# Are you happy?

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***Abstract*—Mental satisfaction plays an essential role in determining our productivity as global citizens part of the human race. The authors strongly believe this and decided to conduct a survey to analyze levels of stress and satisfaction among the students at the Indian Institute of Technology, Bombay. University students often face different stressful situations and preoccupations: the first contact with the university, the freedom of schedule organization, the selection of their minor degree, and the credit load. We aim to demystify the roots of stress at the institute. Detailed analysis based on data obtained as a response to a curated set of questions leads us to quite a few interesting conclusions. Gender, majors and minors being pursued, relationship status, academic load, place of origin, frequency of eating out, sleep cycles and many more such fields form the basis of our investigation.**

## I. Introduction

The survey illustrated below was conducted independently by the authors. This was carried out in two phases. The survey was released as a Google Form, publicized avidly amongst their peers and seniors. This was in the interim between the midsemester and end-semester exams. However, the authors were concerned that they might not be able to capture the sentiments of the Populus completely. To tackle this issue, the second iteration of publicity was carried out just after the endsemester exams. This ensures a generalization of opinions and aims to eliminate biases that may be circumstantial. This section summarizes which factions of the student population were surveyed for the purposes of this report. The target audience is majorly undergraduates from the following:

- 2nd(Sophomore $\sim$ 78%),
- 3rd(Juniors $\sim$ 15%) and
- 4th(Seniors $\sim$ 4%) years.

These students were spread across the following departments:

- Mechanical Engineering ($\sim$ 27%)
- Electrical Engineering ($\sim$ 17%)
- Computer Science Engineering ($\sim$ 12%)
- Civil Engineering ($\sim$ 12%)
- Aerospace Engineering ($\sim$ 6%)
- Chemical Engineering ($\sim$ 6%)
- Metallurgical Engineering and Materials Science ($\sim$ 4%)
- Energy Science and Engineering ($\sim$ 4%)
- Mathematics ($\sim$ 3.2%)
- Chemistry ($\sim$ 2.2%)
- Engineering Physics ($\sim$ 1.8%)
- Humanities and Social Sciences ($\sim$ 1.8%)

Talking about minor degrees being offered by different departments at the institute, this is the distribution of minors that are being pursued by students.

- Centre for Machine Intelligence and Data Science (C-MInDS) ($\sim$ 18%)
- Computer Science and Engineering ($\sim$ 13%)
- No minor degree being pursued ($\sim$ 46%)

The male-to-female ratio at IITs is a topic over which much deliberation has been done. In the data that is under consideration, the male-to-female ratio is 4.19: 1 which comes staggeringly close to that which we know is prevalent on campus. This is quite an interesting insight and hints at the fact that the survey has been conducted extensively. Thus proving that in this aspect, the data is unbiased.
Listed below are the fields/ questions that constituted the survey:

- Year of Study
- Department of Major Degree being pursued
- Department of Minor Degree being pursued
- Sex
- Relationship Status
- Township
- Frequency with which one eats out
- Homesickness
- Internship
- CPI (Cumulative Performance Index)
- Social Life
- Roommate Issues
- Online v. Offline Semester
- Trade-off between Academic and Social Life
- Fluency in English
- Satisfaction Level (How does your life here compare to your expectations)

Aims:

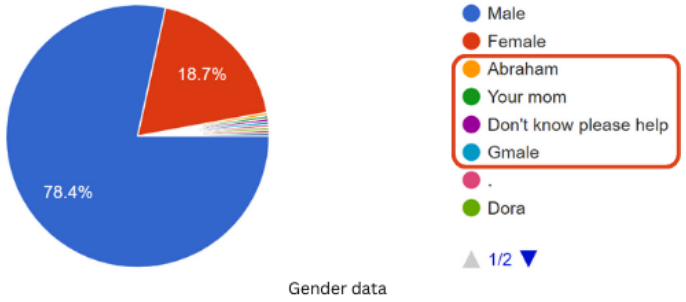
- We have performed extensive data filtering to eliminate bogus responses and to simplify the large variety of responses collected to forms that would ease analysis.
- We have tried to make this survey about much more than just stress levels. The large no of fields that we have collected gives us the privilege of commenting on general statistics.
  - Apart from correlating happiness with each of these fields, we have tried to link each of these fields with

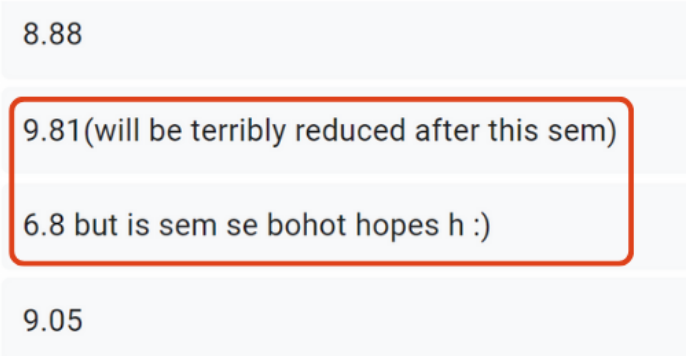
each other which yields amazing outcomes
  - Eg. social life v. CPI, homesickness v. impact of quizzes, and many more.
- We have tried to find links between each of the questions and levels of satisfaction to gauge whether the field can actually be considered a factor leading to stress.
  - In quite a few cases, the results defy our general notions to show that the field has almost no impact on individuals or has a generalized impact which tells us that the levels of satisfaction would remain the same irrespective of the field
  - Eg. relationship status: students who were single and those who were in committed relationships showed almost equal scores of happiness i.e singles(2.9) and committed(3). This tells us that relationship status is hardly a key determining factor for happiness.
- Question-wise analysis helps us conclude whether a certain field is a considerable cause of stress. We then move on to list all such factors and quantify their effects.

This project was the offspring of a group of individuals i.e. the project team. who were curious whether the things that were causing them stress were in fact troubling others as well. Our aim was to encourage others to introspect and identify what exactly was causing them sadness. Only after isolating the crux of such melancholy can one begin to tackle it. We hope this wasn't an exercise in futility and that it helped the students work towards actually confronting the issues bothering them. The authors strongly hope that they could reach to those in need and provide them a place they could voice their opinions. Some of the feedback we received was actually helpful in providing us the motivation to move forward with the project.

