Simulation of Data Plans for Operate Revenues In Telco Industry

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Abstract - **Simulation is properly described the what-if scenario in the real world situations. Combination of simulation and the agent based modeling is widely used in Telco industry which is a powerful tool gaining more attention for simulate the reactive and the proactive behaviors of the human in certain systems. The aim of this paper is identifying the most preferred data plan based on the different age groups by creating artificial agents designed to mimic the attributes and behaviors of their real-world counterparts. The Simulation model runs for the several scenarios based on the different age groups and the results shows the most preferred and suitable data plan in each age group and based on the features and qualities of the most preferred data plans is important to come up with the new data plan including the identified the features.**

Keyword: Simulation, Agent Based Modeling, Demographic, Data plans, Revenues

I. INTRODUCTION

With the increasing the popularity of mobile internet access, understanding the user behaviors become a crucial for the internet service providers to perform network management, capacity planning, network resource allocation and the network planning. Smart phones like Apple iPhone, Android, Samsung Galaxy and others have vastly improved the web surfing experience and increased consumption of media and content-based services. Since there are plenty of networks and Smart devices, Communication service providers have access to lot of information about their customers' behaviors, preferences and movements. Every operator is searching for new ways to increase revenues and profits during a time of stagnant growth in the industry, but few have demonstrated the capabilities needed to make the most of this new technology. Most operators conduct analytics programs that enable them to use their internal data to boost the efficiency of their networks, segment customers, and drive profitability with some success. In present mobile data plans be a crucial factor to operate revenues followed by the Internet Service Providers.

Sales of the Data Plans in Telco industry is continuously changing due to the rapid growth of the featured apps, Entertainment sites and greater consumption of the customers. Most often industry players revise these plans to stay competitive in the market. It is beneficial for them, identifying the most suitable data plans based on the demography and it helps to increase the sales of the data plans by adding different services such as unlimited Facebook data plans. It supports Internet Service Providers' core business, such as improving customer experience, driving new products, increasing productivity etc.

This research paper focused more about the most demanded Subscription-based products called data plans based on the Age groups (Demographic) and identify the features and the qualities of the most preferred data plan among different age groups. By identifying those characteristics will be help to come up with a new data plan for different age groups to obtain more revenues for the Internet Service Providers. According to the literature, several findings are revealed related to the internet usage patterns based on the demography. By observing those findings we can get a thorough idea of how people adopt to use of internet and it has revealed that patterns of the internet adoption and usage indeed differ by demographics. Specially, income, age, education level impact to the adoption of internet usage [4]. It has revealed that the income and the education level positively correlate with the adoption of internet and the negatively correlate with the hours spent online [4]. Demand of the several data plans vary with the data usage of the mobile subscribers and in present revenues from those data plans increase with the rise of the data usage of the users. Demand of the various data plans also can be differ according to the demography such as age, gender, income level, education level and also according to the user preferences. Demographics (such as age and race) and socio-economic status variables (such as education level and household income) play significant roles in predicting the patterns of Internet use. In the category of non-academic websites, most visited websites belongs to Entertainment (43%) and the next most favorite websites were mentioned Social Networks (37%) [6]. The adoption of digital technologies is known to be higher in young adolescents than adults and the highest proportion of computer and Internet usage belongs to the 16–24 year old age group in Turkey [6].So the sales of the data plans can be improve by identifying the internet usage patterns based on the preferences and demography of the mobile subscribers.

A. Agent based Modeling in Telecommunication

Agent based modeling is following bottom-up approach to understand system behaviors in the markets with the characteristics of complexity and the non-linearity such as Telco industry. Even though in the past, econometricians came up with the reasonably confident predictions of the demand but it was proved that the sales of the Subscription-based products in telecommunication is highly non-linear. Traditional linear demand equations are not appropriate in such situation [8]. Agent Based modeling is used in those situations which systems are described in a natural way which leads to a wider acceptance of the modeling approach and can easily be adapted to new constraints. Simple Agent Based Model can exhibit complex behavior patterns and provides

valuable information about the unanticipated behaviors of the real world system.

II. RELATED WORK

A. Data Collection

Data is collected from an Internet Service Provider in Sri Lanka and sample dataset is used for the research work. This research is identifying the most demanded data plan among the users with different age groups; choose the age (demography) and the time as main attributes which are effects to the internet usage patterns of the mobile subscribers from existing literature. In this dataset contains the data about the four data plans with different services and properties (Price, Data Amount) and how the number of users varies with the number of months.

