



**Couse: MAT502 Advanced Statistics**

**Mentor: Professor Shashi Prabh**

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## **Analysis of the data for Weekdays vs. Weekends sales data of the University Canteen**

### **Group Details:**

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## **INTRODUCTION**

As known, Ahmedabad University' canteen provides a variety of cuisines to the students. There are four types of counter that the university Canteen has: 1) Cafe Declice 2) Truly Indian 3) Global Bistro 4) Greens and grains. Here, the maximum busy counter is Cafe Delice as it provides the Fast food and beverages in the canteen. So we have analyzed the data for the same. We would like to analyze and find out if there is any correlation/association between weekday's food sales and weekend's food sales.

## **OBJECTIVE**

The goal of this study is to provide valuable information on the association between the food sales of the Cafe Delice counter of the University Canteen. The study has taken into consideration if there is unusual behavior on weekends if there was a big event going on in the University at the particular weekend.

## **SAMPLING METHOD**

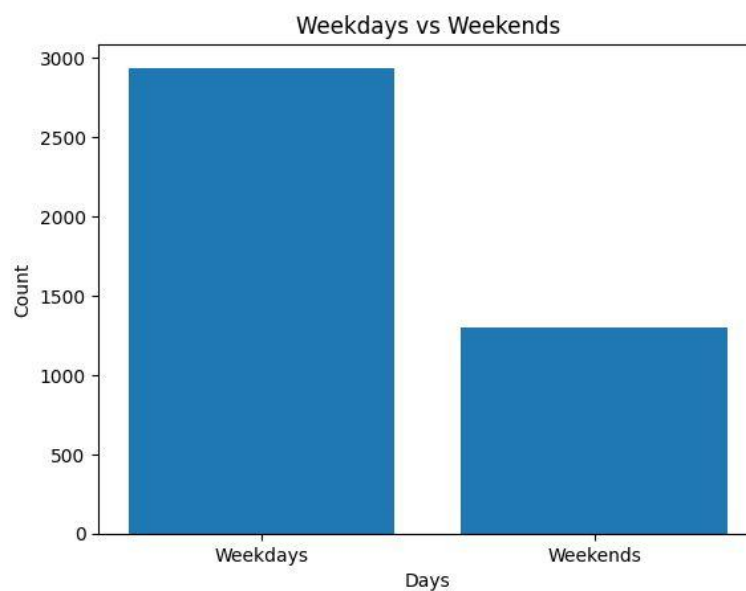
The sample used for this study includes the official data of food sales from the university canteen. The data includes data for the sales of the Cafe Delice counter for 6 months which includes, August 2022 to January 2023. There were also some new food items introduced and some were stopped availability. The menu for the weekends and weekdays is also different. Many items are not available on the weekends in comparison to weekdays.

## DATA COLLECTION METHOD

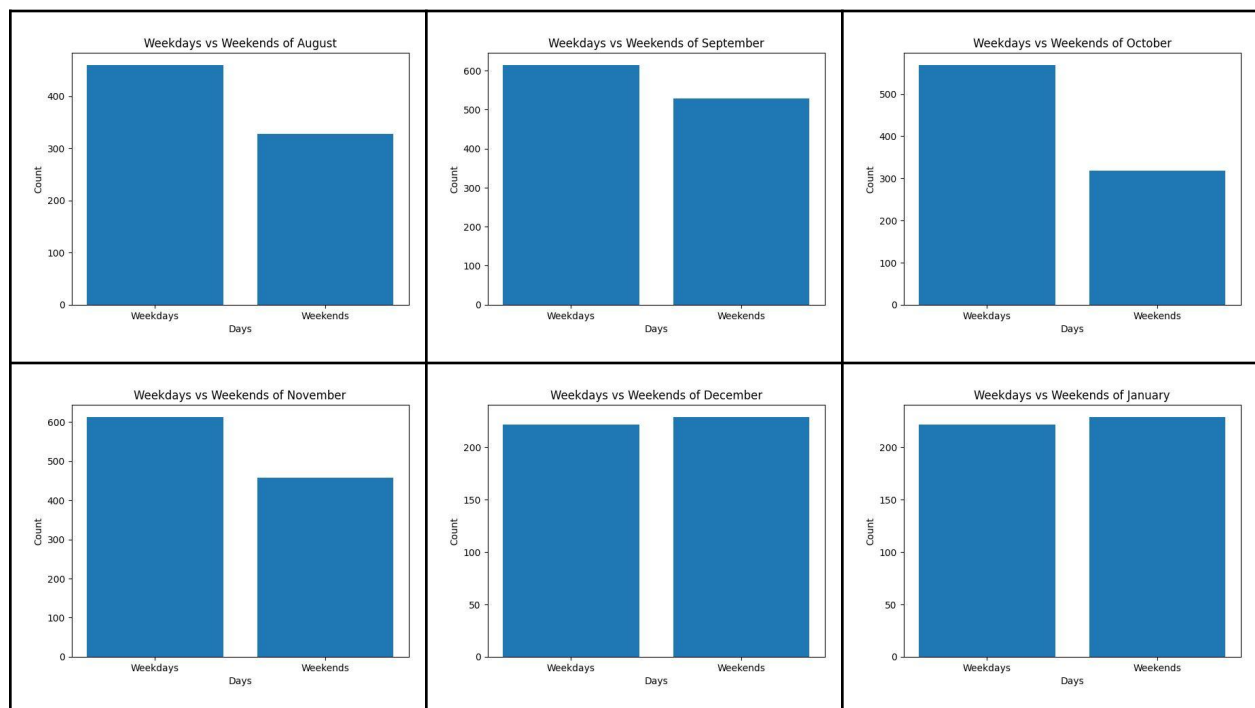
The data was collected from the officials of the university canteen manually with permission of the head of the canteen. The head of the university canteen and the head chef were consulted by our team, to find out their views for the project and the analysis. The views of both of them have been taken into consideration for the analysis of the data for weekends and weekdays food sales as they have first hand experience for the same. The data has been filtered and normalized for each month by the team for 5 weekdays and for the weekends as well, for 2 days, so that the analysis can be made easy.

