

Non-Parametric Project

Analysis of Rotten Tomatoes Movie Data

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Group 2

Introduction & Dataset

► **Objective:** To apply non-parametric statistical tests to understand relationships within movie data.

► **Data Source:** A curated dataset of the Top 300 movies from Rotten Tomatoes.

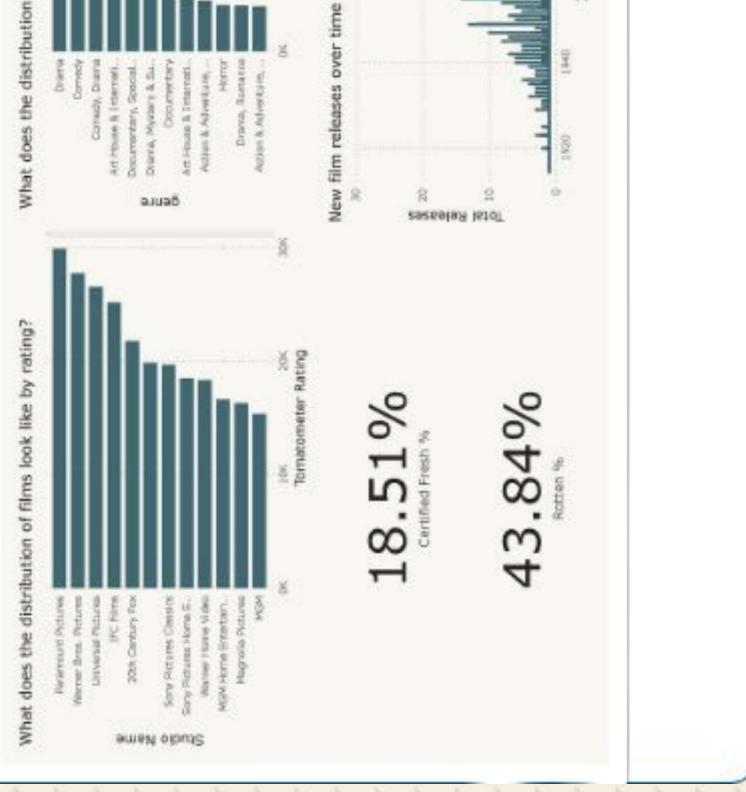
► **Key Variables:**

► Tomato Score, Popcorn Score

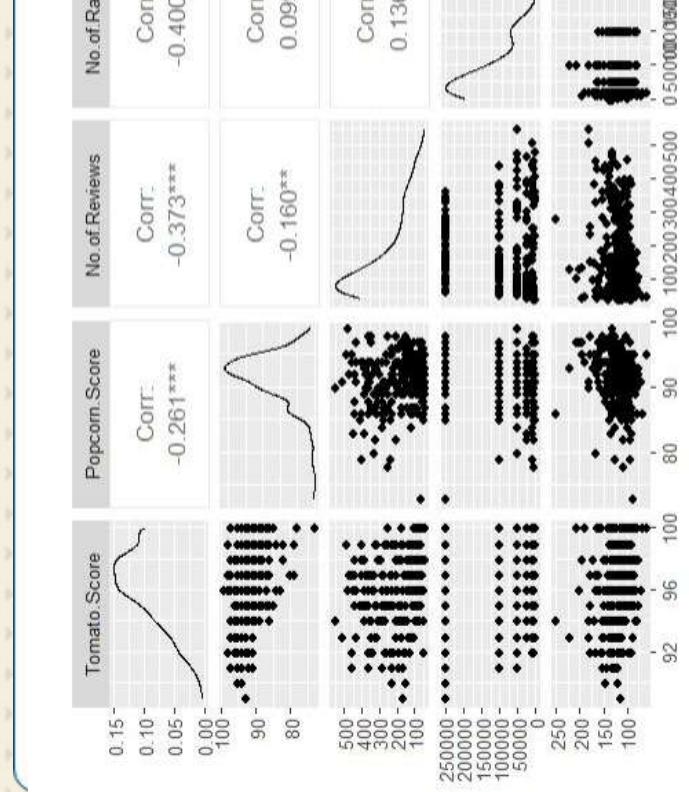
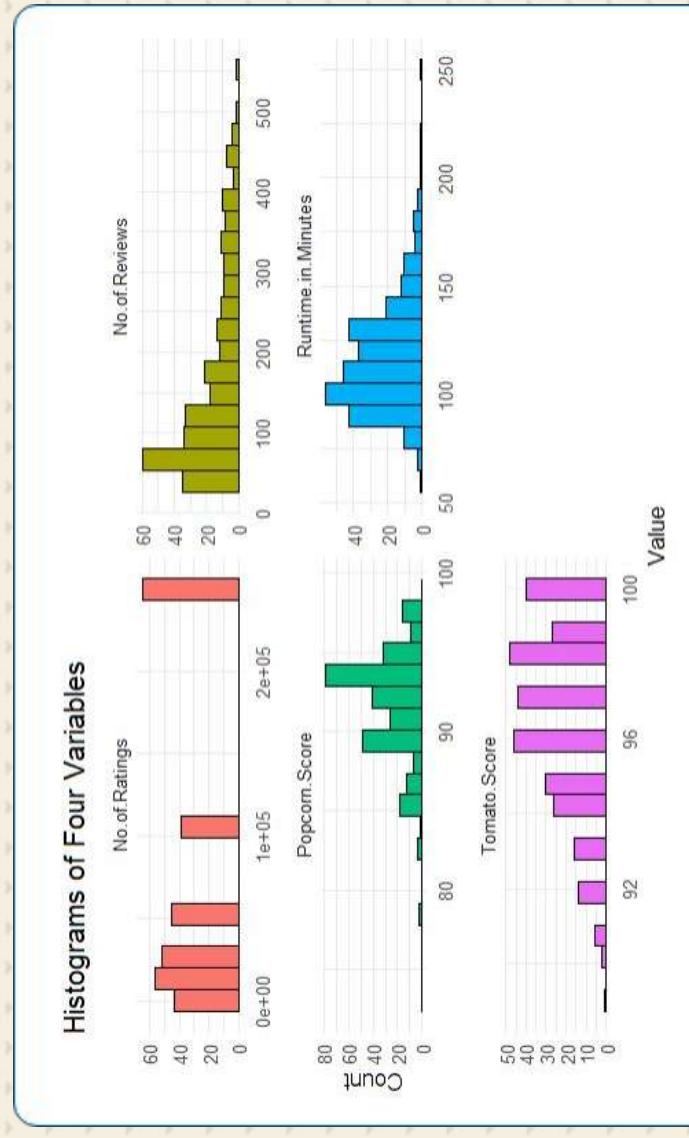
► No. of Reviews, No. of Ratings

► Runtime, Genre, Release Year

► **Comment:** The goal is to use tests that don't require our data to be normally distributed (which it isn't).



Exploratory Data Analysis (EDA)



Histograms show variables have different distributions. Tomato Score is left-skewed; Reviews/Ratings are right-skewed.

The ggplots pairs plot gives a first look at relationships correlations present among the features.

Analysis 1: Is the Data Random?



Test & Why

Test: The Runs Test
Why? We need to know if our data is a random sample before applying other tests.



