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Yelp's Outlying Reviews

1. Introduction
Yelp allows users to review and rate a business on a scale of 1-5. Such a restricted rating scale may limit the expression of rating. What we seek to identify are the outlying reviews. We believe such reviews may give some interesting insights.

2. Methodology
2.1. Outlying reviews
Outlying reviews are those that fall outside of the overall pattern of the rest of the data. For example, if a user tends to usually rate a business around 4 or 5 stars, and then ends up rating a business with 1 star, the latter is an outlying review. We hypothesize that such outlying reviews, by virtue of being outliers, will be different from regular reviews. This project seeks to discover how different are these reviews and in what ways.

We utilize the rule of interquartile range to calculate our outliers. We start by collecting, for each user, the ratings they have attributed to different businesses over time. For this list of ratings, we then calculate the first and the third quartiles, use this interquartile range to calculate our lower and upper outlying thresholds. Any review by this user with a star rating lower or higher than our thresholds is considered an outlying review.

2.2. Comparing outlying reviews with non-outlying reviews
The next step is to compare the outlying reviews with the non-outlying reviews. One way to do this is to utilize the information regarding the number of votes each review received. Yelp allows readers to vote a review as useful, funny and/or cool. We wonder if the distribution of votes is different for outlying and non-outlying reviews.

We calculate the number of votes each review received. Then, to compare the different proportions, we use p-value to indicate the significance of the obtained chi-square.

3. Results
The tests indicated that outlying reviews received many more useful and funny votes (p-value < 0.0001 for both suggest statistically

significant differences). However, for the number of cool votes, no significant difference was observed.

4. Summary

Apart from the observation that outlying reviews on average were deemed more useful and funny, it was also observed that there were considerably more negative outlying reviews than positive. This means that people generally tend to deviate more writing a negative review.

Now that we know that outlying reviews are on average more useful and funny, the next step is to detect the factors that make these reviews collect more votes.