Exploring Graduate Admissions

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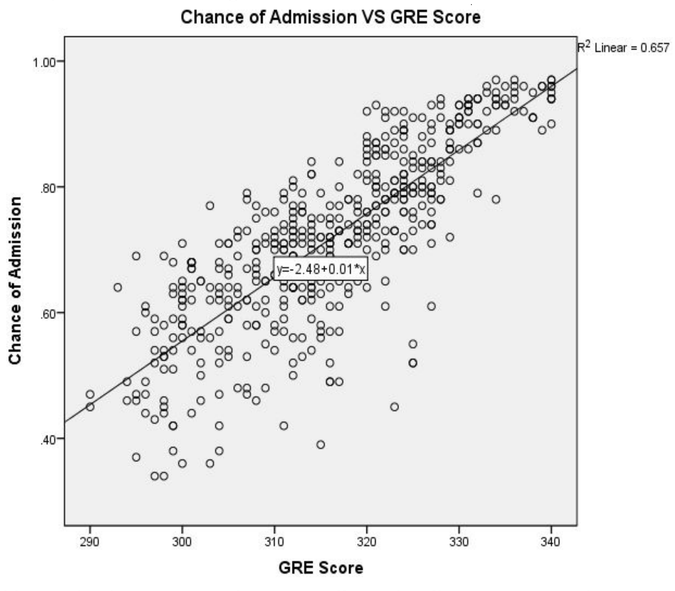
Abstract

We explore various relationships among a number of criteria within the domain of graduate admissions. Our goal is to find out what are the common patterns and trends in the graduate admissions. The data was collected by Mohan S. Acharya and includes over 500 rows of graduate admissions' records for the US universities. The column names include Serial No., GRE Score, TOEFL Score, University Rating, SOP, LOR, CGPA, Research, and Chance of Admit. It should be noted that we do not use columns Serial No., CGPA, and SOP in our analysis (some of the reasons include TOEFL not being required for the US students and CGPA not being measured on the scale of 10).

GRE Score and the Chance of Admission Does It Really Matter?

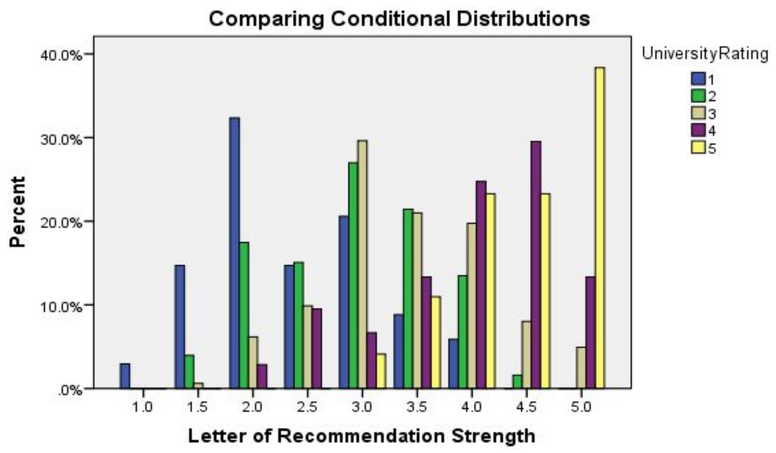
Graduate Record Exam or simply GRE is a prerequisite exam for the graduate admissions in most universities. We thought that it would be interesting to see how impactful a good GRE score can be and whether a high GRE score makes one more likely to be accepted for the graduate studies. In order to determine and analyze the relationship between two quantitative variables, we applied the commonly-used scatterplot and the linear regression for the analysis. Scatterplot allowed us to see the relationship right away while the linear regression strengthened our assumptions and furthermore, made us able to predict the approximate acceptance chance given the certain GRE score.



Above is the scatterplot as well as the linear regression showing the relationship between two quantitative variables. Notice that the scatterplot has the shape of a fairly flat football representing a strong correlation between the variables. Besides, the football ascends from the left to the right making it clear that the correlation is positive. The linear regression line y = -2.48 + 0.01x strengthens the argument that the correlation is positive as its slope is positive. *Therefore, the higher the GRE score, the higher the chance of being admitted for the graduate studies. And now, answering the question "Do the GRE scores matter?" the answer is "YES! They do!"*