## II. Prior Work (Data Cleaning)

The process unfolded in many steps. Firstly, it was only about getting rid of the wrong values filled by the students, which is an expected thing to happen in any survey concerning people. For example, we found out someone had written their gender as "Abraham" under the "Gender" column. Someone else had written "really bad" under their CPI, the column in which we asked for a float value. This feat was achieved by going through the data thoroughly in the initial stages, looking for unexpected unique values with the help of pandas methods. Then it was refining over the data we looked through. Mainly in the CPI column, a lot of students had written their feelings while telling their CPI. For example, "9.81 ( but it would drop in this semester) ", "6.81 but will improve" and a lot more. Also, some students had typed spaces before entering their CPI, as illustrated in the following: " 7.94" instead of "7.94". So a rigorous method had to be used to get rid of the blank spaces, and the unwanted comments simultaneously. While plotting the graphs and box plots for the above-mentioned column, we noticed some absurd graphs, where the maximum value crosses 60,000. We came to know that someone had filled their CPI as "69420", which is unrealistic as the CPI is bound to be under 10. We found the data point and replaced it with a NaN value. As mentioned, we also dealt with many NaN values, following the fact that many people didn't want to share their most personal information, although our survey was an anonymous one. We removed the timestamp column initially because we had not planned to do any temporal analysis. The final thing was to group some subjective data into a single data point, just because they represented the same sentiment, but in a slightly different way. We had to do it manually for the whole data.



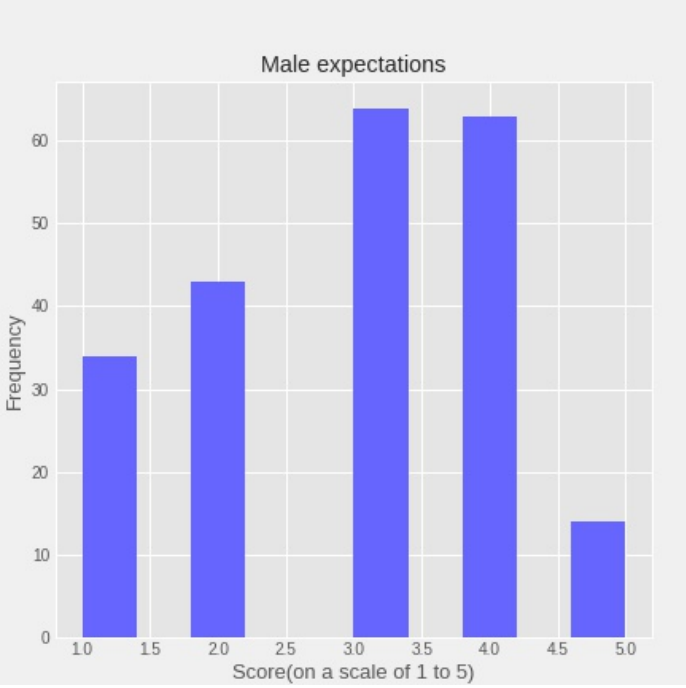

## III. Dataset

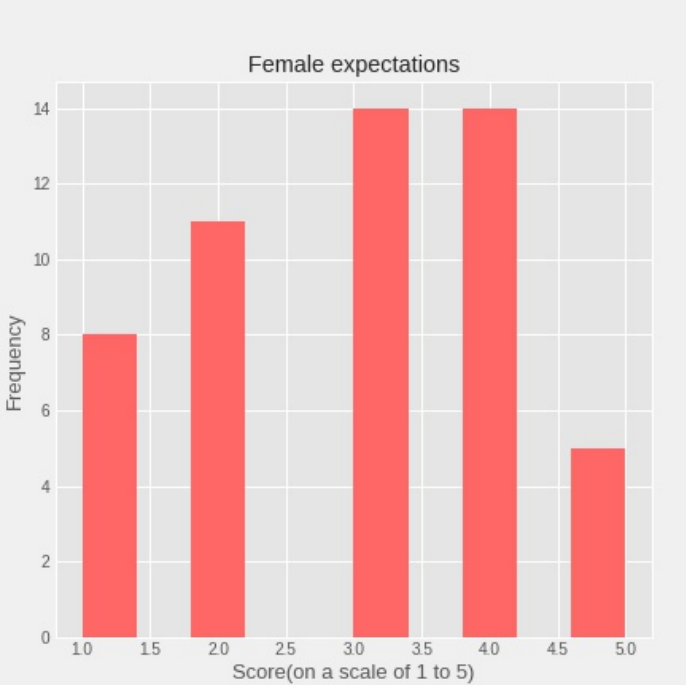
### A. Gender

As mentioned earlier, the male-to-female ratio is 4.19: 1 which comes staggeringly close to that which we know is prevalent on campus. This is quite an interesting insight and hints at the fact that the survey has been conducted extensively. Thus proving that in this aspect, the data is unbiased. We have cross-referenced results of satisfaction with genders and averaged them over all entries which led us to a score of happiness or a "happiness quotient". We have also calculated the variance which gives us an idea about the spread of the distribution.

- Males (Score = 2.908 , Variance = 1.358)
- Females (Score = 2.942, Variance = 1.477)

For any data, the expected value is the mean i.e 2.50 however the happiness quotient is higher than the average which is around 2.9. We thought this was because people are more likely to choose extreme options in a survey. However, when we plotted the histogram, we found the mode is 3. This hints that maybe people are not much satisfied with their life on campus.



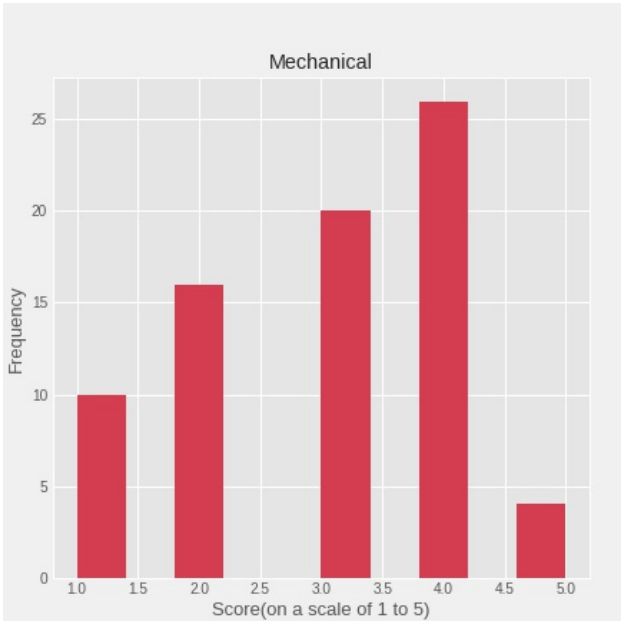

### B. Department

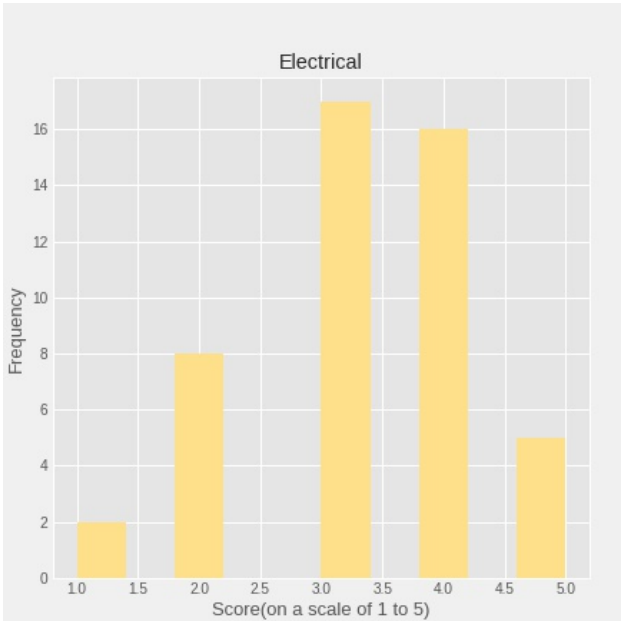
Major departments decide the credit or academic load on students. The departments included in the data are:

- Mechanical Engineering (27%)
- Electrical Engineering (17%)
- Civil Engineering (12%)
- Computer Science Engineering (12%)
- Aerospace Engineering (6%)
- Chemical Engineering (6%)
- Metallurgical Engineering and Materials Science (4%)
- Energy Science and Engineering (4%)
- Mathematics (3.2%)
- Chemistry (2.2%)
- Engineering Physics (1.8%)
- Humanities and Social Sciences (1.8%)

In our calculations, we have calculated scores and variance for departments with maximum representation, namely the Mechanical, Electrical, and Civil Engineering departments. The data were grouped by department, and then the scores were averaged over all entries.

- Mechanical (Score=2.973, variance=1.288)
- Electrical (Score=3.291, variance=0.998)
- Civil (Score=2.885, variance $\sim$ 1)
- Other departments (Score=2.720, variance=1.552)



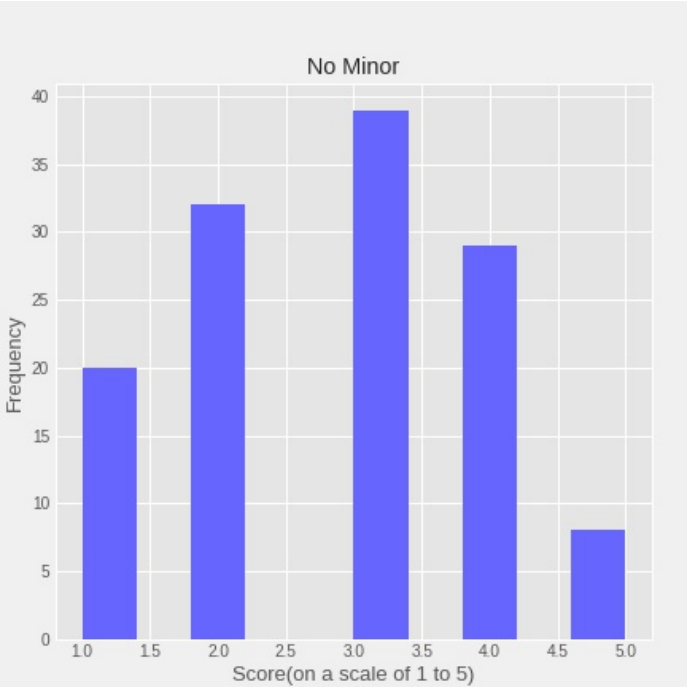
We obtained that the students of the Electrical department have the highest scores on the satisfaction index (3.291), followed by the mechanical department (2.973) and civil department (2.885). The variance for the Electrical department is also very low, showing that the scores are concentrated in the higher ranges. The mode for mechanical is 4, but the mode for electrical is 3. Thus, overall, the students in the electrical department are happier, but the percentage of people having a score of 4 in the mechanical department is higher.

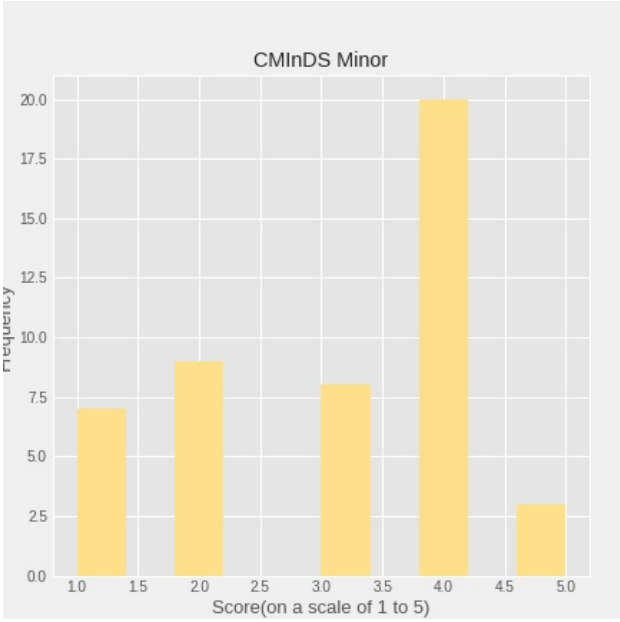
### C. Minors being pursued

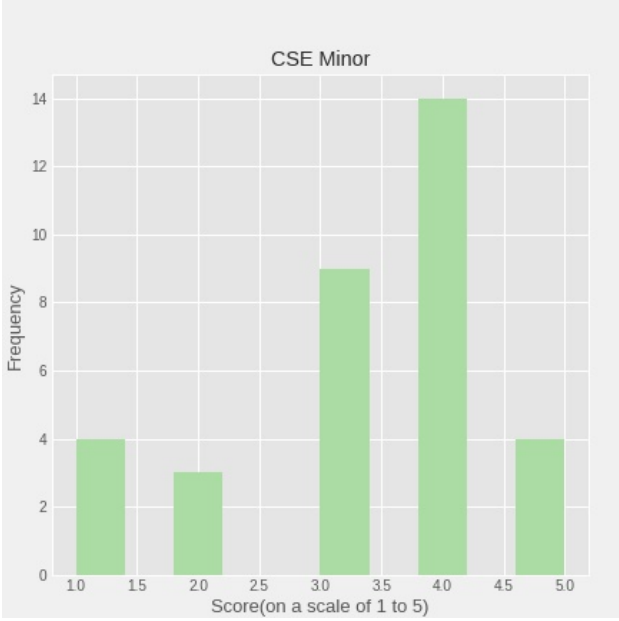
We have explicitly printed scores for the ones that form a larger moiety of the data namely C-MInDS, CSE and no minors.

