Micro-segmentation Method for Claim handling Process in Health Insurance Claims Data

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***Abstract*—The micro-segmentation process helps businesses to improve their customer relationship management process. The whole data set is divided into micro-segments by micro-segmentation. The customers are easily categorized in detail using this segmentation method. The segmentation of the behaviors is based on the user behaviors of the entire data set. We implemented a novel method for micro-segmentation. In this methodology, we used demographic segmentation and the behavior segmentation process. Insurance firms should process their claims process effectively to assess the actions of the policyholder, to claim trends, to request chargers, and other details precisely. In this study, the micro-segmentation approach proposed for managing claims in health insurance firms, which was focused on demographic and behavioral segmentation of clients of the firms, would help to determine the ten policyholders who have higher claiming charges, frequencies based on the policyholder's gender, age and disease status. Using this information, health insurance companies can provide special attention to those policyholders and make strategic decisions to handle their medical claims.**

***Keywords* — Micro-segmentation, Demographic segmentation, Behavior Segmentation**

I. INTRODUCTION

Customer segmentation is the breakdown of the large database of total number of customers into subparts. Members of the subparts have similar characteristics and those features are dissimilar to other members of other subparts[1]. Today, the use of micro-segmentation for companies helps more than standard segmentation of the consumer. Micro-segmentation is more advanced in segmenting customers into several segments[2]. Micro-segmentation can be used in information technology, corporations, and marketing. Companies may use the results of their micro-segment to understand the needs of their consumers and deliver new goods and efficient services to each of their target customers. In the corporate world, insurance is a vital field. For each resource in every business field, this is very relevant. The insurance industry now provides most individuals and businesses with their services. Insurance providers offer various insurance types including life, property and injuries, health care and unemployment, etc. Claimants are covered by health insurance, health costs, and properties. The insurance company's primary concept is that the insurance company shall guarantee the refund of any loss/costs associated with unknown incidents. In this unknown situation, the insured party paid the insurance company with a smaller payment. Claims can significantly affect a health insurance company's earnings. For this reason, the efficient management of claims in the health insurance industry is important. Segmentation of actions may be used for this purpose. Segmentation of behavior, when interacted with an insurance provider, splits the consumer knowledge in a micro-segment into the particular behaviors[3]. Client claims, overall costs for each client, and the number of times they communicate with the organization concerning insurance policy, a form of policy that they required, etc. can be defined predominantly by the use of behavioral segmentation. By understanding the insurer's claims pattern, important decisions can be made and it is very helpful in the effective and reliable handling of the claim management process. And behavioral segmentation outcomes can also be used for the implementation of new deals, new policies and regulations, insurer charging packages, and more[4].

The main aim of this research is to identify the challenges of integrating micro-segmentation in the insurance business. Customers are divided into several different categories by a more sophisticated method of segmentation. Health insurance providers may use findings from the micro-section to understand the needs of individual customers and offer new products and quality services for each of their target customers. Insurance firms will accurately identify their target policyholders at the end of this study. Therefore insurance companies can also easily make strategic decisions about their future objectives.

II. OBJECTIVES

To manage claim data efficiently in the health-care company, the main objective of this survey was the detailed micro-segmentation method using demographic and behavioral segmentation. Claim management today is a vital aspect of the insurance industry. Through lowering excessive claims, an insurance company will increase its income. A detailed approach to micro-segmentation can be used for this. Using behavioral segmentation strategies, the policyholders can classify loyal policyholders, who have the highest overall claims, and so on in various ways. The outcomes of this approach to micro-segmenting can be used for efficient customer relations and insurance firms can provide their customers with such benefits. The insurers will also take a crucial decision on the high claims and frequency of policyholders. The principal objective of the investigation is to forecast micro-segmentation client practices and to incorporate these findings into the operations of health insurance companies. To archive, this primary goal should need to identify the reasons for use of micro-segmentation, to evaluate the reasons for the use of demographics and behavior segmentation for the micro-segmentation process, to identify the problems associated with the introduction of the micro-segmentation process in the insurance sector. And also need to implement the new approach based on micro-segmentation that supports healthcare insurance claim handling.

III. METHODOLOGY

Fig.1 shows the research method that applies to this study.Under the data pre-processing step, we first check the null values from the dataset. A null value indicates the

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knowledge deficiency or unknown value. It is also, critical to identify the outliers in the dataset. Next, we remove all null values and outliers. This step can be called as data cleaning step.

After this pre-processing, we have a cleaned data set. Next, we apply Exploratory Data Analysis (EDA) to the cleaned dataset. Exploratory data analysis is the predictive analytics methodology that includes a lot of approaches. EDA support for many processers. Some of these processers are increase analysis of the performance, the conceptual model is disclosed, highlight major factors, discover outliers, and provides, best possible variable configurations.

