

# **STUDENT STATISTICS**

## **FINAL PROJECT PROCESS BOOK**

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**Link:** <https://github.com/SrijaAdusumilli/Student-Statistics.git>

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# PROJECT PROPOSAL

- **Basic Info**

- Project title: Student Statistics
- Name: Srija Adusumilli
- Email: [srija.adusumilli@utah.edu](mailto:srija.adusumilli@utah.edu)
- UID: u1140248
- Link: <https://github.com/SrijaAdusumilli/Student-Statistics.git>

- **Background and Motivation**

Providing students with their academic statistics may give them the knowledge where they are lagging behind but there is no efficient way implemented until now. This made me choose this project for helping out students for providing their statistics and getting them to know the fields in which they need to improve. Also, a visualization of this kind helps the faculty and parents know the academic performance information and also the basic information of the students.

- **Project Objectives**

The primary objective for implementing this project is to provide students with the statistics in a more efficient and visualized way so that they can get a clear picture of their academics.

visualization is an effective tool to deliver information. Using this visualization, I am trying to project how different circumstances such as how many times the student checks the new announcements, how many times the student visits a course content, how many times the student checks the new announcements, how many times the student participate on discussion groups, how many times the student raises his/her hand on classroom, the number of absence days for each student effect their academic performance.

- **Data**

- Amrieh, E. A., Hamtini, T., & Aljarah, I. (2016). Mining Educational Data to Predict Student's academic Performance using Ensemble Methods. International Journal of Database Theory and Application, 9(8), 119-136.
- Amrieh, E. A., Hamtini, T., & Aljarah, I. (2015, November). Preprocessing and analyzing educational data set using X-API for improving student's performance. In Applied Electrical Engineering and Computing Technologies (AEECT), 2015 IEEE Jordan Conference on (pp. 1-5). IEEE.
- Link: <https://www.kaggle.com/aljarah/xAPI-Edu-Data/data>

- **Data Processing**

I am not expecting any data clean up. I am planning to use the data provided as it is without any data processing.

- **Visualization Design**

The overall design is presented in the form of a pie chart. But, in order to get a detailed picture of the information, we need to expand and show even the minute details of the attributes. So, the line charts and bar charts might help in clearly projecting the data.

- **Must-Have Features**

- The pie chart with concentric circles and each concentric circle represent a different attribute.
- Different shades of colors(saturation) for each circle representing each attribute.
- On a mouse click on these circles, a bar chart and line chart expands showing detailed info about the attributes.
- By hovering on the circles, a tooltip get displayed showing the basic info.

- **Optional Features**

- hue and saturation
- Shadows
- 3D effects

Due to the presence of these features new information will not be added but we get a more effective visualization.

- **Project Schedule**

By dividing the project to modules and assigning deadlines for each module might help me in completing the project in time.

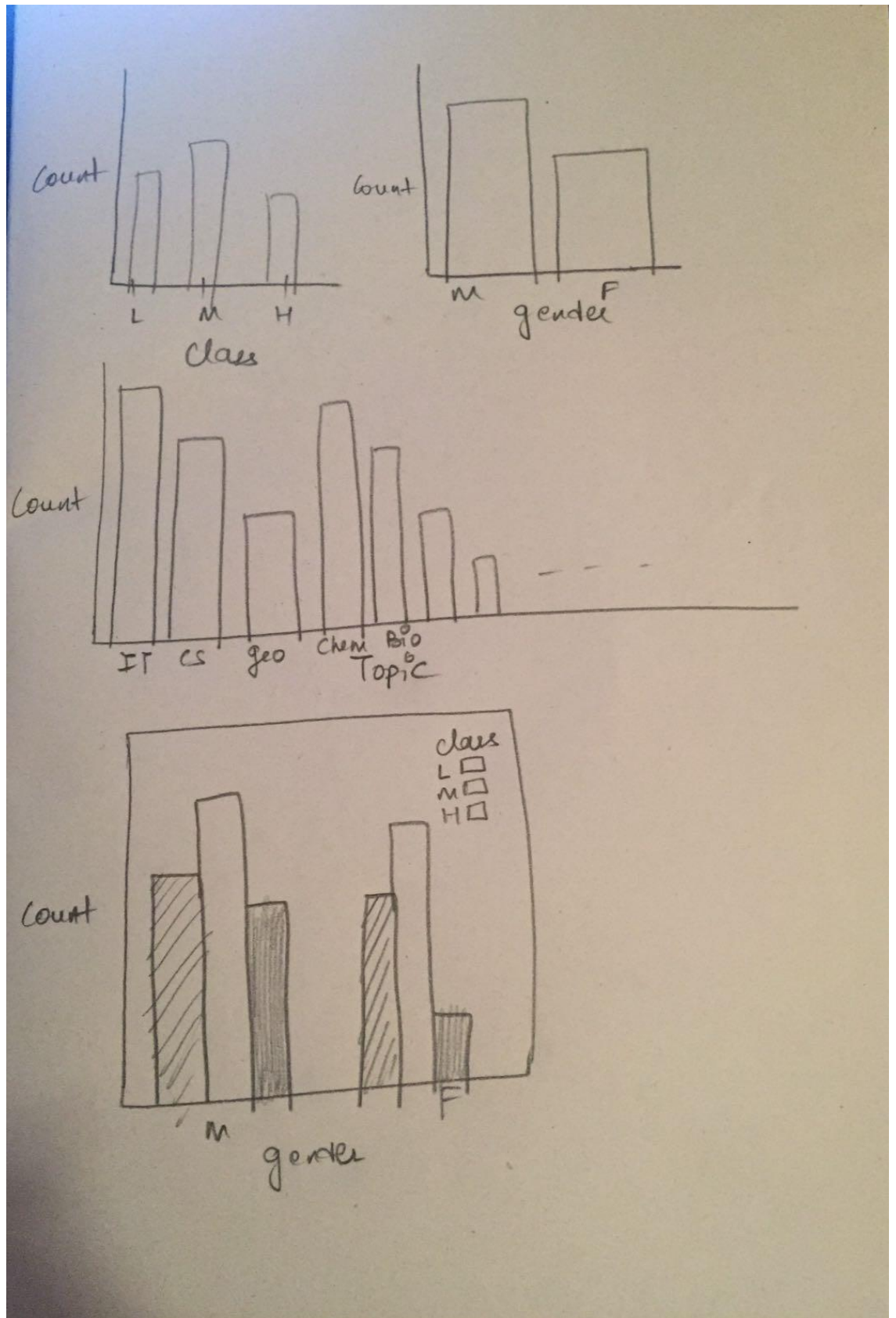
Modules	Deadlines
Module1	11/07/2017
Module2	11/14/2017
Module3	11/21/2017
Module4	11/28/2017