- No minor being pursued (Score=2.789, variance=1.307)
- C-MInDS (Score=3.063, variance=1.464)
- CSE (Score=3.323, variance=1.336)
- Other departments (Score=2.83, variance=1.350)

The students who are not pursuing any minor show a distinctly lower happiness quotient indicating that maybe they feel they are missing out on academics. Another possible reason is that maybe they are struggling so much with academic load or personal problems that they are not able to pursue a minor degree. The students pursuing the C-MInDS minor tend to have a high CPI because of the limited number of seats and high demand. The reason they have lower scores as compared to those pursuing a CSE minor can be speculated to be the pressure they put on themselves trying to maintain the high CPI.

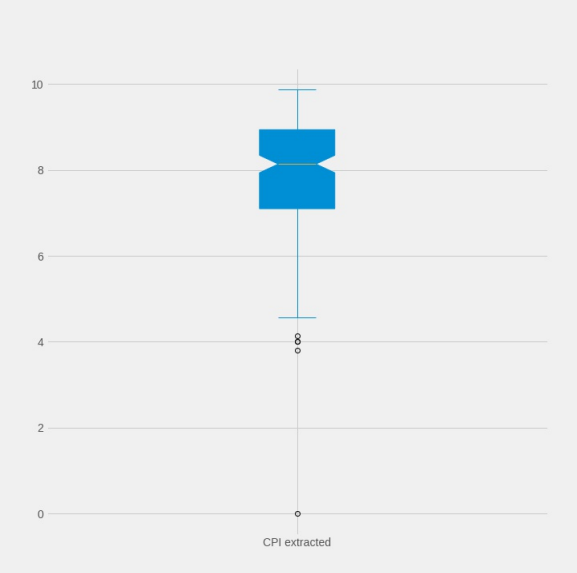


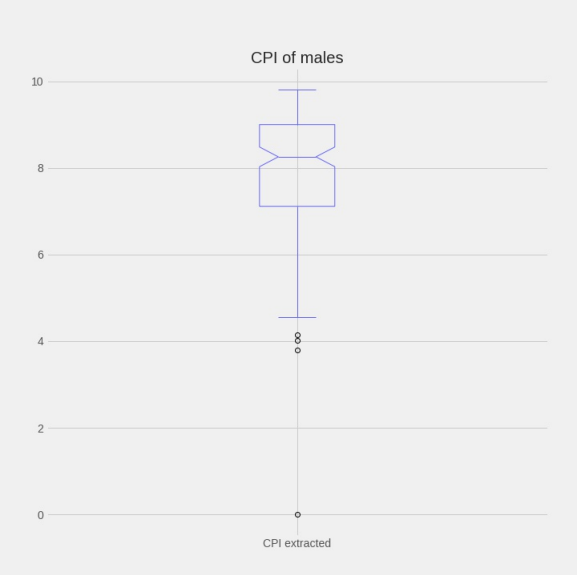



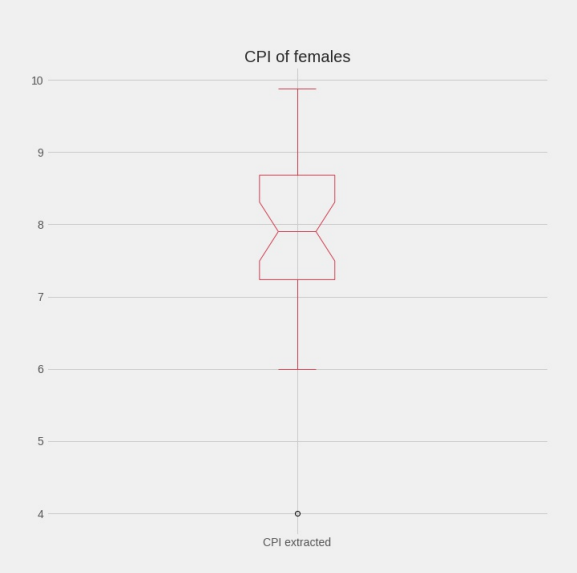




### D. CPI(Cumulative Performance Index)

CPI, or the Cumulative Performance Index, measures the academic performance considering all the semesters the student had attended.
The CPI for the students had a median value of 8.16, whereas the CPI ranges from 0 to 10. This was clearly a much higher value than we expected. One of the explanations could be:
a) Our survey was filled mostly by students of the Mechanical and Electrical Engineering departments. These departments are considered to have students who are high scorers (according to the JEE advanced ranks). So, our data was biased towards a set of high scorer students. Hence, the much higher value of 8.16 instead of 5, which is the ideal value.
It would have reached a value close to 5 if more students from the low JEE advanced rank would have filled out the survey.

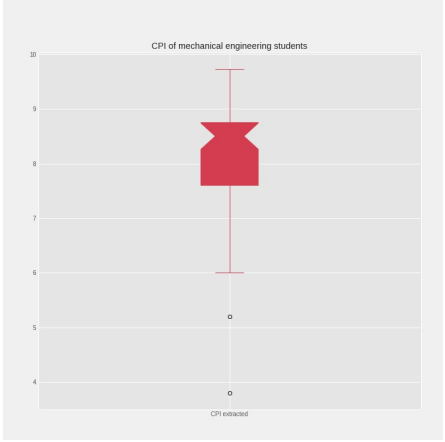


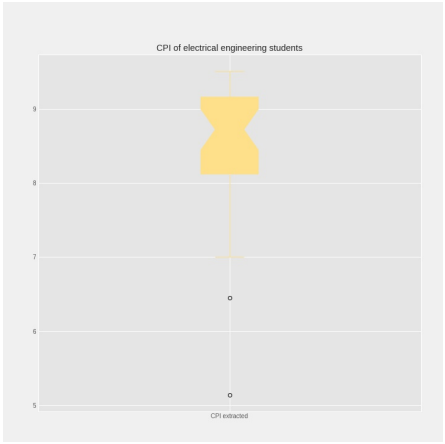



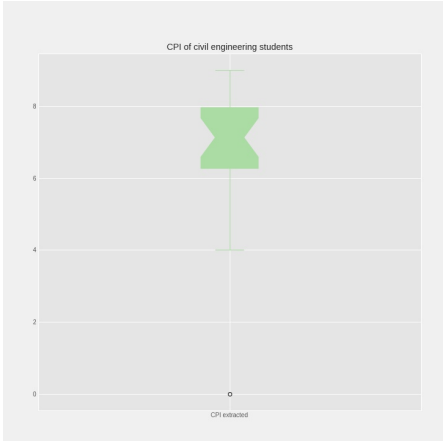




Coming onto gender-wise CPI data, we observed a minor difference in the median CPI. The male students (above 8) had a higher median CPI than female students (below 8).

Taking up the department-wise CPI data, for the top three branches (according to the number of students who filled out the survey), namely Mechanical, Electrical, and Civil, all the other branches were grouped into one single branch, to ease out the statistics.