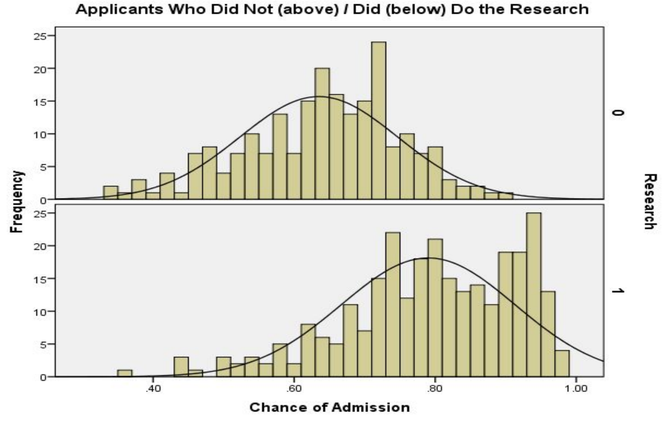
University Rating VS Letter of Recommendation

We use the Chi-square test of independence. Our null hypothesis is that there is no relationship between the university rating and the letter of recommendation strength, with the alternative hypothesis stating that there is a relationship between these two categorical variables. Our Chi-square value is 272.228 with 32 degrees of freedom resulting in the P-value less than 0.001. As for alpha value that measures the strength of evidence, our choice is to use 0.025 (notice that it is the half of the standard 0.05). Since $P < 0.001$, which is a lot smaller than our alpha, we can safely assume that there is a strong relationship between the university rating and the letter of recommendation strength. Thus, we reject the null and accept the alternative. It should also be noted that in the table of the expected counts, all of the entries were ≥ 5 which bolsters our argument even more. *The stronger the letter of recommendation, the higher the university rating, vice versa.*



Is Research That Important?

The dataset provides a simple categorization of the graduate applicants by having two categories: 1 and 0, representing applicants who did research and those who did not respectively. Our goal is to determine whether research experience has a big influence on the chance of being accepted or not.

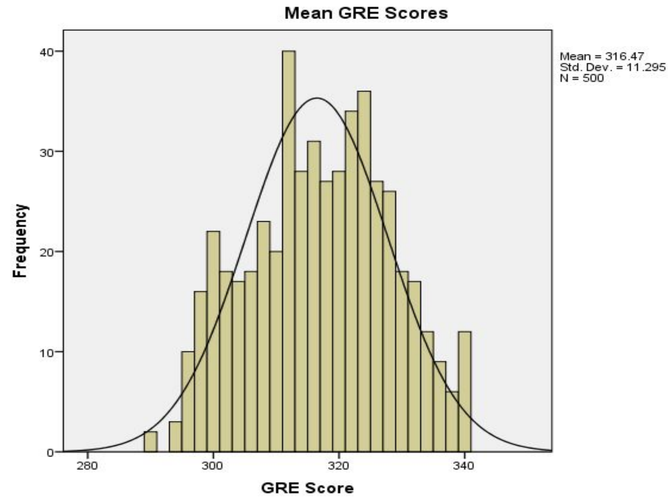


Once we group the applicants by research, we obtain two SRSs and perform the two-sample t test for means. This test allows us to compare average chance of being admitted for the applicants who did the research against those who did not do the research.

Our null hypothesis is that the mean acceptance chance is the same for both groups and the alternative hypothesis states that the mean acceptance chance of applicants who did the research is greater. The statistics dialog generated by the SPSS showed that our test statistic t is -14.707; the degrees of freedom is equal to 487.605 resulting in $P < 0.001$. Our alpha value is 0.025. Therefore, we reject the null and conclude that there is a strong evidence that the means are not the same. Since we accept the alternative hypothesis, we also provide the confidence interval for the difference of means with the confidence level of 95%. The confidence interval for the difference of means is from -0.33083 to -0.2894. *Finally, we conclude that we are 95% certain that, on average, those who did research are, approximately, from 28.94% to 33.083% more likely to be accepted than those who did not do any research.*

What Is the Average GRE Score?

According to ETS (Educational Testing Service), "the 50th percentile," or "average GRE score," is about 303, or 150.05 for verbal and 152.80 for math. We would like to test the accuracy of the reported means. For this, we use the one-sample t test for the mean. Note that we have an SRS with more than 40 datapoints (which is required for CLT to account for the skewness, if any, of the dataset). Since we do not know the population standard deviation, we obviously use the sample standard deviation instead. Our null hypothesis is that the actual mean and the claimed mean is the same. The alternative hypothesis is that the actual population mean and the claimed mean are different.



As seen above, we got the test statistic value of 26.670 with 499 degrees of freedom resulting in the P-value less than 0.001. It is 25 times smaller than the significance level which we, once again, have set to 0.025. Therefore, we reject the null and state that the reported mean is not equal or is not a good approximation of the actual mean. Therefore, we provide a 95% confidence interval using our claimed mean which is 316.47. *Finally, we are 95% confident that the mean is within the range from 328.95 to 330.93.*

References

1. https://www.kaggle.com/mohansacharya/graduate-admissions
2. https://www.ets.org/s/gre/pdf/gre_interpreting_scores.pdf