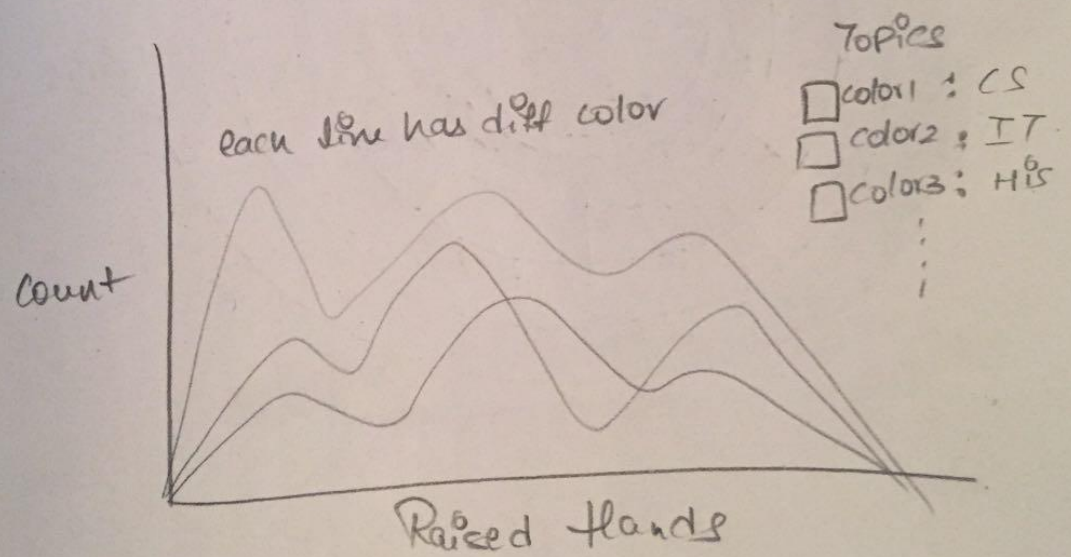
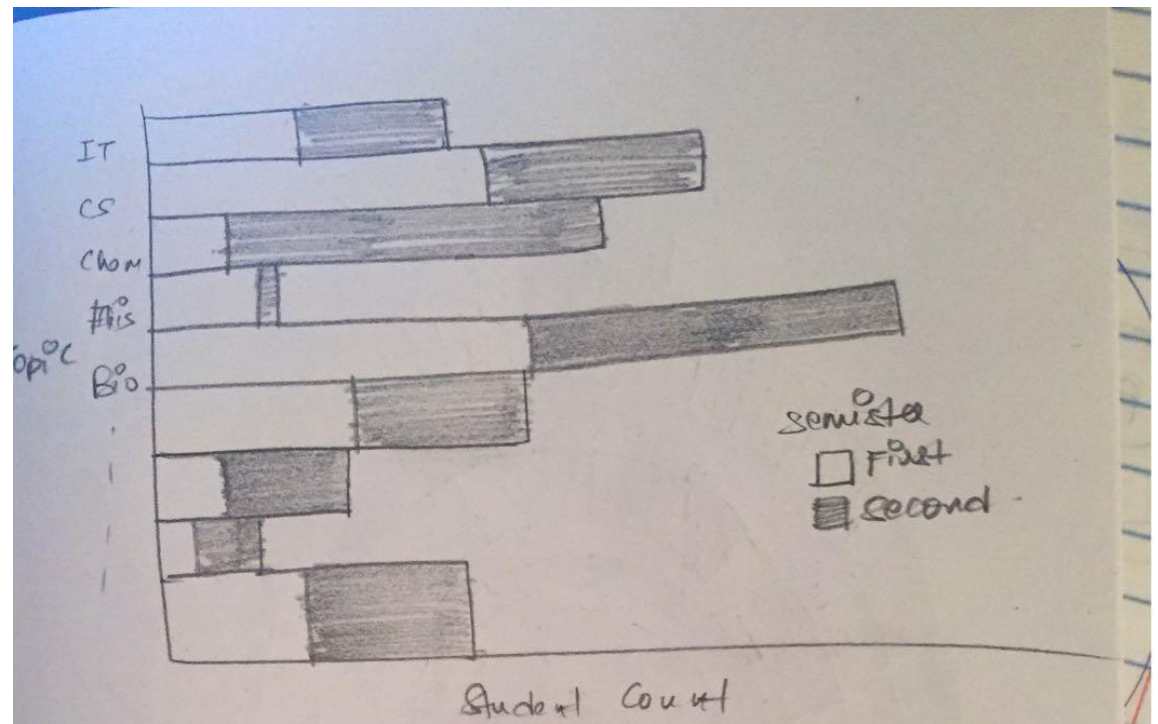
Module1: pie charts

