

## Sample Summary Report (300 words)

### Title: Analysis of Racial Bias in COMPAS Risk Scores Using AI Fairness 360

This study explores racial bias in the COMPAS algorithm, a recidivism prediction tool used in the U.S. justice system. Using IBM's AI Fairness 360 toolkit, we analysed the disparity in false positive rates between African-American and Caucasian individuals. The dataset was pre-processed to isolate relevant features such as prior convictions, charge degree, and recidivism outcomes.

Our model revealed a statistically significant bias, with African-American defendants exhibiting a higher false positive rate, meaning they were more likely to be wrongly predicted as high-risk. The disparity in disparate impact and false positive rate difference indicated clear fairness concerns under standard definitions.

To mitigate bias, we applied the Reweighting preprocessing technique, which adjusts the weights of training samples to balance treatment across groups. Post-mitigation evaluation showed a reduction in bias metrics, although trade-offs in overall accuracy remain a consideration.

Visualizations, such as score distributions by race, further highlighted systemic imbalances. These findings suggest the need for judicial transparency and the use of interpretable fairness-aware models in real-world applications.

### Best Practices for Presenting Chart Findings

#### 1. Start with Clear Titles

- Use descriptive titles like *"False Positive Rate by Race"* or *"Bias Metrics Before and After Mitigation"*.
- Avoid vague labels like *"Chart 1"*—your audience should know what they're looking at instantly.

#### 2. Label Everything Thoughtfully

- Axes, legends, and data points should be clearly labeled.
- Include units (e.g., percentages, score ranges) and define abbreviations.

#### 3. Choose the Right Chart Type

- **Bar charts** for comparisons (e.g., FPR across races).
- **Box plots** for score distributions.
- **Line charts** for temporal trends (if applicable).
- Avoid 3D charts—they often distort perception.

#### **4. Use Color Strategically**

- Highlight disparities with contrasting colors (e.g., red for high bias, green for fairness).
- Stick to accessible palettes—consider colorblind-friendly schemes.

#### **5. Maintain Scale Integrity**

- Use consistent y-axis scales across charts to avoid misleading impressions.
- If you break scale (e.g., zoom in), clearly indicate it.

#### **6. Annotate Key Insights**

- Add callouts or text boxes to emphasize critical findings (e.g., “FPR = 0.45 for African-American group”).
- Helps guide interpretation without overwhelming the viewer.

#### **7. Include Context and Thresholds**

- Overlay fairness thresholds (e.g., DI between 0.8–1.25).
- Add brief captions explaining what the chart reveals and why it matters.

#### **8. Keep It Simple and Focused**

- Avoid chart clutter—remove unnecessary gridlines, shadows, or excessive data series.
- Each chart should answer one clear question.