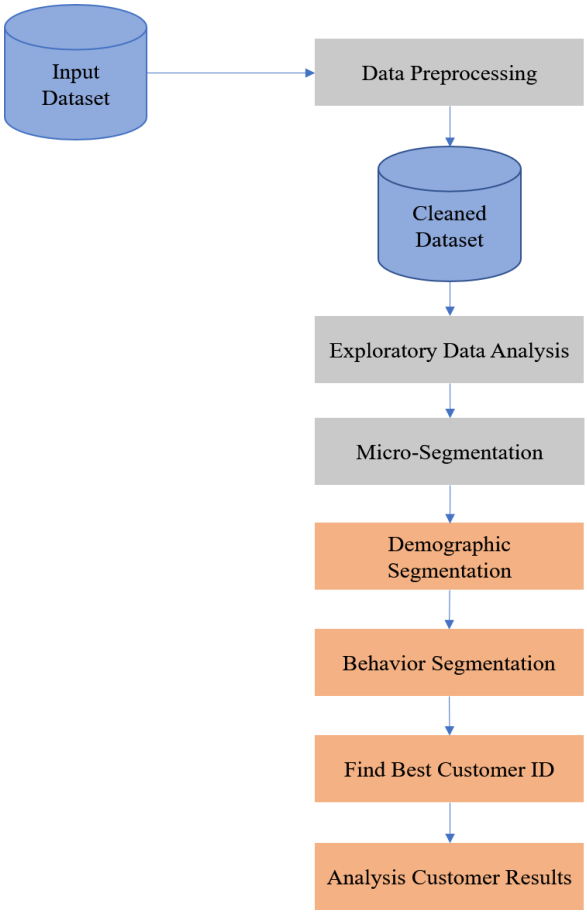

Fig. 1. Methodology

Micro-segmentation is a more advanced form of segmentation that divides the customers into many non-overlapping segments. Businesses can use micro-segment results to understand the needs of their targeted customers and provide offers, new products, and effective services for each of their target customers.

Demographic segmentation is dividing the whole dataset into sub-groups according to age, gender, religion, etc. In this research, we consider three segmentation types. They segment the dataset based on the policyholder's gender, age, and diseases. Age is one of the major and important factors from the factors that are used to segment the data set demographically. Customer characteristics such as level of education, and behavior are very similar for people in the same age group. Therefore, the age-based portion of the dataset makes accurate segmentation results extremely helpful. Gender is another important factor in the demographic segmentation of the dataset. The gender factor is mainly divided into two types, male and female. Customer characteristics for these two types are dissimilar in many attributes for each other. Gender types are important for the claim process, particularly in the insurance industry. There are various reasons for claiming insurance which affects people in different circumstances. The likelihood of a smoker lodging a claim is greater that for those who do not smoker, for example. The gender of these individuals is important in this case. Also, diseases of the policyholders are critical for the claim handling process in the health insurance sector. Because the claiming patterns and charges are mainly dependent on the type of the diseases that each policyholder may have.

Behavior segmentation is segmenting the consumer dataset into micro-segment according to the behaviors of the consumers. This segmentation method is useful in many areas. Researchers can find ways to apply this behavior segmentation process for further development of the organizations. For the insurance industry, policyholders have their characteristics, especially in the claiming process. This research used the behavior segmentation process for the segment of the health insurance claim dataset. Under this, here we consider the claiming frequencies, claiming chargers, and various other factors regarding each policyholder in the insurance company.

IV. Results and Discussion

Most businesses used demographic segmentation to determine the special resources in the target segment in the specific sector rather than targeting an overall industry. Demographic segmentation is dividing the whole client dataset into sub-groups according to the age, gender, religion, size of the family, etc.

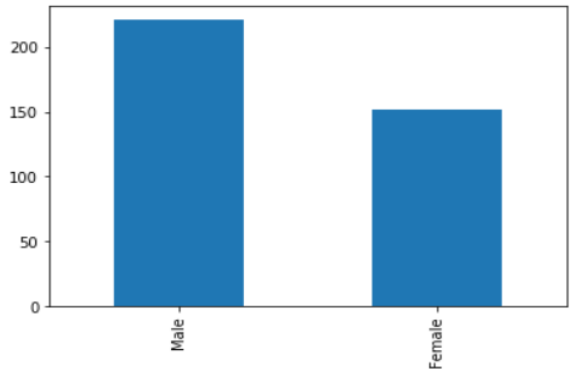

Fig. 2. Segment the dataset based on the gender

Here, segments of the dataset based on the gender of the policyholders. The above Fig.2 shows that, the count of the male policyholders is greater than the count of the female policyholders. Next considering only the male dataset, we applied the demographic segmentation based on the age range of policyholders.

According to Fig.3, the number of policyholders who are in the 36-45 range is greater than other policyholders in other ranges. 46-55 age range has the minimum count of the male policyholders.

Then visualize the count of the policyholder's base on the diseases which are in the age range (36-45).