Module2: Bar charts

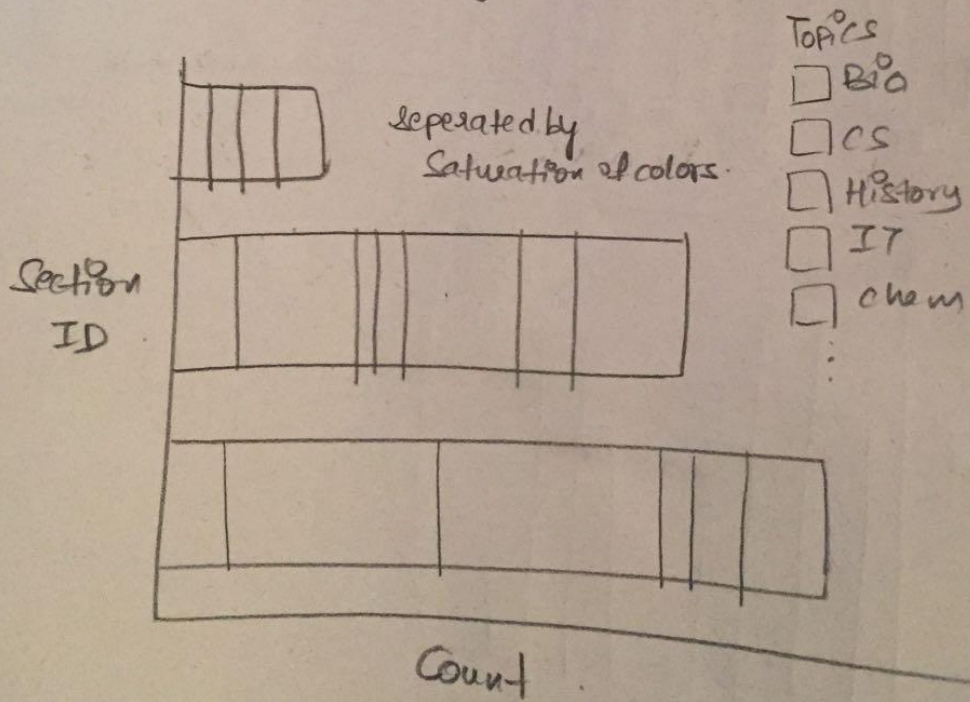
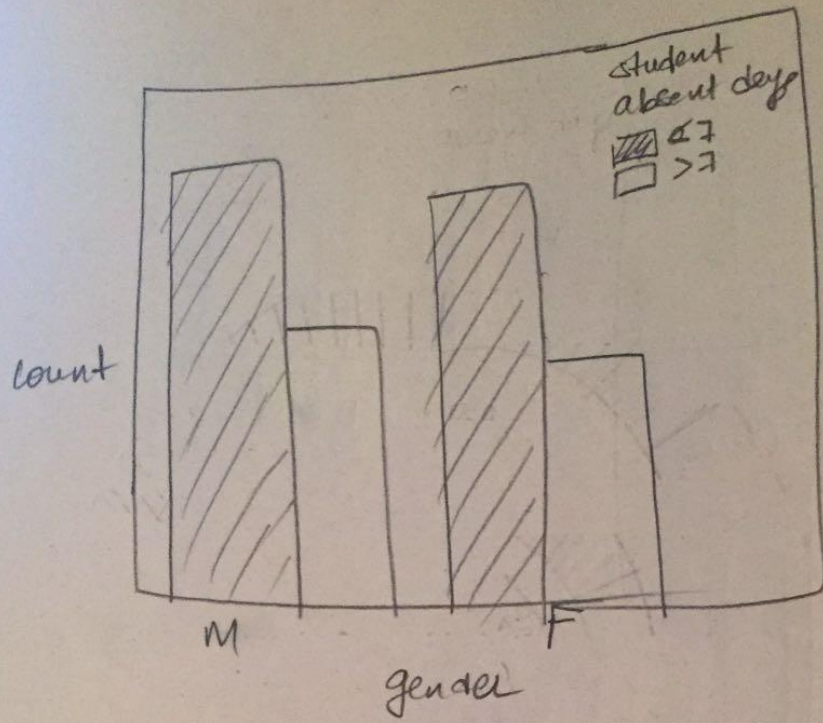
Module3: Line charts and integration of Data

