required fields that were necessary for registration to the system.

Result: Pass

6.1.3 Teachers semester wise visualization

In this we prepared a test case where we had teachers name and the semester he thought for all his subjects in that semester. We had derived a statistical chart derived manually by an expert statistician and checked it in accordance to the result of the application and that of the expert.

Result: Pass

6.1.4 Teachers subject wise visualization.

For this too we took help of an expert statistician. We had a test case developed for the teacher with a specific subject taught in a particular semester. We then gave the similar data to statistician and acquired his version. As a final touch we compared both versions.

Result: Pass

6.1.5 Teachers career wise visualization.

A graph of similar nature was with similar input data was prepared manually. The on the application same requirements were given and the result was compared with the manual one.

Result: Pass

6.1.6 Predict performance

The teacher prediction was derived through application then manually similar techniques were used to formulate the prediction. Both were compared.

Result: Pass

6.1.7 Category wise testing

The teacher prediction for categories was derived through application then manually similar techniques were used to formulate the prediction. Both were compared.

Result: Pass

6.1.8 Category: Attitude for semester testing

A teacher data for his attitude towards all students for all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.9 Category: Attitude for subject testing

A teacher data for his attitude towards all students in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.10 Category: Attitude for Career testing

A teacher data for his attitude towards all students in his career were derived manually and through application then both were compared

Result: Pass

6.1.11 Category: Attitude for Prediction

A teacher data for his performance prediction in next semester for the category of his attitude towards students was derived both manually and through application and were then compared.

Result: Pass

6.1.12 Category: Availability and Fairness for semester testing

A teacher data for his Availability and Fairness towards all students for all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.13 Category: Availability and Fairness for subject testing

A teacher data for his Availability and Fairness towards all students in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.14 Category: Availability and Fairness for Career testing

A teacher data for his Availability and Fairness towards all students in his career were derived manually and through application then both were compared

Result: Pass

6.1.15 Category: Availability and Fairness for Prediction

A teacher data for his performance prediction in next semester for the category of his Availability and Fairness towards students was derived both manually and through application and were then compared.

Result: Pass

6.1.16 Category: Syllabus for semester testing

A teacher data for Syllabus covered in all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.17 Category: Syllabus for subject testing

A teacher data for Syllabus covered in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.18 Category: Syllabus for Career testing

A teacher data for Syllabus covered in his career were derived manually and through application then both were compared

Result: Pass

6.1.19 Category: Syllabus for Prediction

A teacher data for his performance prediction in next semester for the category of Syllabus covered was derived both manually and through application and were then compared.

Result: Pass

6.1.20 Category: Subject Command for semester testing

A teacher data for his Subject Command for all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.21 Category: Subject Command for subject testing

A teacher data for his Subject Command in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.22 Category: Subject Command for Career testing

A teacher data for his Subject Command in his career were derived manually and through application then both were compared

Result: Pass

6.1.23 Category: Subject Command for Prediction

A teacher data for his performance prediction in next semester for the category of his Subject Command was derived both manually and through application and were then compared.

Result: Pass

6.1.24 Category: Teaching methodology for semester testing

A teacher data for his Teaching methodology for all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.25 Category: Teaching methodology for subject testing

A teacher data for his Teaching methodology in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.26 Category: Teaching methodology for Career testing

A teacher data for his Teaching methodology in his career were derived manually and through application then both were compared

Result: Pass

6.1.27 Category: Teaching methodology for Prediction

A teacher data for his performance prediction in next semester for the category of his Teaching methodology was derived both manually and through application and were then compared.

Result: Pass

6.1.28 Category: Course for semester testing

A teacher data for his Course covered for all subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.29   Category: Course for subject testing

A teacher data for his Course covered in a subjects in a semester were derived manually and through application then both were compared

Result: Pass

6.1.30   Category: Course for Career testing

A teacher data for his Course covered in his career were derived manually and through application then both were compared

Result: Pass

6.1.31   Category: Course for Prediction

A teacher data for his performance prediction in next semester for the category of his Course covered was derived both manually and through application and were then compared.

Result: Pass

Chapter 7

Conclusion

The purpose of the project was to maximize information gain and minimize time wastage. If we can so easily learn data, analyze it, make strong decisions backed by strong evidence. Previously in the existing system data was in tabular form and also decisions were more random. But now this data will be in graphical form analyzed in a more appropriate way. The prediction done on the available data can help the administration in the future to make more bold and accurate decisions.

7.1 Future Work

Every application has always a room for improvement. In next version the data will be analyzed in new ways. Visualization techniques will also be increased. We have to figure out in future work to make prediction more realistic and include multiple entities to our data which can affect our prediction. At current QEC data we donâĂŹt had those records.

Chapter 8

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