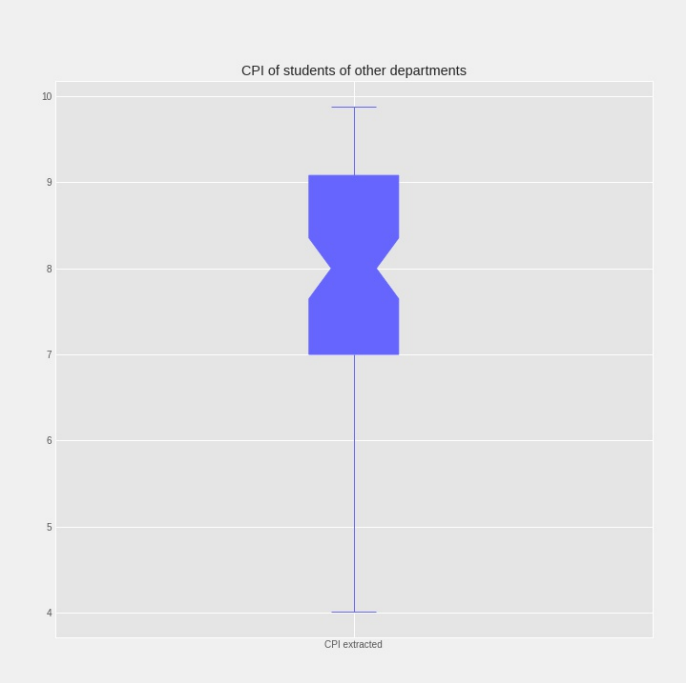


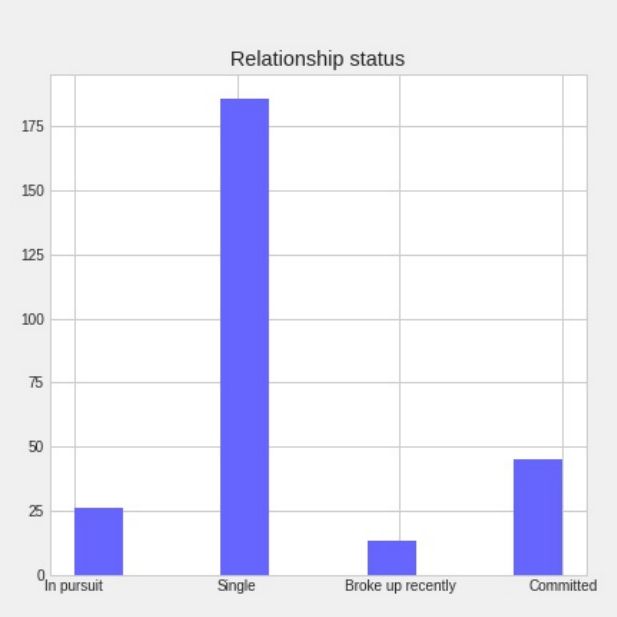

For the Mechanical branch, the median CPI was a little above 8.5, precisely (8.57), and for the Electrical branch, it was 8.69. But for the Civil Department, the median CPI was

around 7.2, which reinforces the explanation stated above, knowing that it is a low JEE advanced rank branch.




The same effect was observed in the combined branch, the median was 8, which can be explained by the fact that it included students from Computer Science and Engineering, Aerospace, Physics, and Math along with students from Metallurgy, Chemistry, Environmental and Energy Sciences departments.

### *E. Relationship Status*

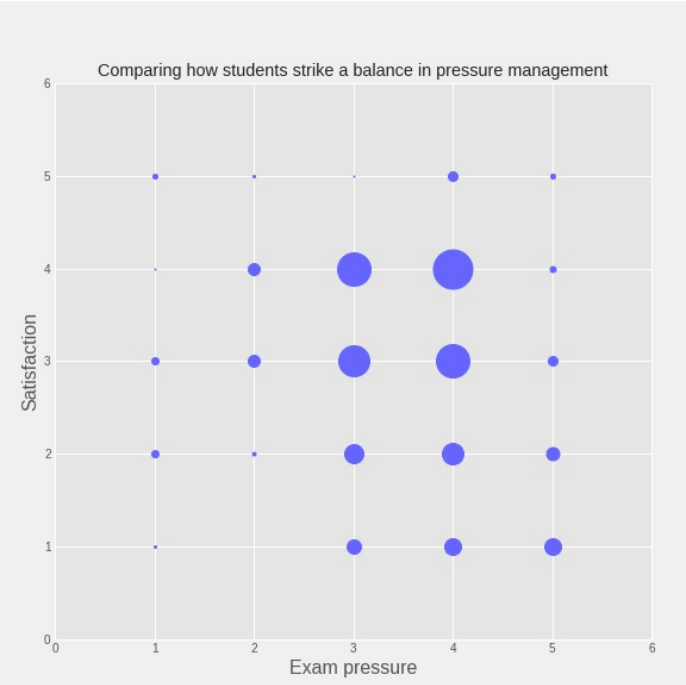


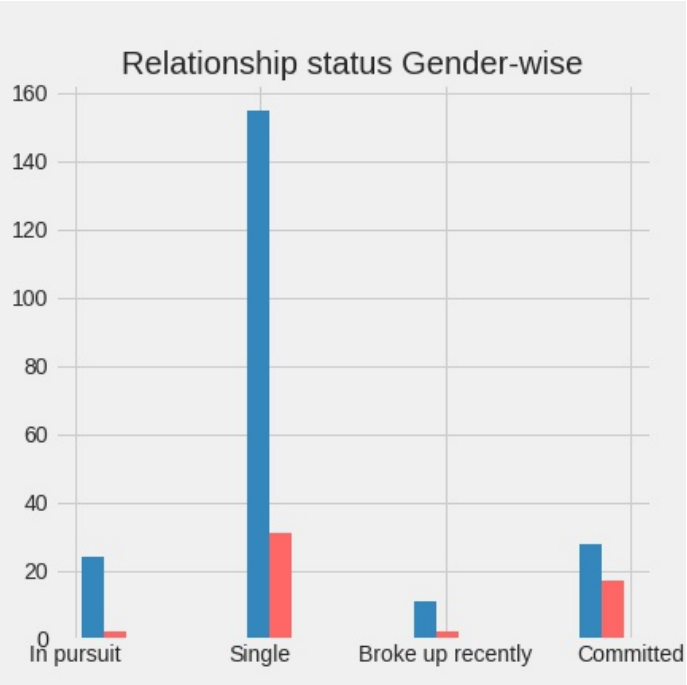

College is the first time students interact after becoming adults. In this ripe age, relationships are likely to spring. In our data, the relationship status of the surveyed was as follows:

- Single (68.3%, Score=2.903)
- Committed (16.2%)
- In pursuit (10.1%)
- Broken up recently (5.4%)

Among individuals in a committed relationship:

