

Car Insurance Claims Fraud & Cost Analysis

1. Industry and Organization Description:

The project operates within the Property & Casualty Insurance sector. This industry focuses on protecting vehicle and liability coverage. It is a data-intensive sector where profitability relies heavily on accurate risk assessment and efficient claims management. That's where we got the idea to help achieve this profitability and generate insight out of already available data in order to identify points of weakness and ways to diagnose insurance fraud early on.

- **Business Problem:**

Insurance fraud silently drains profits through staged accidents, exaggerated injuries, and fake claims, ultimately raising premiums for honest customers.

- **The primary drivers identified are:**

- Undetected Fraud: A significant percentage of claims are suspected to be fraudulent, but manual detection methods are too slow and inconsistent.
- Operational Inefficiency: Claims adjusters spend disproportionate time investigating low-risk claims while high-value fraudulent claims slip through.
- Lack of Visibility: Management lacks a centralized view of how factors like *incident severity, demographics, and age* correlate with financial losses.

- **Project Goal:**

To build an end-to-end Business Intelligence solution that visualizes claims data to identify fraud patterns, monitor key risk indicators, and optimize the claims' approval process.

2. Analytical Questions:

The BI solution will answer the following business questions to drive decision-making:

1. **Fraud Profiling**: What is the overall fraud rate, and does it correlate with drivers who have a history of past claims?
2. **Demographic Risk**: Is there a correlation between the driver's education level and annual income regarding the likelihood of filing a fraudulent claim?
3. **Operational Efficiency**: What is the average time to settle a claim (Days Open), and does this duration increase for fraudulent claims?
4. **Temporal Trends**: Which Day of the Week sees the highest frequency of accidents, and does fraud spike on weekends?
5. **Vehicle Analysis**: Do expensive vehicles (Vehicle Price) or specific Vehicle Categories (e.g., Sport vs. Sedan) have a higher rate of fraud?
6. **Driver Safety**: How does the Safety Rating of the driver correlate with the frequency of accidents and the probability of fraud?
7. **Liability Analysis**: Does the Liability Percentage (fault assigned to the driver) tend to be higher in claims marked as fraudulent?
8. **Deductible Impact**: Do policyholders with lower Policy Deductibles tend to file higher-value claims?
9. **Witness Influence**: Is a claim less likely to be fraudulent if a police report was filed or if a witness was present?
10. **Cost Breakdown**: What is the ratio of Injury Claims to Total Claims, and are "high-injury" claims more likely to be investigated for fraud?

3. Key Performance Indicators:

We will measure the success of the business using the following 8 measurable KPIs:

1. **Fraud Rate**:
 - Goal: Monitor and reduce the percentage of illegitimate claims.
2. **Total Claims Cost**:
 - Goal: Track total financial outflow.
3. **Average Settlement Time**:
 - Goal: Measure operational efficiency; lower is better for customer satisfaction.
4. **Claims Loss Ratio**:
 - Goal: Ensure premiums collected are covering the payouts.

5. **Fraud Loss Exposure:**

- Goal: Quantify the potential money lost to fraud.

6. **Past Offender Ratio:**

- Goal: Assess the risk quality of the customer base.

7. **Average Liability:**

- Goal: Track how often our drivers are at fault in accidents.

8. **Injury Ratio:**

- Goal: Monitor if injury costs are becoming the primary cost driver.