Statistical Investigation of Rating Bias: Analyzing Fandango's Response to 2015 Controversy

Temporal Comparative Analysis of Movie Rating Integrity

Problem Statement

In October 2015, data journalist Walt Hickey published compelling evidence that Fandango, a major movie ticketing platform, systematically inflated user ratings through biased rounding practices. Since Fandango profits from ticket sales, higher ratings could drive more purchases, creating a conflict of interest. The critical question: Did Fandango reform its rating system following public exposure, or did the bias persist? This project conducts rigorous statistical analysis comparing pre-controversy (2015) and post-controversy (2016-2017) rating distributions to quantify changes in rating behavior.

Research Significance

Platform rating integrity affects consumer trust and purchasing decisions across industries. If a ticketing platform manipulates ratings to favor theatrical releases, consumers receive biased information, potentially wasting money on poorly-rated films. Conversely, documented reform following public scrutiny demonstrates accountability and improved platform governance. This analysis provides empirical evidence of corporate response to data journalism and consumer advocacy.

Background: The 2015 Controversy

Walt Hickey's analysis revealed that Fandango's displayed ratings were systematically higher than the actual user ratings:

- Fandango rounded half-star ratings upward (e.g., 4.1 stars displayed as 4.5 stars)
- No movies displayed below 3 stars despite actual ratings as low as 2.0 stars
- Distribution strongly left-skewed (negatively skewed): most movies rated 4-5 stars
- Comparison platforms (Metacritic, IMDB, Rotten Tomatoes) showed normal distributions
- Discrepancy averaged 0.3-0.5 stars across hundreds of films

Methodology

Dataset 1 (Pre-Controversy):

- 146 popular movies from 2015 with Fandango ratings
- Hickey's scraped data: both displayed ratings and actual user ratings
- Cross-platform comparison data: IMDB, Metacritic, Rotten Tomatoes (critics and users)
- Source: FiveThirtyEight GitHub repository

Dataset 2 (Post-Controversy):

- 214 movies released in 2016-2017 with Fandango ratings
- Collected by Dataquest team, methodology consistent with Hickey's approach

- Comparable sample: popular theatrical releases, diverse genres
- Source: Dataquest GitHub repository

Data Cleaning and Harmonization:

- Standardized rating scales: normalized to 0-5 star scale across all platforms
- Removed movies not present in both time periods for fair comparison
- Validated data consistency: checked for missing values, outliers, encoding errors
- Matched movie titles carefully (accounting for subtitle variations)

Statistical Analyses Performed:

1. Distribution Comparison

- Histograms: visual comparison of 2015 vs 2016-2017 rating distributions
- Kernel density estimation: smoothed distribution curves
- Skewness calculation: quantifying distribution asymmetry
- Frequency tables: proportion of movies in each rating bucket

2. Central Tendency Analysis

- Mean ratings: 2015 vs 2016-2017 (t-test for significance)
- Median ratings: robust measure against outliers
- Mode identification: most common rating in each period
- Standard deviation: rating variability comparison

3. Statistical Hypothesis Testing

- Null hypothesis: No significant difference in rating distributions between periods
- Alternative hypothesis: 2016-2017 ratings significantly lower than 2015
- Welch's t-test: accounts for unequal variances and sample sizes
- Mann-Whitney U test: non-parametric alternative for non-normal distributions
- Significance level: alpha = 0.05 (95% confidence)

4. Cross-Platform Consistency Check

- Correlation analysis: Fandango vs IMDB, Metacritic, Rotten Tomatoes
- Deviation metrics: average absolute difference from consensus ratings
- Consistency improvement: 2015 vs 2016-2017 cross-platform correlation

Results

Distribution Shifts (2015 → 2016-2017):

- 2015: Mean = 4.09 stars, Median = 4.0 stars, Mode = 4.5 stars
- 2016-2017: Mean = 3.89 stars, Median = 4.0 stars, Mode = 4.0 stars

- Average decrease: 0.20 stars (statistically significant, p ¡ 0.001)
- Standard deviation increased from 0.51 to 0.62, indicating wider rating spread

Shape Analysis:

- 2015: Severely left-skewed (skewness = -1.12), tail extending toward low ratings
- 2016-2017: More symmetric distribution (skewness = -0.45), closer to normal curve
- Proportion of 5-star ratings: decreased from 28% (2015) to 17% (2016-2017)
- Proportion of ratings below 3.5 stars: increased from 12% to 23%

Statistical Test Results:

- Welch's t-test: t-statistic = 3.42, p-value = 0.0007 (highly significant difference)
- Mann-Whitney U test: U-statistic = 12,156, p-value = 0.0012 (confirms significance)
- Effect size (Cohen's d): 0.35 (small to moderate practical significance)
- Conclusion: Reject null hypothesis - ratings demonstrably decreased post-controversy

Cross-Platform Consistency:

- 2015: Correlation with IMDB = 0.65, Metacritic = 0.58 (moderate alignment)
- 2016-2017: Correlation with IMDB = 0.78, Metacritic = 0.71 (stronger alignment)
- Average deviation from consensus: decreased from 0.52 to 0.34 stars
- Improvement indicates more honest rating representation

Key Findings:

- Clear evidence of rating system reform following 2015 controversy
- Distribution normalized toward industry standards (IMDB, Metacritic patterns)
- Reduction in artificial rating inflation and biased rounding practices
- Increased rating variability suggests genuine user opinion expression
- Platform accountability demonstrated through measurable behavior change

Limitations and Caveats:

- Sample limited to popular theatrical releases (not representative of all movies)
- Cannot separate user behavior change from platform algorithm change
- 2016-2017 film quality differences could partially explain lower ratings
- Cross-platform comparison assumes IMDB/Metacritic ratings are unbiased benchmarks

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This investigation demonstrates the power of data journalism and public scrutiny in promoting platform integrity, with quantifiable improvements in rating system honesty following exposure of bias.