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OPTIMIZATION ANALYSIS OF TWO GROUPS

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ABSTRACT

The standard method to decide if a group of data is comparatively different than other in terms of location, dispersion, and proportion is the statistical comparison. This work attempts to look into this problem with a mathematical optimization perspective.

INTRODUCTION

Optimization is necessary because comparing statistical analyses seeks to improve the process by helping to determine whether two groups are different or not. Each case generates a normal random data with the parameters required for them. P-Value, which we compare with alpha, is the probability of having the measured difference of a group randomly.

OBJECTIVES

- Generate random data for the purpose of determining whether two groups are different or not by optimizing the statistical analyses performed.
- Work with three cases of group differences.
- Find the proportion of wrong conclusions for each case.

METHODOLOGY

The following tests were performed for comparing two groups in hopes of finding them different when its true and equals when it's true. We rejected our null hypothesis for the T- Test when our P-Value was less or equal than our Alpha. For the Radar Test, we rejected when one of the Radar graphs was inside of the other. While for our final test, the Profile test, we rejected when the linear graph where completely apart.

RESULTS AND DISCUSSION

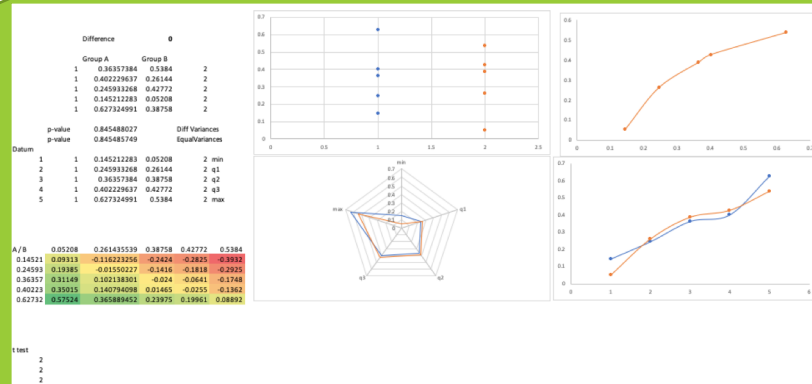


Figure 1: Methodology method

Figure 2: Represents our proportions results for the 3 types of tests done and their respective evaluated alphas.



CONCLUSIONS AND FUTURE WORK

In our first case, where the difference is zero, we should not reject our null hypothesis because our data, which consisted of two groups, were not different. While on our second case, where the difference was 0.3, we should reject our null hypothesis because in our groups are different by 0.3, the same is expected for the difference of 0.6. As presented before, our best results were with our first case because when examining the P-Value versus our alpha, we see that we get proportions that better resemble our alpha. For future work, we will continue to evaluate cases where there are groups with even smaller differences than 0.3 and run the same tests.

REFERENCES

Walpole, R. E., Myers, R. H., Myers, S. L., & Ye, K. (2016). *Probability & Statistics for Engineers & Scientists* (9th ed.). Virginia: Pearson.

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