Hypothesis

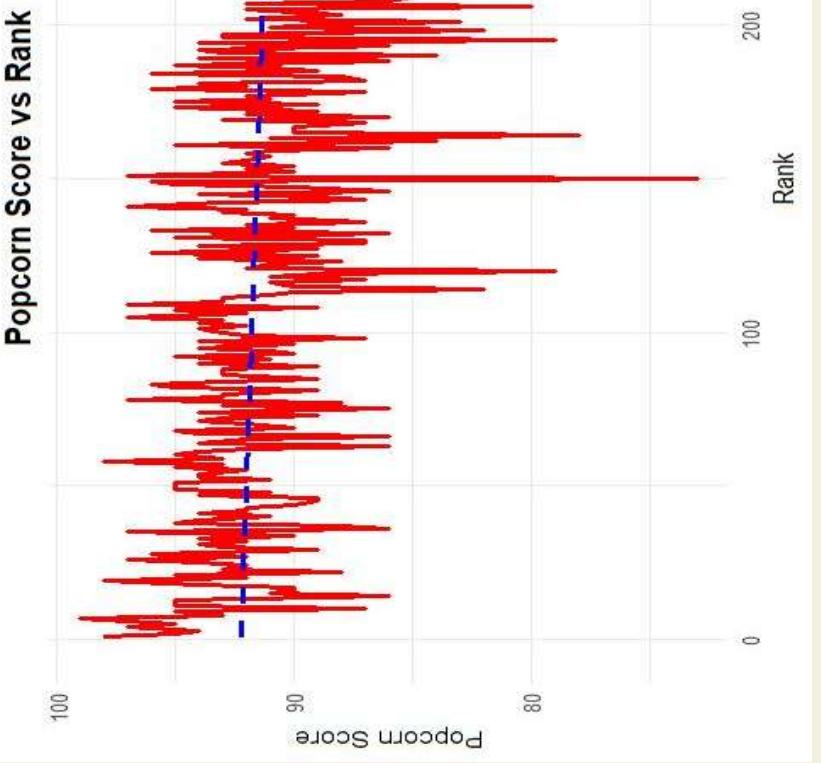
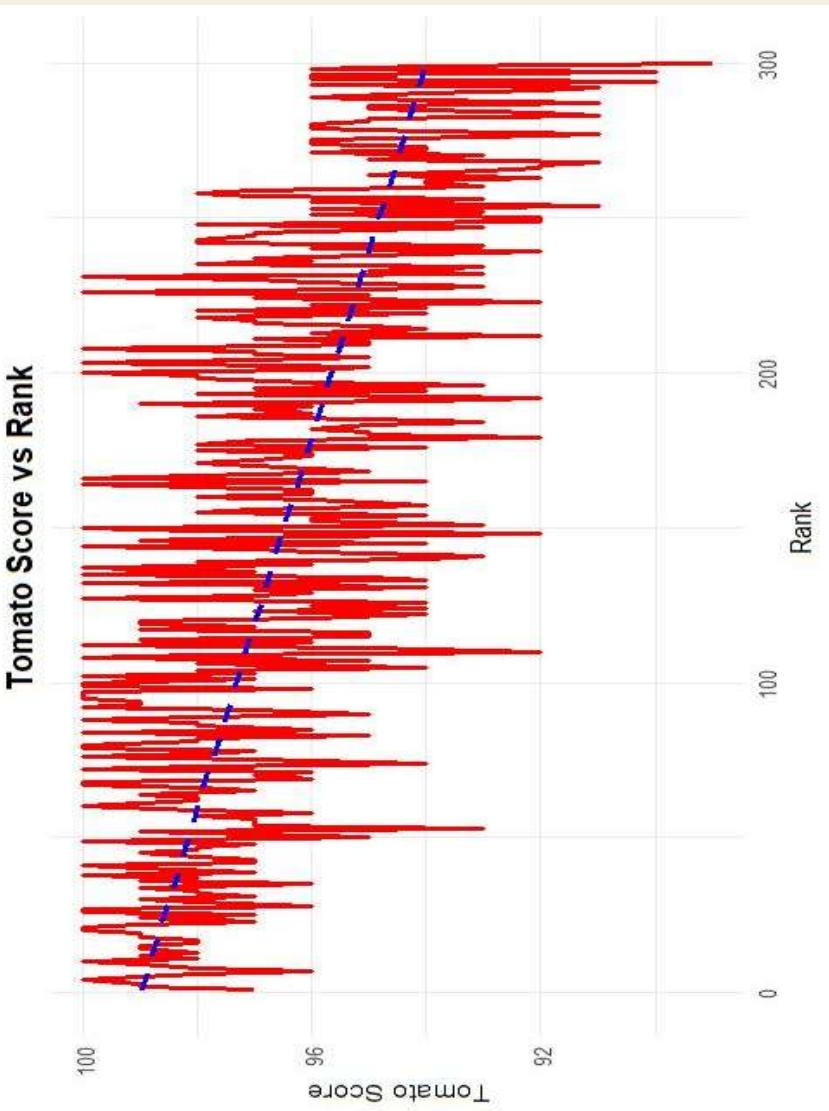
Null (H0): The data is random.

