**INTEROFFICE MEMORANDUM**

TO: CEO of General Casualty Kansas City (GCKC)

FROM: Tyler Conrad

SUBJECT: Possible Coverage Expansion Analysis

DATE: November 5th, 2017

**Abstract:**

Do we have enough information about crashes to be able to accurately predict where we should expand coverage in order to maximize our profits? Using the information collected from law enforcement on fatal accidents will allow us to develop a methodology to prioritize our expansion into new regions to maximize our profits. From the clustering model, we can increase the likelihood of our company’s success.

**Key Takeaways:**

Over the course of the last several years our company, General Casualty Kansas City, has started the process of seeking approval for expansion into new regions. However, it is believed that we will only be allowed to initially expand into one new census region. This report aims to provide guidance based on data from 2011 provided by law enforcement agencies on fatal crashes to facilitate prioritizing which regions to expand our coverage into first. The key takeaways from our analysis are shown below.

* There are six key segments within our fatal crash data.
* Each key segment has some defining characteristics.
* Each key segment also overlaps some characteristics with other key segments.
* Certain regions consistently have higher fatal crash rates than other regions.

**Analysis Summary:**

To answer the business question of how to prioritize region expansion of our company, data from 2011 provided by law enforcement agencies was used. The data had records from all across the United States. The data did require some preparation before any analysis could be performed. This preparation consisted of removing un-necessary information, filling in missing information, and organizing the data. Once the data was prepared, clustering analysis was performed to find any commonalities between groupings of characteristics. Several different models with different numbers of clusters were analyzed. In the end, it was found that there were six distinct clusters of fatal accidents. These clusters with three of their key characteristics are shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Group ID**  **(Count)** | **Key Characteristic #1** | **Key Characteristic #2** | **Key Characteristic #3** |
| Group 1  (169) | Rural-Major Collector | Ages 16-23 | South |
| Group 2  (1178) | No Alcohol Involved | Male Driver | South |
| Group 3  (105) | Rural-Principal Arterial-Other | Age 16-25 | West |
| Group 4  (1023) | Rural-Local Road or Street | Age 20-28 | West |
| Group 5  (261) | Alcohol Involved | Male Driver | West |
| Group 6  (351) | No Alcohol Involved | Female Driver | Midwest |

**Recommendations:**

Using the results of the analysis there are several recommendations that I would like to make:

* Expansion to the South and West Regions should be avoided or accounted for with higher rates.

The highest percentage of fatal accidents occurred in the south from both a percentage stand point and from commonality among the largest clusters. Young drivers in the South and West tend to have fatal accidents on rural roads which means young drivers in rural areas should be charge higher rates or avoided as well.

* Male drivers between the in their teens and mid to late twenties should be avoided or charged higher rate.

Again, the highest percentage of fatal accidents occurred when the driver was male and in their teens or mid to late twenties from both a percentage stand point and from commonality among the largest clusters. This is not surprising since it is common insurance practice to charge these customers more, but our analysis confirms that this is continuing best practice going forward.

* Expansion to the Northeast should be the regions prioritized for expansion first or charged lower rate.

The northeast showed no statistical commonality between the driver’s characteristics among drivers involved in fatal accidents. Also, the number of fatal accidents is lower than other regions. This region presents a good opportunity for expansion since many people whom own and car and require insurance do not frequently use it due to public transportation options available.

I hope this analysis proved helpful in our decision making process on future expansion. As always feel free to contact me with any questions.

Tyler Conrad

Data Enthusiast