

Gender Bias in Employee Promotions

Problem Statement: Assess whether gender impacts promotion decisions and provide actionable recommendations.

1. Problem Framing & Hypothesis

The objective is to analyze whether gender affects promotion decisions in a company setting. We simulate a realistic HR dataset to mimic employee records and promotion decisions. - Hypothesis: - Null Hypothesis (H0): Gender does not influence promotion decisions. - Alternate Hypothesis (H1): There is a statistically significant relationship between gender and promotions. - KPIs: - Overall promotion rate - Promotion rate by gender - Model evaluation metrics (accuracy, F1 score)

2. Descriptive Analysis

The dataset was examined for distributions, outliers, and key relationships. Promotion rates were calculated by gender. As shown in the chart below, males had a significantly higher promotion rate compared to females.

Promotion Rate by Gender (Bar Chart)

Male: 56.97% | Female: 48.69%

3. Diagnostic Analysis

Cross-tabulations were used to explore promotion rate variations by department and gender. Promotions were generally higher in departments like Sales and Operations. Females had lower promotion rates across almost all departments, even when performance scores and tenure were similar.

4. Predictive Modeling

We trained a logistic regression model to predict promotion likelihood based on features such as performance score, KPI, tenure, and gender. - Model Accuracy: 58.53% - F1 Score: 0.64 - Gender Coefficient (Male): 0.350 The positive coefficient for 'gender_Male' suggests that males are more likely to be promoted, even when controlling for other variables.

5. Prescriptive Insights

Based on the findings, the following recommendations are proposed to mitigate gender bias in promotions: - Use blind evaluation techniques during promotions. - Set clearly defined, quantifiable criteria for promotion eligibility. - Provide gender-bias training for promotion panels. - Create dashboards to monitor promotion trends by gender quarterly.

6. Conclusion

Our end-to-end analysis pipeline—from problem framing, data simulation, descriptive statistics, diagnostics, modeling, to prescriptive insights—strongly indicates the presence of gender-based disparity in promotions. Implementing the above strategies can help organizations like Gigaversity ensure fairer, more merit-based promotions.

Key Findings:

- Overall promotion rate: 53.22%
- Promotion rate (Male): 56.97%
- Promotion rate (Female): 48.69%
- Logistic regression coefficient for gender (Male vs Female): 0.350
- Model F1 Score: 0.640

Recommendations:

- Adopt blind promotion reviews to minimize unconscious bias.
- Define transparent, performance based criteria for promotion.
- Provide bias awareness training for managers.
- Track promotion KPIs and gender ratios quarterly with dashboards.

Impact: Implementing these actions could reduce promotion disparities and improve overall employee satisfaction and retention.