Alt (H1): The data is NOT random.

Conclusion

Tomato Score: Can data is random (Rej)
Others: Random (Fa)

Comment: Tomato random because the sorted by rank.



This plot shows a clear negative relationship between Tomato Score and Rank. As rank increases, Tomato Score decreases almost linearly, indicating that movie rankings are primarily based on the critic's Tomato Score.

In contrast to Tomato Scores, Popcorn Scores show a pattern with Rank. The trend line is nearly flat, indicating they're not determined by audience scores — they're based on other critic scores. We may expect same plot for other

Analysis 3: Are Reviews and Ratings Related?

Spearman's Rank Correlation

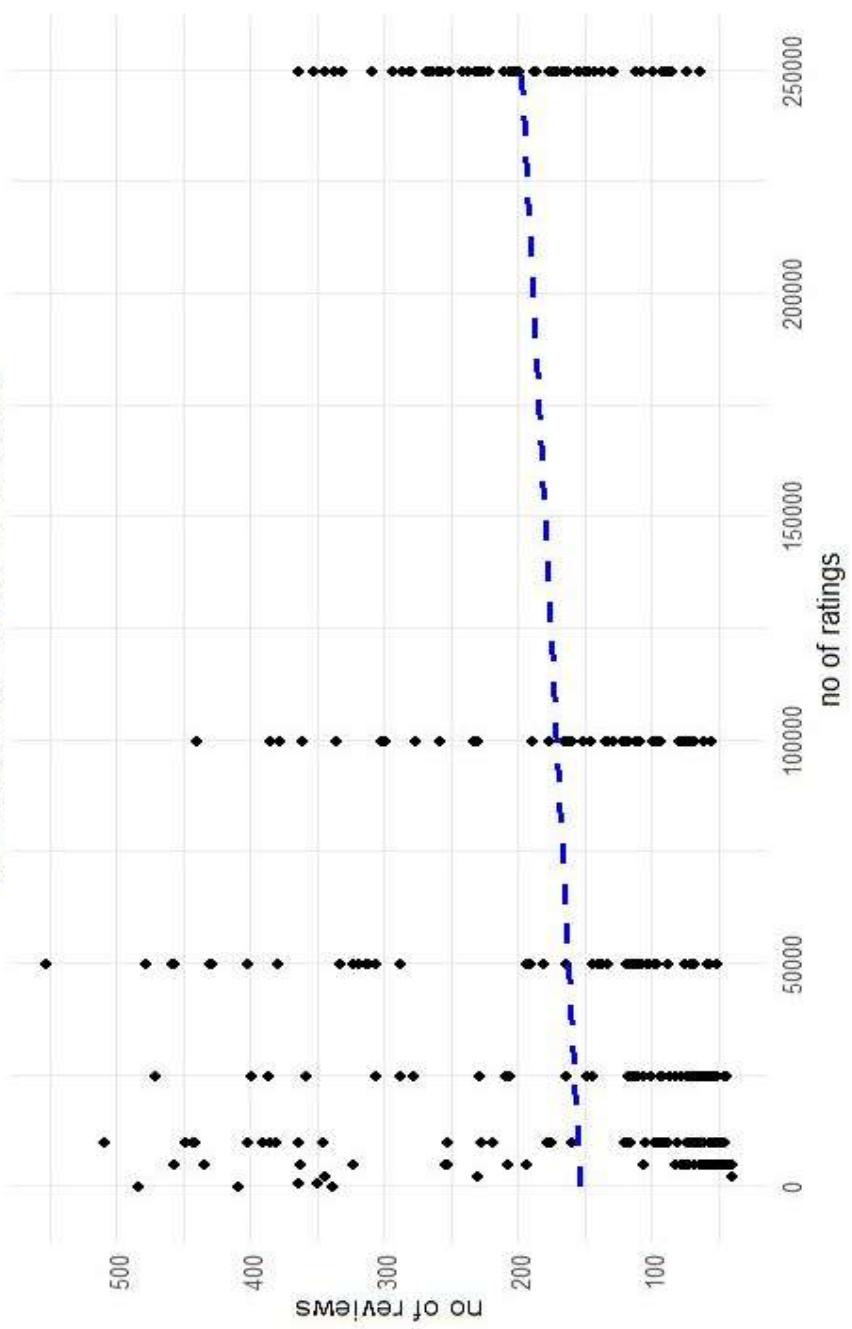
- HO: There is no correlation.
- Result: Very small p-value ($p = 1.428e-8$).
- Decision: Reject HO.