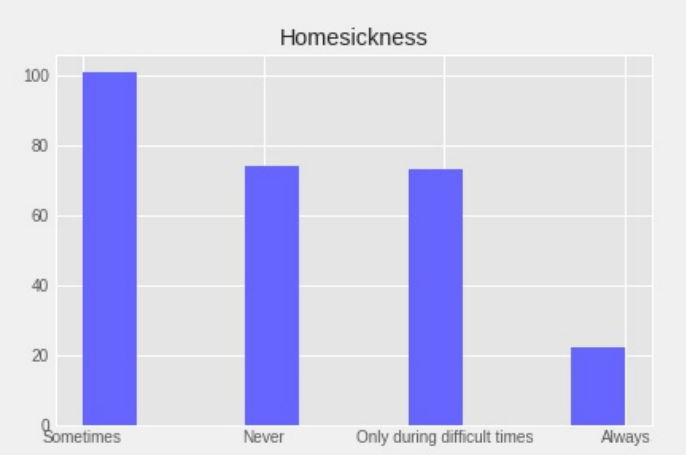
- Females (Score = 3, Variance=1.313)
- Males (Score = 3.071, Variance=1.882)



There is a huge gap between the number of single males and females however, the number of committed males and females is almost similar (around 20). This indicates that of the relationships being assessed, many are such that both partners are students at IITB. The mode for committed males is 3, whereas that for committed females is 4 showing that females in relationships tend to be happier. The ones in a relationship have higher happiness quotients (3.0), but that for singles is not far behind at 2.90. Thus, the relationship is hardly a deciding factor for determining whether or not an individual is happy.

### *F. Homesickness*

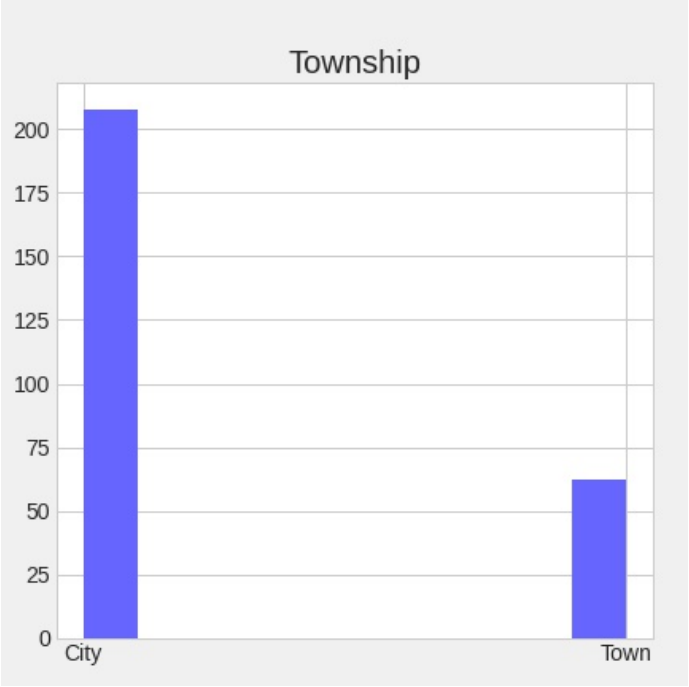



Irrespective of the place of origin, feelings of homesickness may develop in individuals. This can in turn affect productivity and make them vulnerable to stress. We divided the answers to this question into 4 different categories along with the percentages they represent in the data:

- Those who never feel homesick (27.3%, Score = 2.95 )
- Those who feel homesick only sometimes (37.1%, Score = 2.97)
- Those who feel homesick only during difficult times (26.3%, Score = 2.84)
- Those who always feel homesick (9.4%, Score = 2.72)

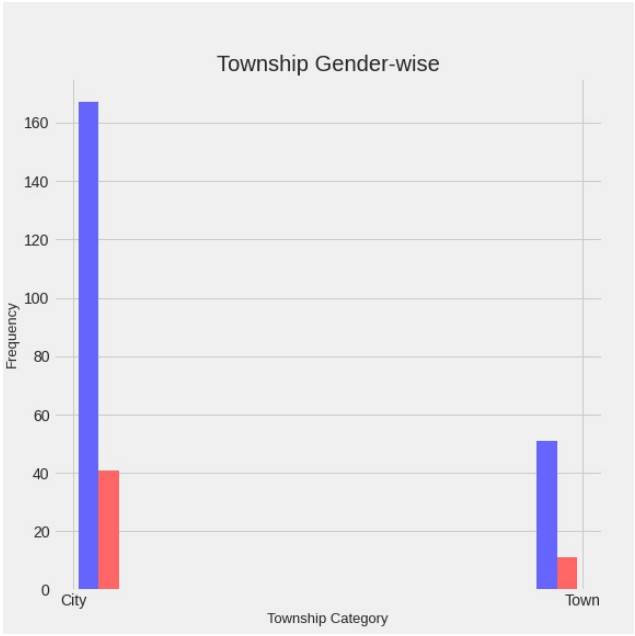
In a general sense, the results are paralleled with intuition. The ones who are homesick more often show lower levels of happiness. One fact, however, stands out. The students who feel homesick sometimes (2.970) exhibit higher levels of happiness compared to those who are, allegedly, never homesick (2.959). This could possibly mean that the students who say they are never homesick are in denial. They might be lying to themselves. We often find that perceived appearances are of importance in a college setting. In an attempt to seem tough, they might have convinced themselves that they never feel homesick, but this manifests adversely in their happiness quotient. When we try to link these with the statistics for gender, we find that in almost all the categories, the male-to-female ratio is roughly 4:1, leading us to the conclusion that the development of feelings of homesickness transcends gender.

### *G. Township*




The place of origin is a seemingly important factor. Moving out of your home and residing in an educational institution can affect different individuals differently. The effects can either work in the favor of an individual or adversely affect them. The scores are as follows:

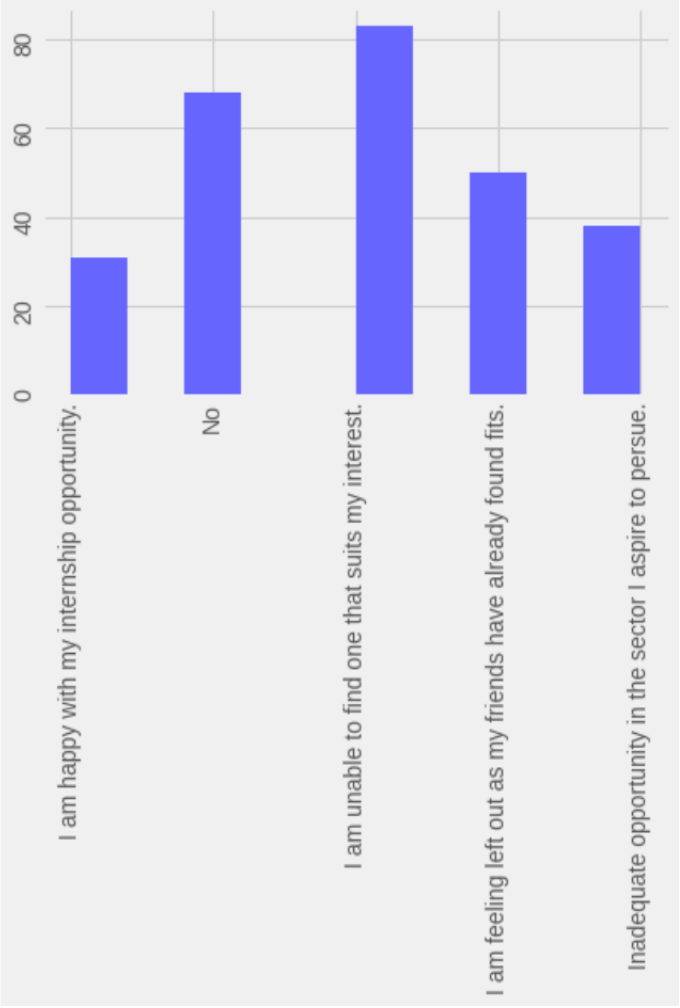
- City
  - Males (Scores= 2.976, Variance = 1.388)
  - Females (Scores = 3.097, Variance = 1.405)
- Town
  - Males ( Scores= 2.686, Variance= 1.195)
  - Females ( Scores = 2.363, Variance = 1.322)



In our dataset, the students originating from cities (around 2.9) showed much higher levels of satisfaction as compared to those from towns( around 2.4). In addition to the strains of being far from home, they must deal with the stresses associated with moving to a big city like Mumbai. Ideally, it is difficult to comment on how this change will affect one, but in our case, the results are fairly conclusive. The Township of origin is an essential factor for determining the happiness quotient of an individual.

### *H. Internship*

The end goal of the time spent here at IITB is to land a job. Interns are important stepping stones in this process. The responses to this question fall under one of the following categories:




- Unable to find one that interests me (30.6%)
- Feeling left out as my friends have already found fits (18.7%)
- Inadequate opportunity in the sector I aspire to pursue (14%)
- I am happy with my internship (11.5%)
- Not pursuing an intern (25.2%)

It is inevitable that there is fierce competition at the institute since it is a collection of some of the brightest minds in the country and, quite arguably, the world. Not bagging an internship can cause feelings of inadequacy in individuals. This is a problem with many students. When cross-referenced with departments, we find that this feeling is largely prevalent among students from 'other departments. who are primarily from the Chemical, Energy Science, and Aerospace Engineering departments. We find that a majority of these students are not able to find an intern of their liking. This might be because of the fact that only a small number of internship opportunities at major tech companies are open for students of departments other than Computer Science Engineering.

### *I. Fluency in English*

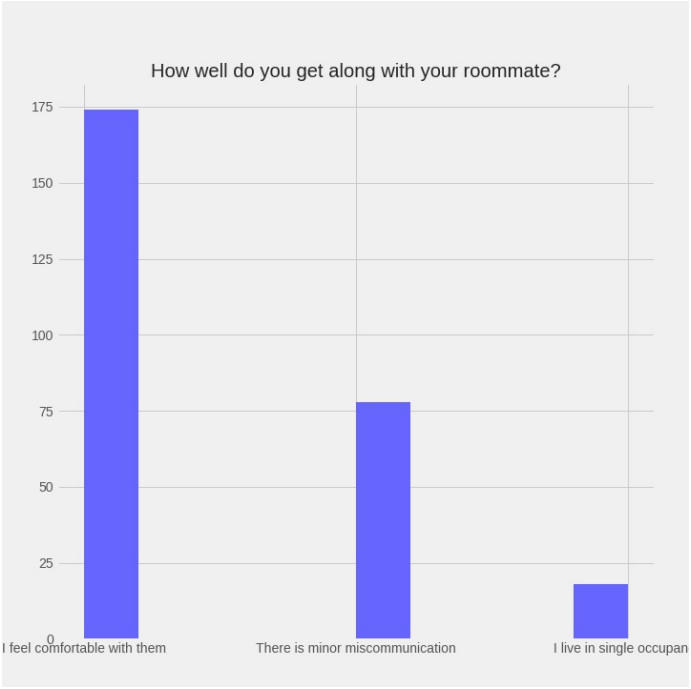
The data is almost equally divided on this matter, with both faces of the coin, forming 50%. Cross-referencing across gender and department does not produce any different results. The opinions are equally divided. While one half does not believe that their fluency in English affects their confidence, there is another that believes that it does. Thus, we cannot eliminate this field completely. Self-confidence is highly critical to a feeling of well-being which in turn affects stress levels.


### *J. Roommate Issues*

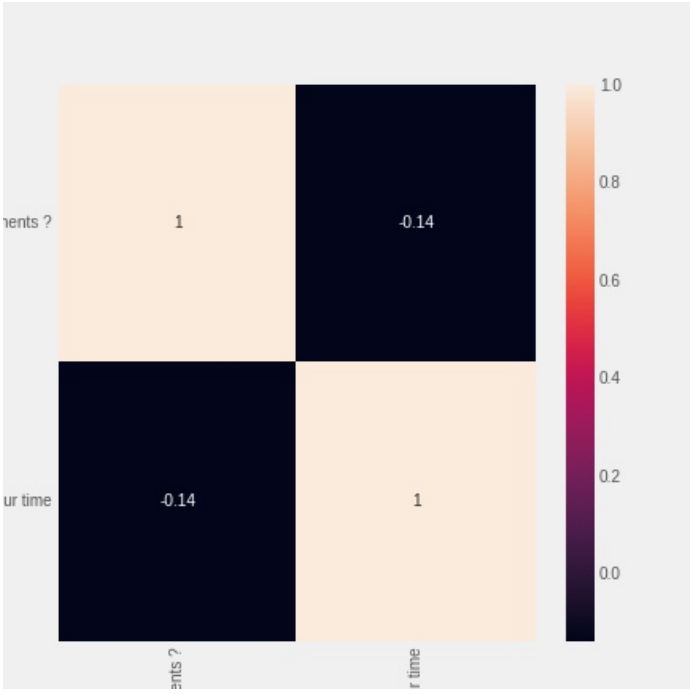
The data is divided as follows on this matter:

- I feel comfortable with my roommate (62.9%, Score=2.97, Variance = 1.436)
- There is minor miscommunication (29.9%, Score = 2.807, Variance = 1.206)

We see that while the percentages are different, the level of satisfaction of both groups is almost equal, with the value for the former being marginally higher.




