

Lecture 10 Demo

PSTAT 100: Spring 2024

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In this mini-report, we investigate the claims (posited by the *Daily Nexus*) that 35% of undergraduate regularly bike to campus. The results of a convenience sample seemed to indicate that, at a 5% level of significance, the *Daily Nexus*'s claim can be rejected, however the nature of the sample collected necessitates further investigation.

1 Introduction

A recent (February 24, 2024) *Daily Nexus* article claimed that 35% of undergraduate students regularly bike to campus. The main purpose of this report was to collect a sample and assess the claims posed by the *Daily Nexus*.

2 Data Collection

A convenience sample consisting of the 34 students in attendance in lecture on Thursday, May 2, was taken. Each student was asked whether or not they regularly bike to campus; 18 students indicated that they do, leading to a sample proportion of $\hat{p} = (18/34) \approx 52.94\%$.

3 Analysis and Results

Setting p to be the true proportion of UCSB undergraduates who regularly bike to campus, we conducted a two-sided hypothesis test of

$$\begin{cases} H_0 : & p = 0.35 \\ H_A : & p \neq 0.35 \end{cases}$$

The observed sample proportion value of $\hat{p} = 18/34$ was standardized to

$$ts = \frac{\left(\frac{18}{34}\right) - 0.35}{\sqrt{\frac{(0.35)(1-0.35)}{34}}} \approx 2.19$$

and the critical value was computed as the 97.5th percentile of the standard normal distribution - approximately 1.96. As the observed value of \hat{p} exceeds the critical value, the null was rejected leading to the conclusion

At a 5% level of significance, there was sufficient evidence to reject the claims that 35% of UCSB students regularly bike to campus.

To confirm, an analysis using p -values was also conducted: the observed statistic corresponds to a p -value of approximately 0.029, which falls under the $\alpha = 0.05$ significance level, leading us (once again) to reject the null.

4 Discussion

Though the results of the test indicate a rejection of the null is warranted at a 5% level of significance, it should be noted that the sample collected was a **convenience sample**. As such, inference on the data collected should be viewed as dubious at best - a future study should be conducted, taking greater care in the initial sampling procedure.

5 Conclusion

A convenience sample of 34 students attending PSTAT 100 on Thursday, May 2, 2024 was collected, and 18 of these students indicated they regularly bike to campus. At a 5% level of significance, our sample lead sufficient evidence to reject the *Daily Nexus*'s claim that the true proportion of UCSB undergraduates who bike to campus is 35%. However, given that the sample collected was a convenience sample, the results of this study should be viewed with extreme caution.