Kendall's Tau

- HO: two features are independent.
- Result: Very small p-value ($p = 1.344e-8$).
- Decision: Reject HO.

Conclusion: Yes, there is a strong, significant positive correlation. As the number of critic reviews increases audience ratings also tends to increase.

no of ratings vs no of reviews



Interpretation:

This plot shows a weak but positive relationship between the number of reviews and the number of ratings. Movies that receive more reviews generally also receive higher ratings, though the correlation is not very strong.

Analysis 4: Does Runtime Affect Engagement?

Q1: Runtime vs. No. of Reviews

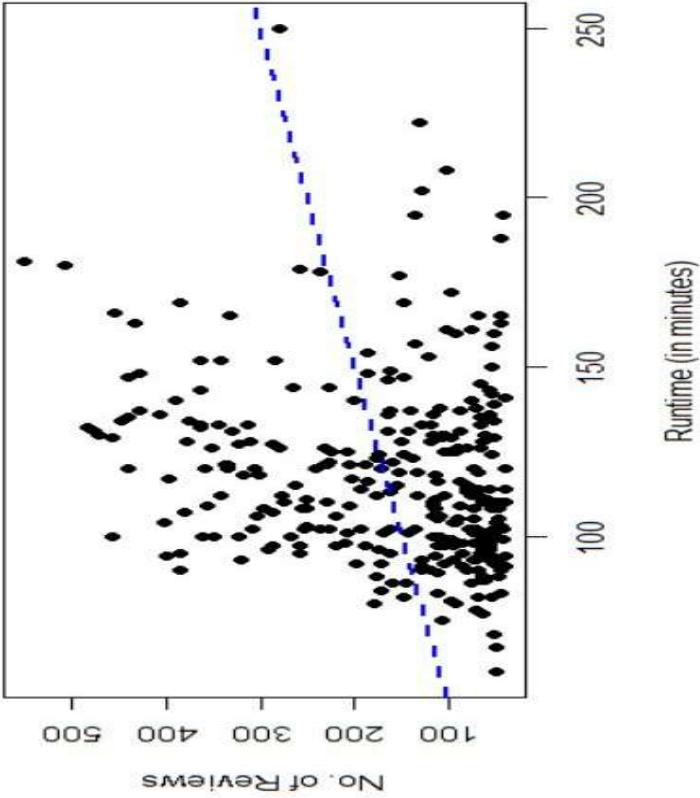
- Test: Spearman/Kendall's Correlation.
- Result: p-value < 0.05 in both case. Reject HO.
- Interpretation: Yes, a significant positive correlation.
 - Also they are not independent. Longer movies tend to have more reviews.

Q2: Runtime vs. No. of Reviews

- Test: Spearman/Kendall's Correlation.
- Result: p-value > 0.05. Can not reject HO.
- Interpretation: No significant correlation
 - they are independent. Thus movie length affect how many rating the movie gets.