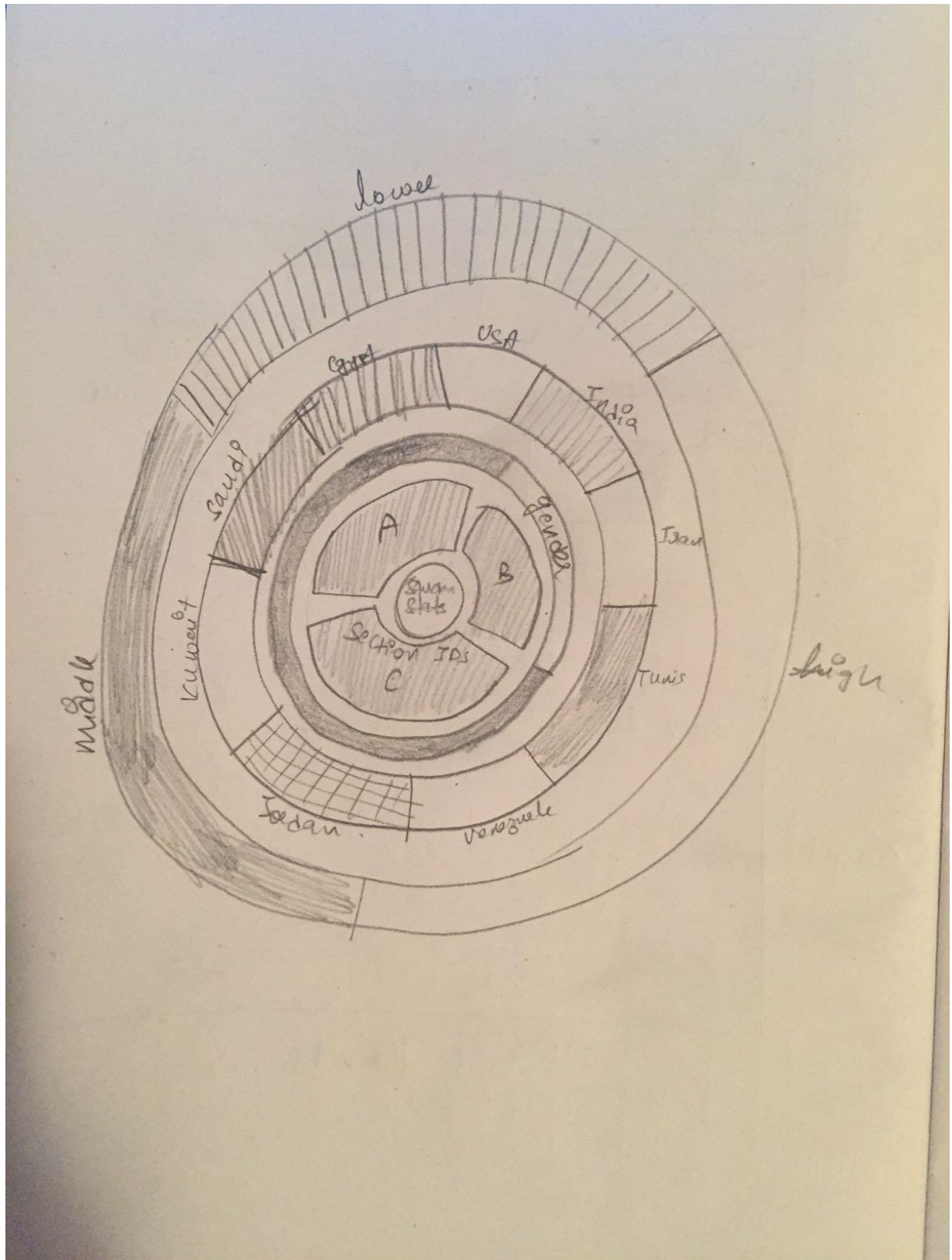
Module4: debugging and testing













# Peer Feedback

## General Questions Feedback:

- The objectives of the project are interesting to the target audience i.e., in the case of my project, the students, the faculty and parents.
- The scope of the project is kind of appropriate, i.e., the features, deliverables and interactions. But, involves many modules.
- The optional and must have features splitting is good but the animation should have been in the must have feature.
- The visualization is indeed creative because, the sundial is a new concept so far and it would take much time to implement it.
- The visualization is totally suitable for the given dataset. It can handle larger but similar datatypes.
- The project plan is detailed enough. The path to the final project is clear. The sundial module will take more time when compared to others.
- The story of the whole project is interestingly told.

## Visual Encoding:

- The visualization follows majority of the principles discussed in the class and used in the home works.
- The primary visual encoding is the sundial and all the interactions in the project webpage are related to this sundial. It matches to the important aspect of the data taken.
- The new concept of visualization used here in the project is the sundial. But, the data representation in the sundial will be difficult to analyze.
- The color should be sensibly used and in the sundial.
- I have been suggested to use the most impactful attributes first i.e., the most important attributes of the data should be represented in the inner circles and less important data should be represented in the outer circles.

## **Interaction and Animation:**

- The interaction is meaningful, and the suggestion is to implement the interaction of bar charts on double click of the mouse.
- There are no multiple views needed for this visualization. The visualization of the data is meaningful with one view itself.
- The visualization will be more attractive if the animation is planned on the axis of bar charts and line charts.

## Project Milestone Meeting Feedback

On November 14<sup>th</sup>, Tuesday I met teaching assistant for my milestone meeting and we discussed the following points.