## EXPLORATORY DATA ANALYSIS

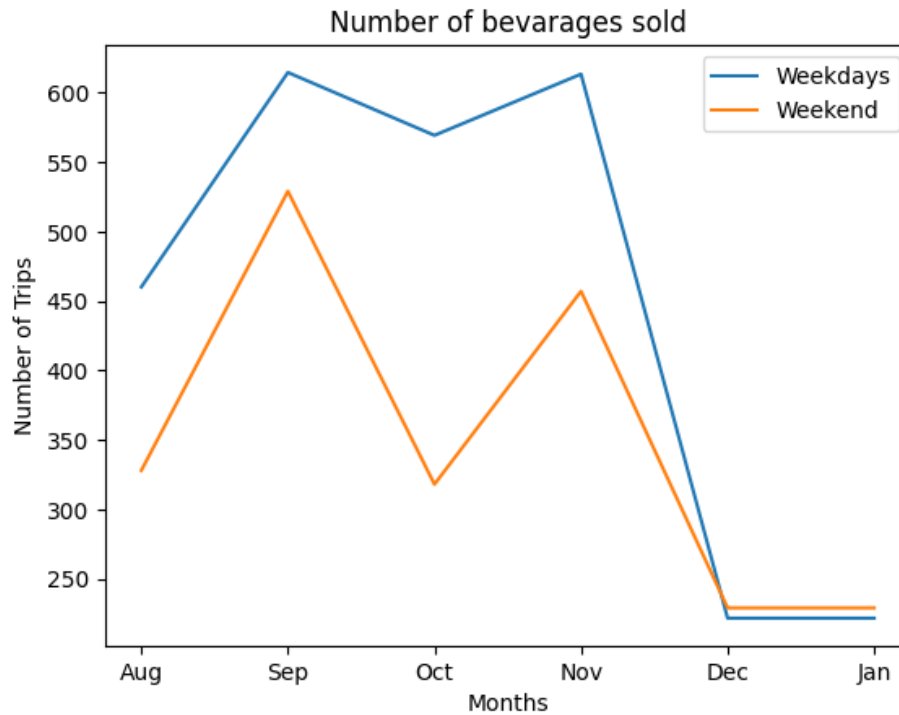
The following graphs can help to look through the sales data of Cafe Delice on weekdays vs weekends as it shows the data regarding beverages over every month from August, 2022 to January 2023.



The data of August shows significant differences between the data of Weekends and Weekdays, and the sales data of the beverages in the weekdays is quite higher than the weekends. The graph of September shows the same statistics as graph of the August for the same reason. This reason also goes same for the data till November. After that, for the december and january, it is visible from the graphs that, the weekends data has higher value than the weekdays data. The main reason for the same is, Ingnum which is technical fest of Ahmedabad University, which started from mid-December and lasted till mid-January. The events were mainly on weekends, which led to unusual behaviour in sales data of weekends in December and January. During this time of December - January, other big events from different schools were also going on on weekends. The fest of School of Arts and Science was also during this time.



Month wise weekdays and weekend days count



## HYPOTHESIS TESTING, RESULTS AND INFERENCES

### 1) Chi-Square Test:

Null hypothesis: There is no statistically significant association between the type of day (weekdays vs weekends) and the sales of different items in the university canteen.

Alternative hypothesis: There is a statistically significant association between the type of day (weekdays vs weekends) and the sales of different items in the university canteen.

For testing association between the two variables, chi-square test was performed.

The p value for the test is  $7.536279618452897 \times 10^{-8}$ . As it is very small than the significance level ( $\alpha=0.05$ ), the null hypothesis is rejected.

## 2) Anova Test:

Now, confirming the results of the Chi-Square test using Anova test.

Null hypothesis: There is no statistically significant association between the type of day (weekdays vs weekends) and the sales of different items in the university canteen.

Alternative hypothesis: There is a statistically significant association between the type of day (weekdays vs weekends) and the sales of different items in the university canteen.

For testing association between the two variables, and to find out if, for more than two groups or levels of a categorical variable, is there a significant difference in the means of a continuous variable among the groups? As the solution, Anova test was performed. The p value for the test is  $6.095866646581368e-16$ . As it is smaller than the significance level ( $\alpha=0.05$ ), the null hypothesis is rejected.

## CONCLUSION

The weekend sales data is affected by many factors. One very obvious and important factor is, no lectures or less number of lectures on weekends. This leads to lesser students present on university campus. So, the number of sales go down. Another reason is, less number of items available in weekends in comparison to weekdays. There is significant difference in number of items available on weekends. For month of August, available number of items on weekdays are 118 and on weekends, this number gets to 75. And the reason for unusual data of December and January is the events going on in the university.

## Code and Dataset:

[https://github.com/SpandanShah/analysis\\_of\\_canteen\\_data](https://github.com/SpandanShah/analysis_of_canteen_data)

## References:

1. Armstrong, R. A., & Hilton, A. C. (2010). One-way analysis of variance (Anova). *Statistical analysis in microbiology: Statnotes*, 33-37.
2. Matsumoto K. [Statistical analysis of pharmacological data: use of cumulative chi-squared statistic]. *Nihon Yakurigaku Zasshi*. 1997 Dec;110(6):341-6. Japanese. doi: 10.1254/fpj.110.341. PMID: 9503392.