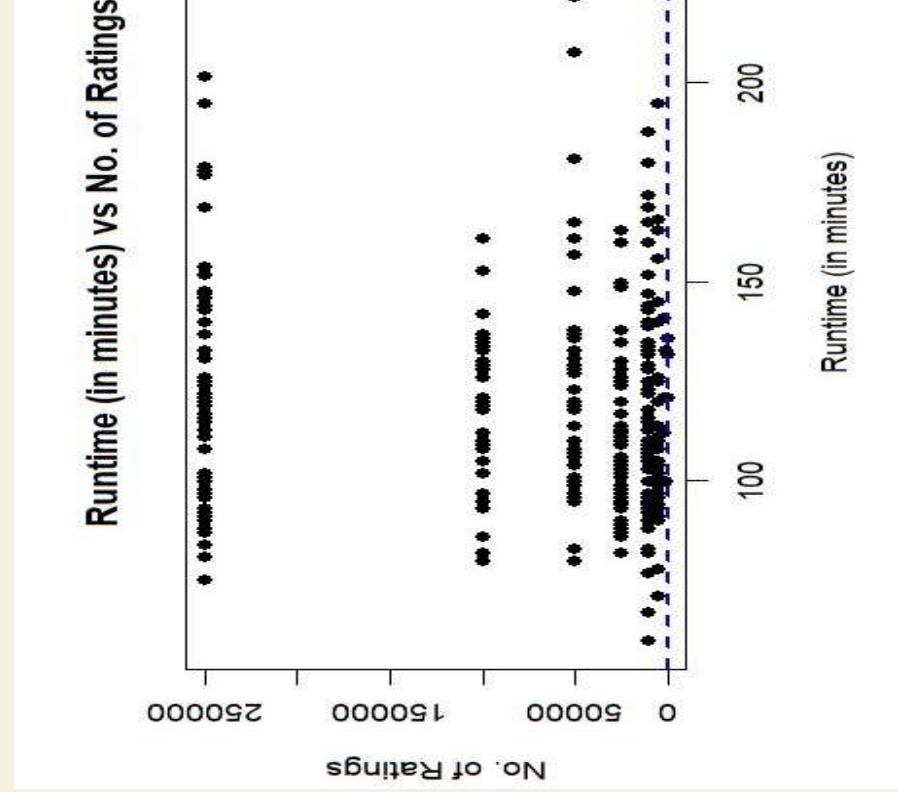
Comment: Longer movies tend to get more number of reviews, whereas, there is no effect of length of movies on reviews.

Runtime (in minutes) vs No. of Reviews



This plot shows a weak but significant positive relationship between runtime and number of reviews. As runtime increases, the number of critic reviews also tends to increase i.e longer movies generally attract more reviews.

Runtime (in minutes) vs No. of Ratings



The scatterplot is showing a flat trend with no visible systematic increase or decrease with run length does not influence how many people

Analysis 5: Do Tomato Scores Differ by Genre?

Question: Do different genres have different median Tomato Scores?

Test Used: Kruskal-Wallis Test

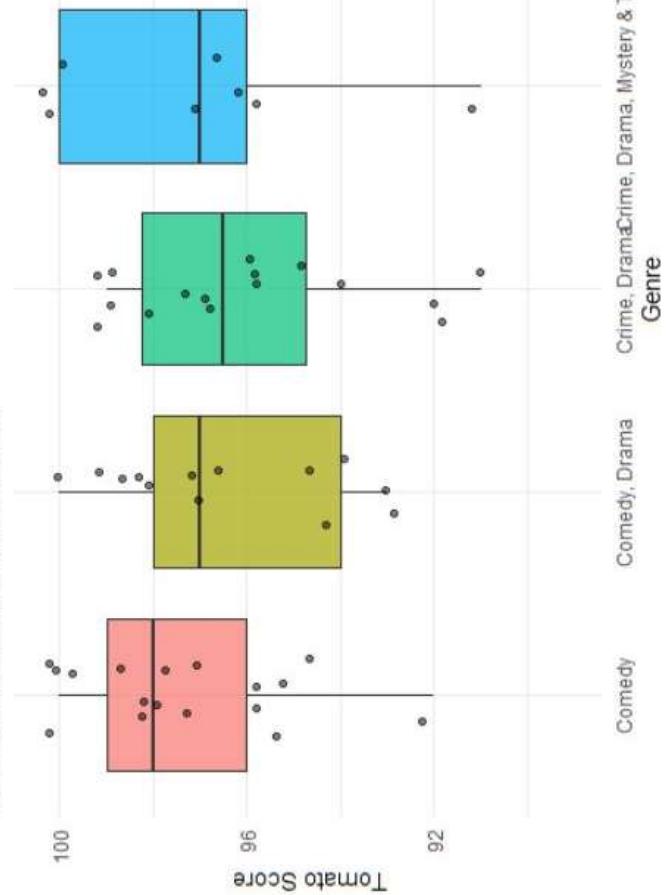
Why? A non-parametric alternative to ANOVA for comparing 3+ groups.