- The data processing is done by then, I must focus on implementing the visualizations for the data.
- I do have a clear picture of the visualization associated with the project, as mentioned in the proposal.
- I have visualized some bar charts by the time of the meeting, I was suggested to put the axis coordinates in focus while implementing them.
- By placing the charts in the correct coordinates on the viewport during the coding time, then the project would be more sorted in the rear end.
- Before the project deadline, if I want any kind of feedback for my existing work done till then, I can fix up another project milestone meeting with the TA.
- By the time of the project deadline, I should have a screencast video of not more than two minutes explaining the project website and how the interactions which are designed in the project work.
- I should be ready with my full-fledged project website prior to the project deadline so that I can have time for debugging my code.
- It is advisable to update the process book on par with the project so that it wouldn't be a burden in the rear end.
- The interaction should be clear to the audience and should not be too confusing about how to handle.

## **Overview and Motivation:**

Providing students with their academic statistics may give them the knowledge where they are lagging behind but there is no efficient way implemented until now. This made me choose this project for helping out students for providing their statistics and getting them to know the fields in which they need to improve. Also, a visualization of this kind helps the faculty and parents know the academic performance information and also the basic information of the students.

## **Related Work:**

There is no particular platform for visualizing student statistics till date. A website like this could be more helpful to students. After listening to the “web based interactive visualizations” discussion in class, I started doing this project with that knowledge. I have been reading the book which helped me understand how visual representations can help in the analysis and understanding of complex data, how to design effective visualizations, and how to create your own interactive visualizations using modern web-based frameworks.

Link to the referred book: <http://proquest.safaribooksonline.com/book/databases/business-intelligence/9781491921296>

## **Questions:**

The primary objective for implementing this project is to provide students with the statistics in a more efficient and visualized way so that they can get a clear picture of their academics.

visualization is an effective tool to deliver information. Using this visualization, I am trying to project how different circumstances such as how many times the student checks the new announcements, how many times the student visits a course content, how many times the student checks the new announcements, how many times the student participate on discussion groups, how many times the student raises his/her hand on classroom, the number of absence days for each student effect their academic performance.

## Data:

This is an educational data set which is collected from learning management system (LMS) called Kalboard 360. The data is collected using a learner activity tracker tool, which called experience API (xAPI).

The dataset contains of 480 student records and 16 features. The features are divided into three major categories:

- (1) Demographic features such as gender and nationality.
- (2) Academic background features such as educational stage, grade Level and section.
- (3) Behavioral features such as raised hand on class, opening resources, answering survey by parents, and school satisfaction.

The dataset comprises of 305 guys and 175 females. The students originate from various sources, for example, 179 students are from Kuwait, 172 students are from Jordan, 28 students from Palestine, 22 students are from Iraq, 17 students from Lebanon, 12 students from Tunis, 11 students from Saudi Arabia, 9 students from Egypt, 7 students from Syria, 6 students from USA, Iran and Libya, 4 students from Morocco and one understudy from Venezuela.

The dataset is gathered through two instructive semesters: 245 understudy records are gathered amid the main semester and 235 understudy records are gathered amid the second semester.

The informational index incorporates likewise the school participation highlight, for example, the students are characterized into two classifications in view of their nonappearance days: 191 students surpass 7 nonattendance days and 289 students their nonappearance days under 7.

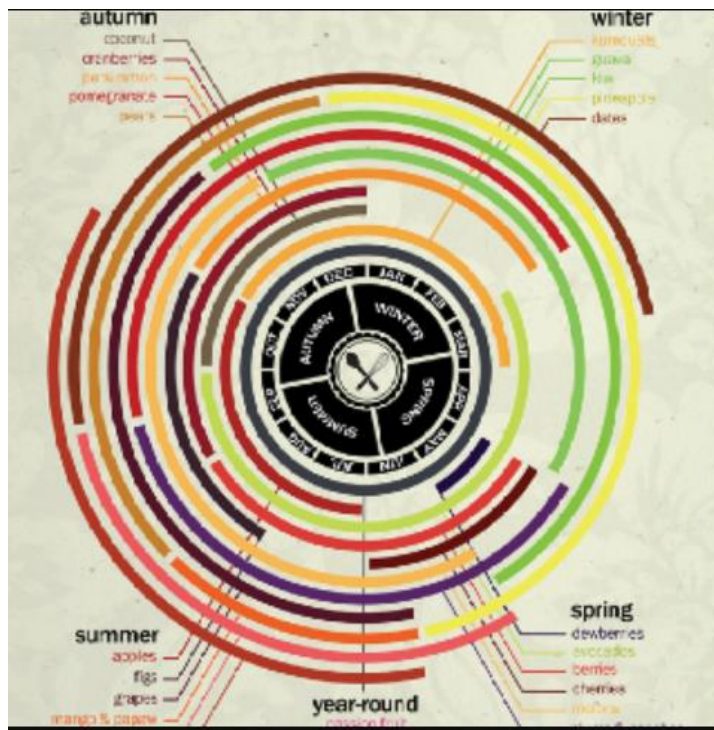
This dataset incorporates additionally another classification of highlights; this component is parent participation in the instructive procedure. Parent participation include have two sub highlights: Parent Answering Survey and Parent School Satisfaction. There are 270 of the guardians addressed review and 210 are not, 292 of the guardians are fulfilled from the school and 188 are definitely not.