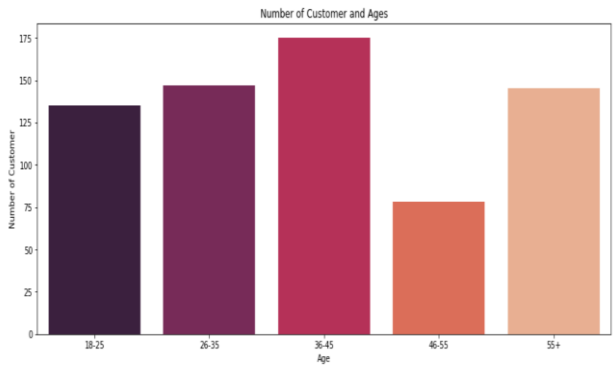

Fig. 3. Male dataset based on the age ranges

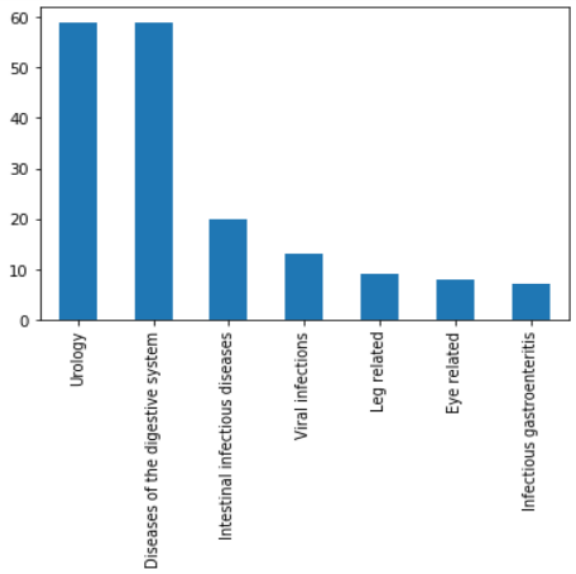

Fig. 4. Distribution of the diseases based on the 36-45 age range

The above Fig.4 represents the distribution of count of policyholder's diseases. According to this figure, we can say the count of the policyholders who have diseases of the digestive system is similar to the count of the policyholders who have urology.

Then find the top ten customer IDs with several claims from the male policyholders who have diseases of the digestive system in the selected age range (36-45).

Below Fig.5 shows, the top ten customers and the number of claims for each customer ID, and that figure visualize the three policyholders have eight claims and two policyholders have five claims. And also, four policyholders have four claims and three claims that come from one policyholder in the selected dataset.

Finally, these ten customers' details visualized using treemap. Fig.6 displays that treemap and that shows the number of items and mean charges for each customer ID.

V. CONCLUSION

The information related to the policyholders is more beneficial for the insurance firm. Applying demographic and behavioral segmentation for that information may obtain the precise results and help to determine the policyholders who have higher claiming charges, frequencies based on the policyholder's gender, age, and disease status. Using this information, health insurance firms can provide special attention to those policyholders and make strategic decisions to handle their claiming patterns. As future work, we would like to carry out experimentation for real-world workload traces and improve the machine learning algorithm for automating the claim handling process in the health insurance sector.

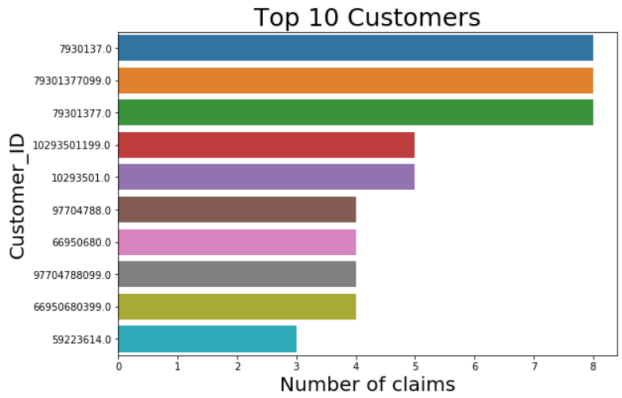

Fig. 5. Top ten customers based on the number of claims

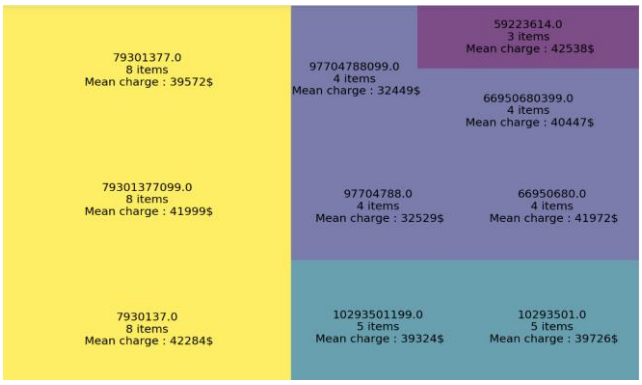

Fig. 6. Treemap for Top ten customers

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