5.2: Data Ethics: Data Bias

1. Carefully read the background and collection plan again. What types of potential bias exist in your team lead's collection plan? Why was it biased? Please explain your answer. You may also think of biases that go beyond this reading (e.g., cultural bias).

Answer: The team lead's collection plan may suffer from several potential biases. One bias arises from focusing only on cash deposits made at banks within 100 miles of the US-Mexico border and subsequent ATM withdrawals in Mexico. This geographical limitation might overlook similar suspicious activities occurring outside this specific region. Additionally, there's a bias in assuming that the data from the previous project, led by the team lead, is representative of all possible scenarios.

Moreover, the reliance on human input to label instances as suspicious or normal introduces the potential for human biases. Analysts may unconsciously exhibit confirmation bias or cultural biases, especially when dealing with Mexican citizens due to the context of the problem involving Mexican drug cartels.

Furthermore, there could be demographic biases as the model might not account for different patterns and behaviours exhibited by different nationalities, occupations, or age groups.

To address these biases, the collection plan should strive for more comprehensive data from various regions, not solely focusing on the border area. Implementing measures to reduce human biases, such as using diverse analysts from different backgrounds and providing guidelines for objective analysis, can also help create a more robust and unbiased model.

2. How might these biases distort the results? What could you do to avoid these biases?

Answer: Biases in the results may occur due to the overrepresentation of suspicious transactions involving Mexican citizens. This could lead to a higher number of false positives and misidentification of normal activities as suspicious. To avoid biases, the team should consider balancing the data sample to ensure a more equal representation of customer nationalities. Additionally, they should carefully assess and adjust the model's weightings on different variables to avoid giving undue significance to nationality or any other factor that might introduce bias. Regularly reviewing and updating the model based on new data can also help mitigate biases and improve accuracy.

3. If you know that there is bias in the collection method, what could you do to communicate your concerns to your team lead? Please be as specific as possible.

Answer: To communicate concerns about bias in the collection method to the team lead, I would take the following steps:

1. Schedule a meeting with the team lead to discuss the findings: Request a dedicated meeting to address the concerns regarding potential bias in the data collection method.

2. Present the data: Prepare a concise presentation that highlights the key statistics and the bias observed in the data sample. Include relevant visuals, such as graphs or charts, to clearly illustrate the disparities.

3. Explain the bias: Clearly articulate how the bias in the collection method may have influenced the results. In this case, mention that the data was collected from ATMs near the US-Mexico border, which could have disproportionately captured transactions involving Mexican citizens, leading to a skewed representation.

4. Discuss the implications: Explain the potential consequences of the bias on the accuracy and fairness of the model. Emphasize the importance of addressing this issue to ensure reliable and unbiased results.

5. Suggest solutions: Propose strategies to mitigate the bias, such as expanding the data collection beyond the border area to include a more diverse sample of transactions. Alternatively, consider weighting the data based on demographic factors to balance the representation of different customer groups.

6. Offer recommendations: Provide recommendations for future data collection, emphasizing the need for a more comprehensive and representative dataset to improve the model's accuracy and fairness.

7. Request action: Conclude the conversation by requesting the team lead's support in addressing the bias issue and collaborating on appropriate steps to rectify it, such as refining the data collection process or incorporating additional variables in the analysis.

By effectively communicating the concerns about bias and proposing potential solutions, we can create awareness and foster a collaborative approach to ensure the model's reliability and integrity.

4. Read through the details of testing. How might the lack of transparency around the experience and training of the investigators allow for bias?

Answer: The lack of transparency around the experience and training of the investigators could allow for bias because it leaves room for potential variations in how each analyst interprets and scores the transactions. Biases may arise based on personal backgrounds, cultural perceptions, or implicit assumptions about certain nationalities or occupations. If some analysts have prior knowledge or experiences that influence their judgments, it could result in inconsistent and skewed scores, leading to biased inputs for the model, potentially affecting its accuracy and fairness in identifying suspicious transactions.

5. Analyze the bar chart showing the scores of individual analysts and see where their scores fall on the distribution curve. If the mean of the scores was 307 and the standard deviation is 166, which score or scores might you eliminate to control for bias? Why?

Answer: To control for bias in the scores, it is important to identify scores that significantly deviate from the mean. Based on the provided information, the mean score is 307 and the standard deviation is 166. One approach to control for bias would be to eliminate scores that fall outside a certain range, such as scores that are more than two standard deviations away from the mean. Assuming a normal distribution, scores below 307 - (2 * 166) = -25 and scores

above 307 + (2 * 166) = 639 could be considered for elimination to mitigate potential bias.