### K. Trade-off between Academic and Social Life



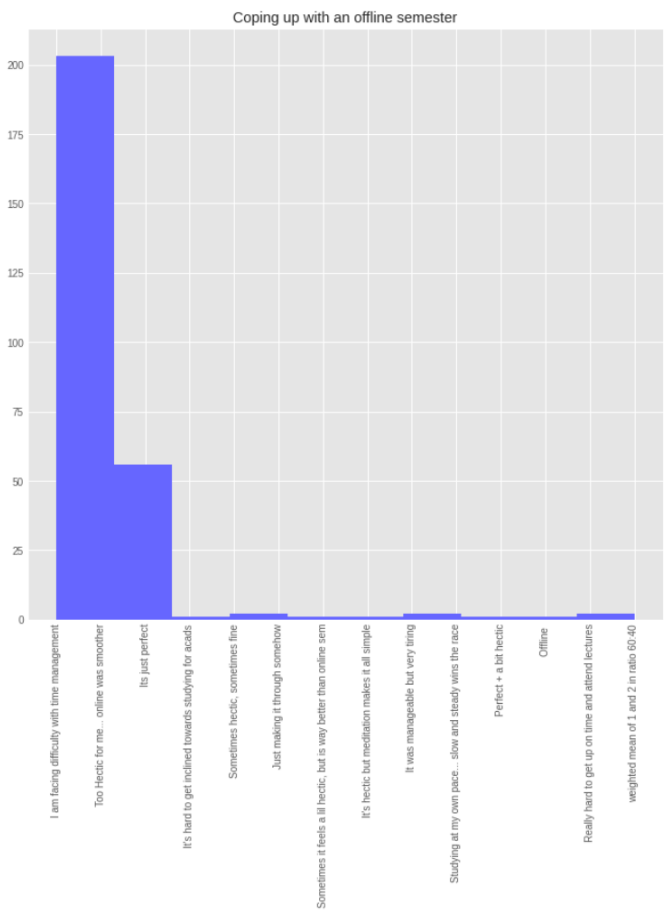

In a university setting, striking a balance between social life and academics is quintessential. We asked students to rate how they were affected by quizzes and assignments. A correlation matrix was used for analysis here. We see a negative correlation between academic effect and satisfaction. As the importance of academics increases in a student's life, his level of satisfaction seems to drop.

### L. Online v. Offline Semester

We asked students to answer how well they were coping up with the offline semester. Responses are widely spread across these 3 categories:

- It's just perfect (20.9%)
- I am facing difficulty with time management (54.3%)
- Too Hectic for me... online was smoother (20.9%)

A vast majority (more than 50%) is facing time management issues. The second most popular opinion is a tie between those who feel that it is just perfect and those who feel it is too hectic. On average, we can say that students are finding the offline semester difficult. Relating this to departments, this yields that students from the Mechanical and Electrical departments are affected to a greater extent by this as compared to those from other departments. We plotted different histograms for each of these pairings of fields, and the result was astonishing. Although a large number of mechanical engineering students were facing time management issues, they are yet satisfied with what the institute had in store for them i.e. they had high happiness quotients (Mode= 4) People from different departments who wished to have an online semester exhibit happiness quotients which are consistently in the lower ranges. The majority of electrical students who are enjoying the offline semester are satisfied i.e. have high satisfaction levels (mostly 4s and 5s).



### M. Social Life

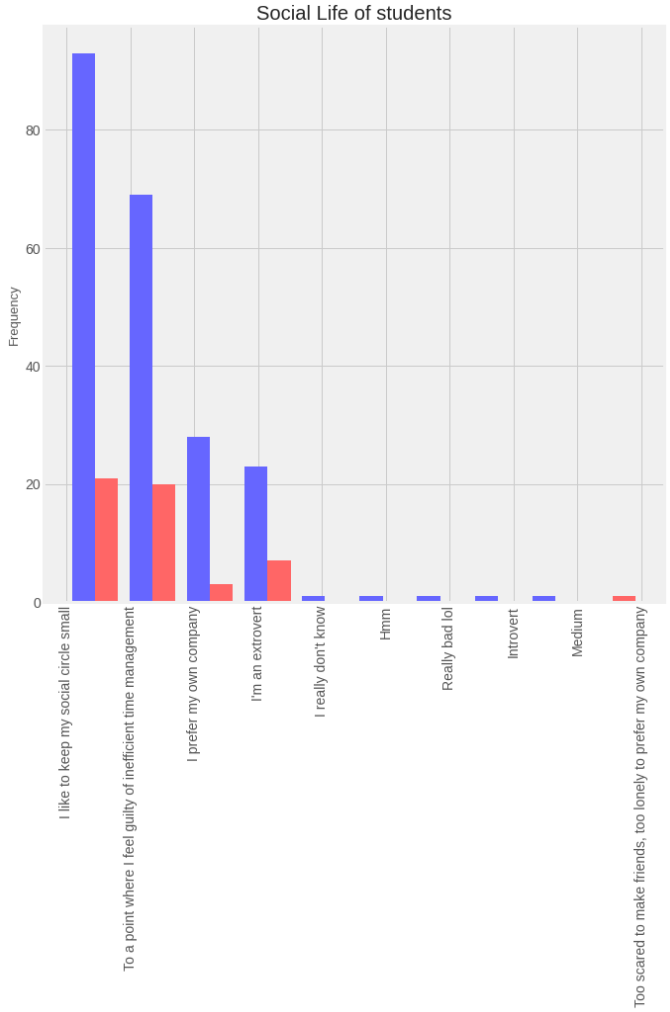
We wanted to analyze the kind of social life people on campus are leading and what type of social beings they are i.e. introverts or extroverts. The data distribution is as follows:

- To a point where I feel guilty of inefficient time management (33.5%)
- I'm an extrovert (11.5%)
- I like to keep my social circle small (41.4%)
- I prefer my own company (11.5

We now venture to comment on the happiness of these two distinct groups of individuals:

- Introverts with small but close circles (Score=3.148, Variance=1.179)
- Extroverts with large social circles (Score=2.640, Variance= 1.533)

Evidently, small but close circles are most definitely recipes for a happier existence at the institute. We tried to check if there was any disparity in these results when investigated against gender. However, males and females have almost similar scores which tells us that the result is independent of gender. Histograms further supplement our beliefs.




Social life across genders

## Summary

Conducting a survey for the students helped us gauge what factors affect the student life's stress the most. Getting an insight into the data on the basis of gender also helped us analyze the discrepancies arising out of gender differences. The CPI and the branch affecting the students the most, the following data could be used by official authorities to help minimize stress among students.

## References


[1] Link to the survey form: Are You Happy?
[2] Colormaps in matplotlib and seaborn
[3] Using filters in pandas dataframes: Filters
[4] Plotting the bubble plot: Bubble Plots


Our dataset might have been a little biased towards some particular branches and years of study. However, throughout the study we have tried to reduce the effect of the bias on our conclusions made from the data.