- Amrieh, E. A., Hamtini, T., & Aljarah, I. (2016). Mining Educational Data to Predict Student's academic Performance using Ensemble Methods. *International Journal of Database Theory and Application*, 9(8), 119-136.
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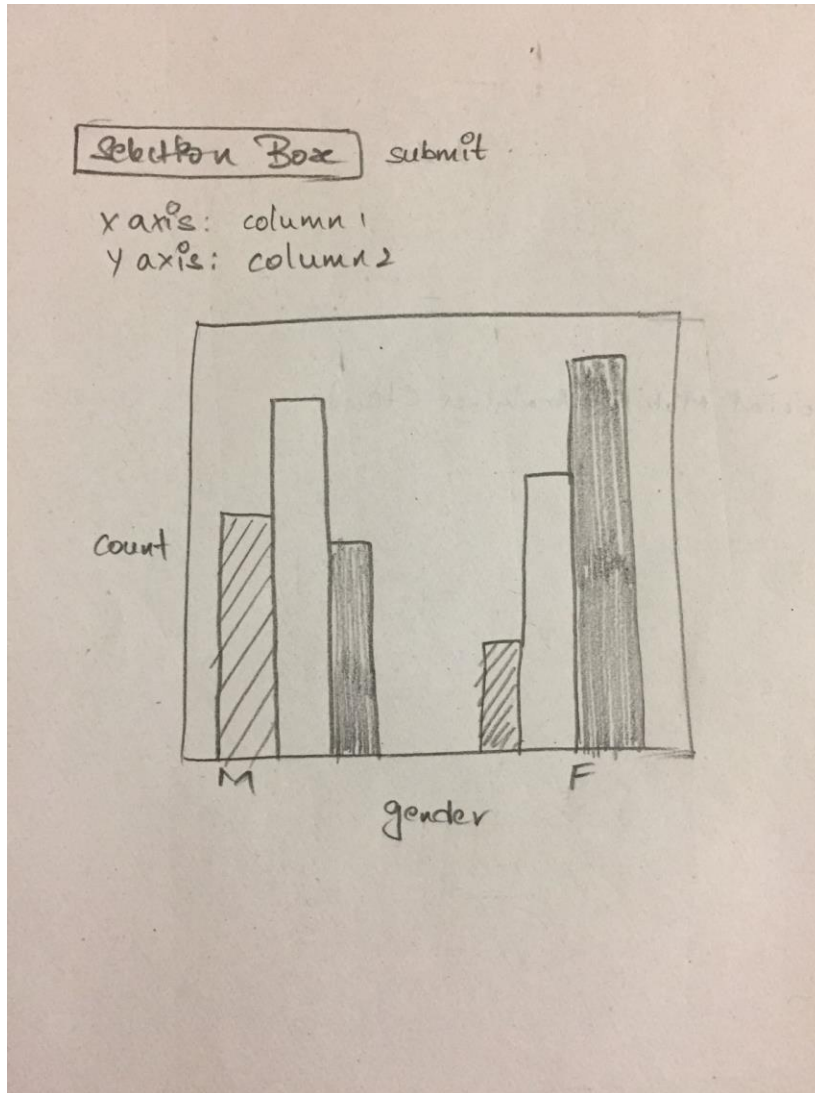
## Exploratory Data Analysis:

In the beginning I started my project as shown in the following figure. But I was not able to represent the whole data using this sun dial visualization. So, I ruled out this idea. The following figure is the basic idea what I wanted to visualize first. (It does not represent my data)



## Design Evolution:

There is a slight deviation from the design proposed in the project proposal. I was not able to represent the whole data in the sun dial visualization as I have said in the project proposal. So, I discarded the idea of including a sun dial visualization in my design. Instead, I added a drop box for the interaction part. The following sketches are the updated design from the proposal.