B. Methodology

The research is started with a literature survey to find out the approaches, gaps and applicability of existing available literature. After receiving the dataset, cluster the age of users into three clusters based on the existing literature and chooses the age group as 16- 24 yrs., 25-40 yrs. and the above 40 yrs. [6]. After clustering the age groups, identified the distribution of the users as normal distribution using the tool Arena before using the Agent Based Modeling tool called Net Logo. Based on the properties and the behaviors of the distribution, model the system how number of users vary with the next coming months.

C. Findings

These plots show the results provided by the simulation model related to different age groups how the demand of the data plans vary with time of next coming months.
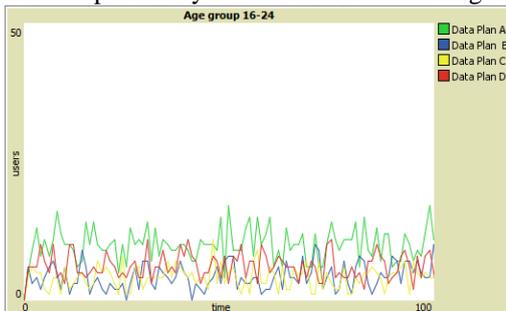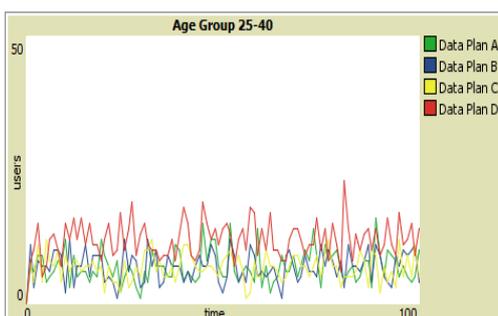

Figure 1 Age group 16- 24
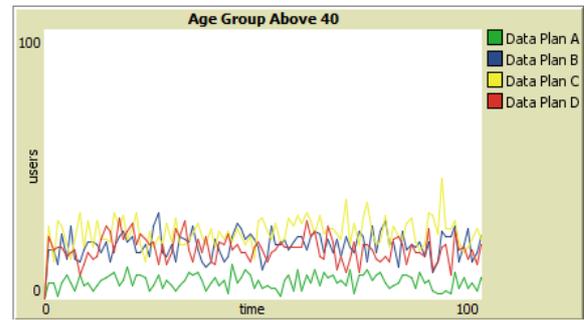

Figure 1 Age group 25- 40

Figure 3 Age group Above 40

Above plots shows how the number of users in the different age groups vary with the time for the four data plans (Data Plan A, Data Plan B, Data Plan C and Data Plan D). Figure 1 shows Data Plan A will be selected by the most of the user in age group 16-24 and it clearly shows the demand of that product vary with the next coming months. Likewise Figure 2 and Figure 3 shows Data Plan D will be selected by users in age group 25- 40 and Data Plan C will be selected by the users above the 40 yrs. respectively. But there is no drastically change between Data Plans B, C, and D like the other age groups.

III. CONCLUSION

In this study mainly focused on the age groups of the mobile subscribers and the attraction of them toward different data plans. This research based on the empirical dataset and the agents in the simulation model must behave according to the rules and the behaviors of that dataset. In this study the demand of the each data plan vary with the time and by observing that we have ability to improve the quality of the product by adding more services and the offers for those data plans. In present there are so many offers provided with the data plans, for an example unlimited data for the facebook and other social networks. So it has ability to identify the preferences of the mobile subscribers by analyzing the characteristics (price, amount of data) and features of those data plans. It is important to identify the customer trends and behaviors before finding ways to increase the revenues of service providers. By analyzing the data in real time service providers have the opportunity to predict the future trends of mobile subscribers through the current usage patterns and implement new revenue models to maximize their profits. So it is revealed the significant of this type of research for both service providers and also for the mobile data users. Finally it will be helped to come up with the new data plans for several age groups by improving the sales and the customer satisfaction. According to the literature, bulk of data usage comes from a surprisingly small number of network activities, mainly associated with mobile video/audio sites, social networking sites and mobile apps and by considering that information when introducing new data plans helps to obtain more revenues for the Internet Service Providers.

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