Null Hypothesis (HO): The median Tomato Score is the same across all genres.

Interpretation: With a p-value = $0.2897 > 0.05$, we do not reject HO.

This means — there's no significant difference in Tomato Scores across genres. In other words, critics rate different genres similarly.

Tomato Scores Across Genres



Analysis 6: Have Scores Changed Over Time?

Question: Are Tomato Scores for movies before 2000 different from those after 2000?

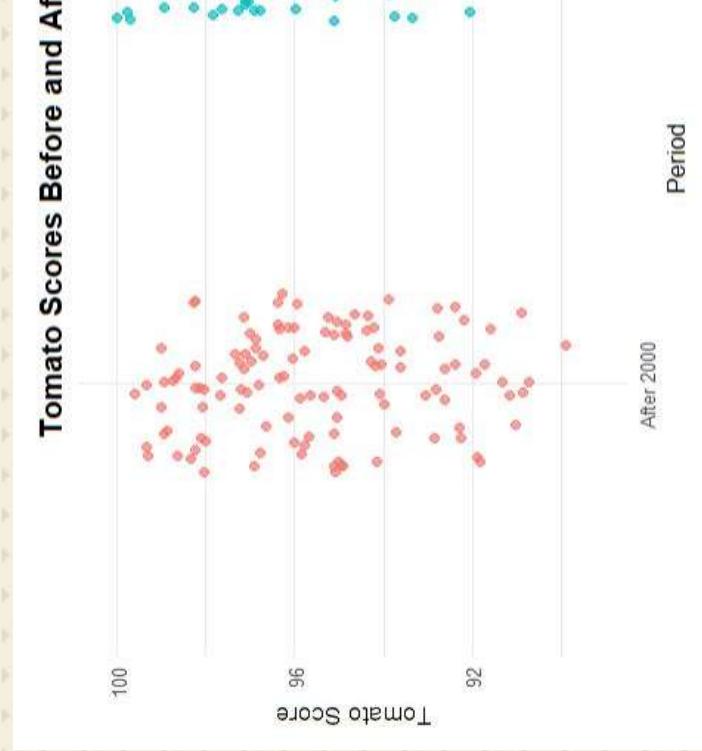
Test Used: Wilcoxon Rank-Sum Test (Mann-Whitney U)

Why? This test compares the medians of two independent groups.

Null Hypothesis (HO): The median scores are the same for both periods.

Interpretation: With a p-value < 0.05, we reject HO.