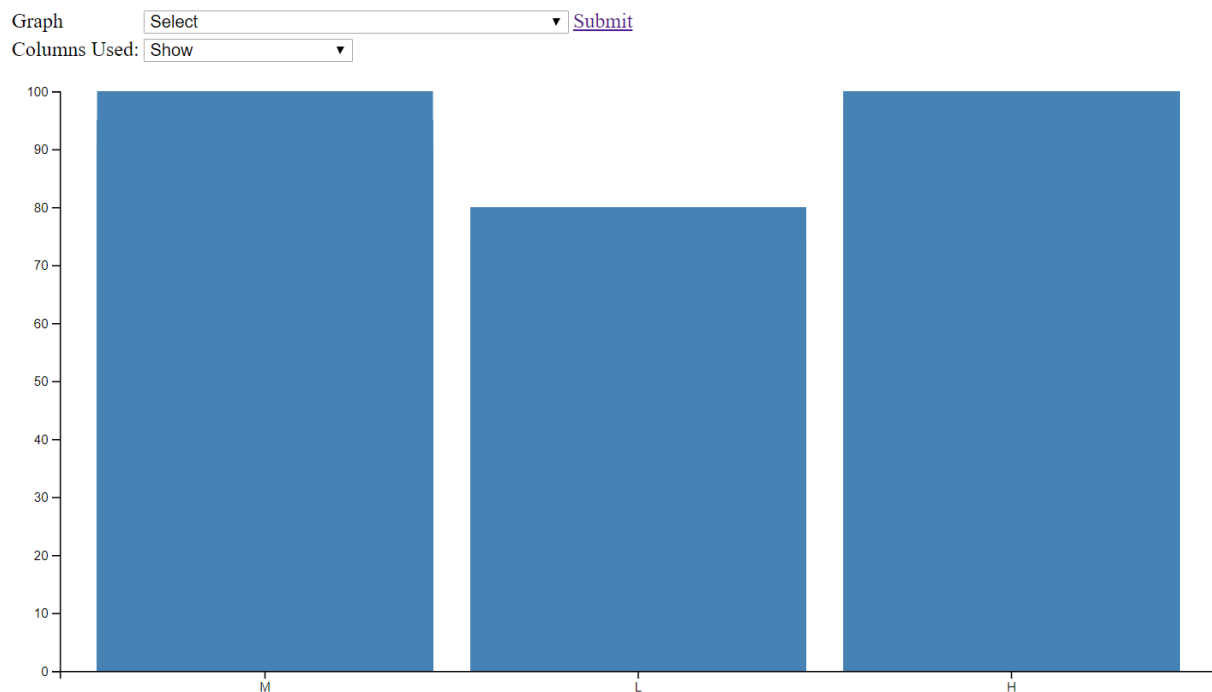


Updated sketches.

## Implementation:

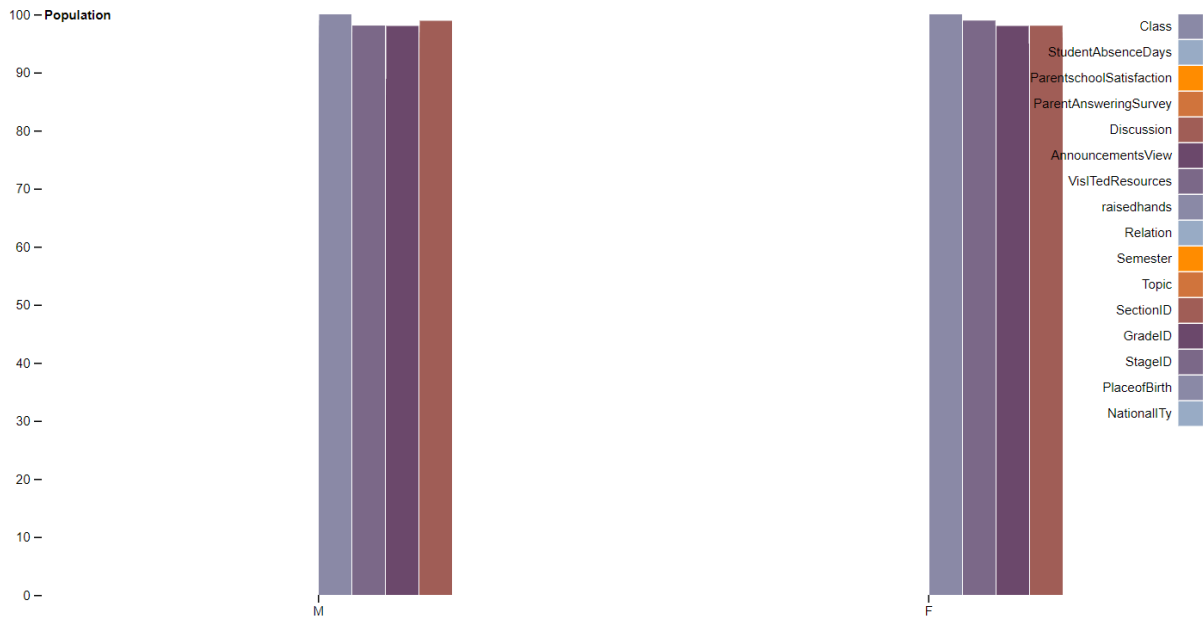
The interaction in this project is using drop box. I have used bar charts and line charts to represent the data. The first four selections in the drop box will be representing the bar charts and the next four selections in the drop box will represent the line chart. After selecting an item in the drop box, the user should press the submit button in order for the chart to be displayed. The second drop box's intension is to show the information of x axis and y axis used in the graph representing the data.

