**Data Cleaning & Exploration - Task 2**

## **Step 3: Document Potential Bias and Its Effect on Analysis**

### **1. Demographic Bias Documentation**

**Columns: Gender, Senior Citizen**

#### **Findings:**

1. **Gender Bias:**
   1. If one gender has a significantly higher churn rate, it may indicate a bias in service offerings or marketing strategies.
   2. For example, if female customers churn more frequently, it could mean services are not catering equally to both genders.
2. **Senior Citizen Bias:**
   1. If senior citizens have a higher churn rate, it may suggest difficulty in using digital services or a preference for different customer service approaches.
   2. If they churn less, it could be due to longer tenure or reliance on traditional services.

#### **Effect on Analysis:**

* **Predictive models may become biased** if gender or seniority strongly influences churn but is unrelated to service quality.
* **Business decisions could be skewed**, assuming one group is more likely to churn when the real reason might be different.

### **2. Financial Bias Documentation**

**Column: Payment Method**

#### **Findings:**

* If certain payment methods (e.g., credit card vs. bank transfer) show higher churn, it may be due to ease of payment, security concerns, or automatic renewals.
* Customers using **automatic payments (e.g., credit card, bank transfer)** may churn less, while those using **manual payments (e.g., mailed checks)** may churn more.

#### **Effect on Analysis:**

* If Payment Method is a strong predictor of churn, the company may focus on promoting auto-pay options to reduce churn.
* However, **correlation ≠ causation**—some customers might already be financially unstable, which affects their payment method choice **and** their likelihood to churn.

### **Summary of Bias Impact**

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| --- | --- | --- | --- |
| **Bias Type** | **Column** | **Findings** | **Effect on Analysis** |
| **Demographic Bias** | Gender | One gender may have a higher churn rate, indicating possible service/marketing bias. | Could lead to incorrect assumptions in predictive modeling. |
| **Demographic Bias** | Senior Citizen | Older customers may churn at different rates due to service usability or tenure. | May lead to age-based targeting, ignoring real churn causes. |
| **Financial Bias** | Payment Method | Customers using manual payments may churn more than auto-pay users. | Correlation may be mistaken for causation, leading to misleading conclusions. |

### **Actionable Insights**

* Investigate whether churn differences by gender are **due to service issues** or unrelated external factors.
* Offer **senior-friendly digital support** if older customers struggle with online services.
* Encourage customers to **switch to auto-pay** to reduce involuntary churn.