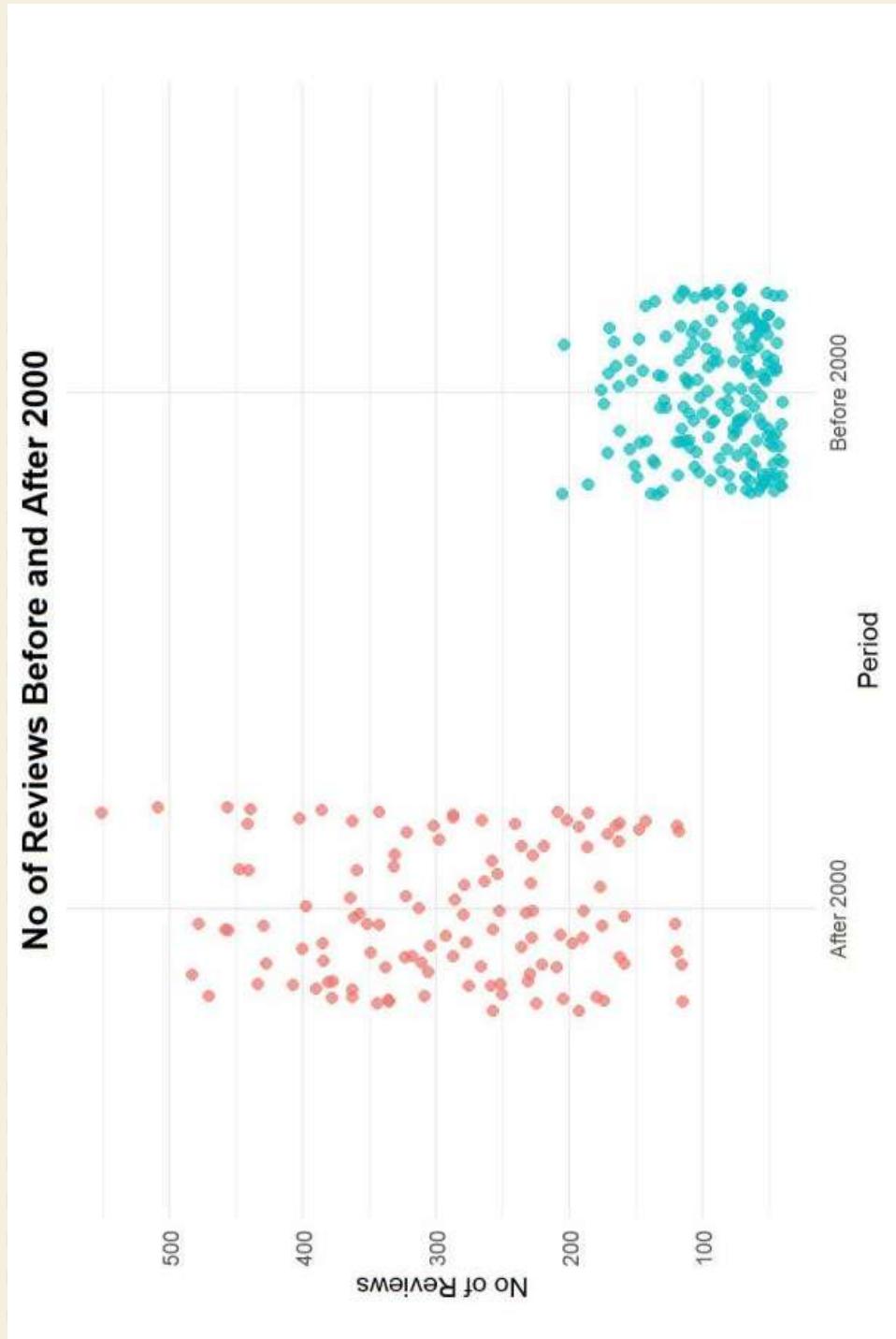
This indicates there is a significant difference in Tomato scores between older and newer films.



Analysis 7: Have number of reviews changed over

Interpretation:

From this plot, it is clear that the number of reviews received by movies increased before 2000. So it means that for less number of reviews these movies got less rank and led to high tomorrows and better rank.



Final Conclusions

- ❖ **Ranks:** Movie ranks in this dataset are driven by Critic Scores (Tomato Score), not Audience Score (Popcorn Score).
- ❖ **Engagement:** No. of Reviews and No. of Ratings are strongly correlated. Runtime is positively correlated with no. of reviews, suggesting longer movies attract more critical attention. Whereas, there is no significant correlation between runtime and no. of ratings, implying rating does not depend on length.
- ❖ **Group Differences:** Critic scores do not differ significantly across genres. But we found a significant difference in tomato scores for movies made before and after the year 2000. And also we get to know that number of reviews for the movies before 2000 are few than the movies after 2000.
- ✓ **Overall:** Non-parametric tests allowed us to find significant relationships in our data without assuming a normal distribution, revealing key insights into movie rankings and engagement.

THANK
YOU