### Student Statistics

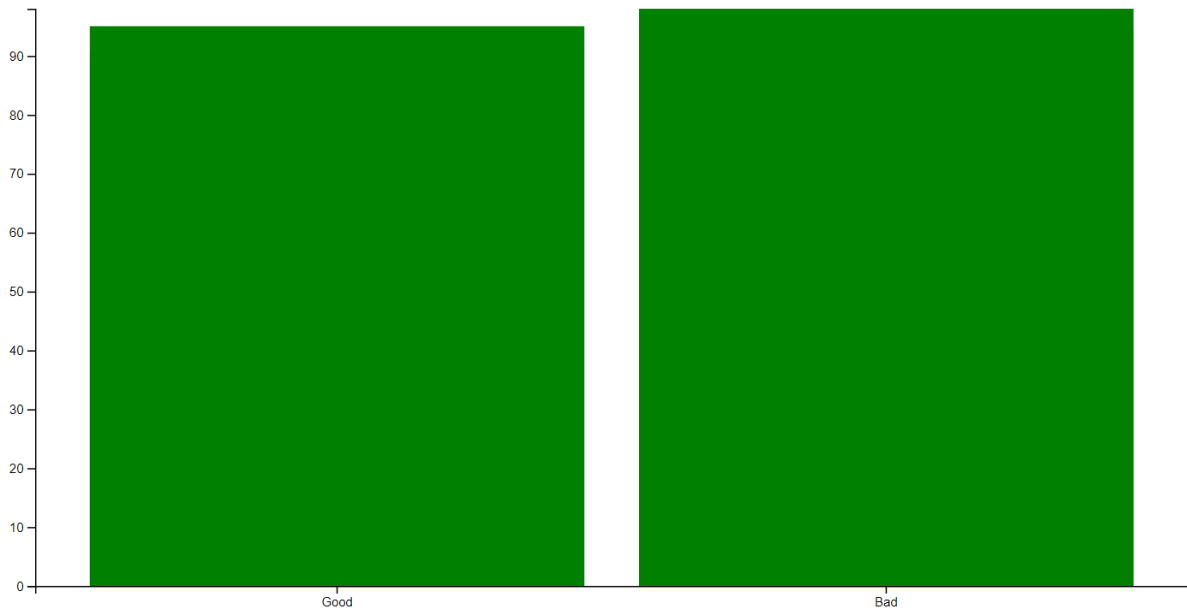


# Student Statistics

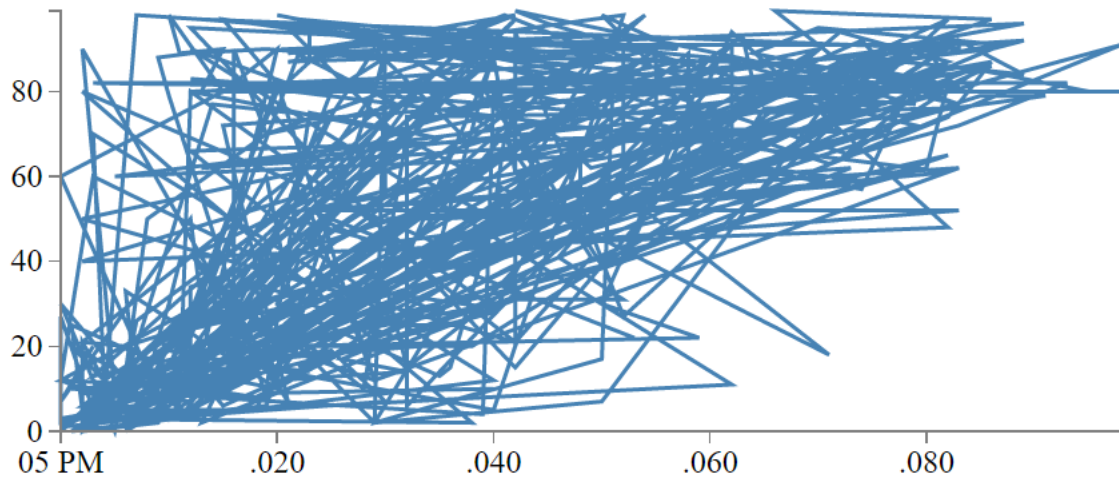
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 Columns Used:



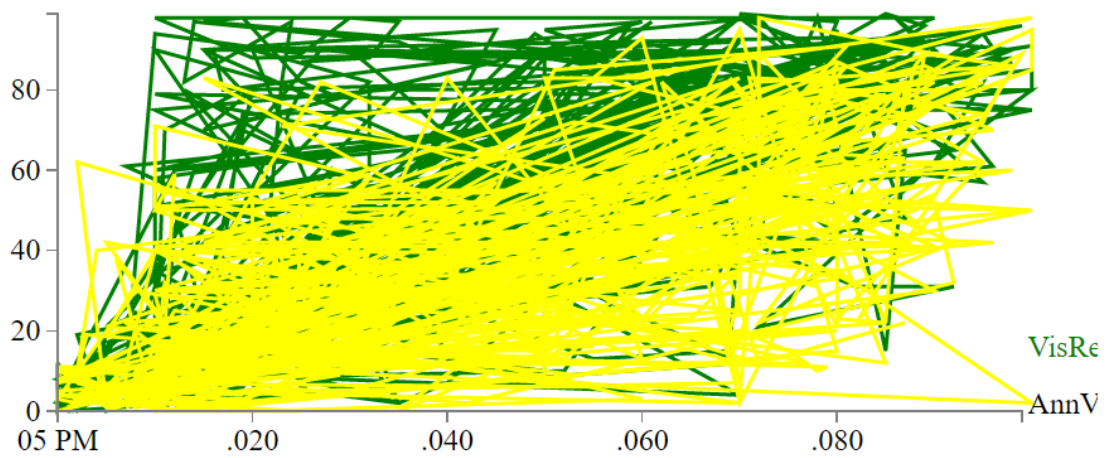
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 Columns Used:



Graph  [Submit](#)  
Columns Used:



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## **Evaluation:**

This visualization project about student statistics has helped me a lot in learning the subject in depth. I was able to draw bar charts and line charts from the data I have taken. visualization is an effective tool to deliver information. Using this visualization, I was able to implement the project by providing end users with the statistics in a more efficient and visualized way so that they can get a clear picture of their academics. However, without using the interaction provided, there is not much knowledge that can be acquired just by seeing the first chart.

**.....THE END.....**