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**SUBSCRIBERS’ CHURN PREDICTION MODELING IN TELECOMMUNICATION INDUSTRY USING BIG DATA**

**Abstract -** While customers are able to switch between communication service providers, subscribers churn becomes a major problem in telecommunication industry and it is emerged as crucial. According to high concurrency in media of communication, business model in telecommunication industry must be focused on customer retention than customer acquisition. Because acquiring new clients costs five to six times more than retaining existing customers [1]. No other industries have data about clients as much as telecommunication companies. Refining acquired data from customers can be potential way for communication service providers to improve economic assets. Behavioral analyses of subscribers are based on systematic analyses of the wealth dataset and discover new profit streams.

**Keywords:**Big Data, churn prediction, telecommunication industry, behavioral analysis, customer retention

**Introduction**

The aim of this paper is to demonstrate how big data techniques are used to implement behavioral analysis of subscribers and customers churn prediction. In telecommunication industry huge client base provides enormous information that can be complex systematically analysis and retrieve valuable information. High interests in using smart devices and social networking provides generating data flow that discovers customers’ interests, lifestyle and behaviors. Customers’ requirements influence for customer service providers to spread service offerings. Customers’ requirements expand service offerings and at the same time bring influence on the structure of the company’s organization and to focus on certain types of clients and services.

Since the cost of winning a new customer is far greater than the cost of retaining an existing one, mobile carriers have now shifted their focus from customer acquisition to customer retention [2]. Big Data techniques are positioned as the solution to predict potential churners and develop optimal strategies in the way of customer retention.

The reminder of this research paper structured as follows. The following section gives short reviews in related works in customer churn prediction modeling. In the section 3 we discuss local communication service providers’ organization and do some analytics of them. Section 4 describes churn prediction modeling and subscribers’ behavioral analysis. Section 5 gives recommendations for communication service providers in future structure organization. Finally, the last section concludes with highlighting importance of big data technique in industry and future work.

**Related work**

As subscribers’ attrition has become crucial problem in the recent years there has been a lot of investigation in customer churn prediction. After acquiring appropriate data Eui-Bang Lee, Jinwha Kim and Sang-Gun Lee [3] used machine learning algorithm such as Logistic Regression, Decision Trees and Neural Network to identify causes of subscribers churn. The result presented as significance of 45.71 percent for logistic regression, 68.57 percent for decision tree, and 72.86 percent for neural network.

In another research in churn prediction Umayaparvathi and Iyakutti [4] used ANNs and decision trees. They discovered that decision trees are outdone in accuracy indication.

From the researches above we can make surely conclusion that there are several methods that can give high accuracy in subscribers’ churn prediction. Depending on acquired data each algorithm differs in performance. In this study we give some suggestion on integration big data techniques into local telecommunication industry to deal with common problems.

**Analytics**

Acquired data from different data sources does not bring wealth information itself until retrieved data is not structured. Big Data becomes value when there are business model included big data technologies to solve business challenges. Such kind of activity requires proper software tools and excellent skills to use them.

Examining local telecommunication companies’ structure it is very new challenge for communication service provider to be engaged in big data techniques to implement customer behavioral analysis. Churn prediction models extremely important to use algorithms to retrieve a model in data which can give wealth information about subscribers. Structured analysis of that data can bring information about customers who about to churn. If communication service providers are able to predict which customer is potential churner, they can avoid unfavorable results in customer retention way.

In the last few years local communication service provider like Kazakhtelecom JCS extremely interested on integration of big data into telecommunication industry. We analyzed report of the Kazakhtelecom JSC for 2014 [6] and information in this report tells that nowadays volume of the data increases exponentially and doubles in amount every two year. 2.3 trillion Data are generated at this time. It is hard to imagine to process and retrieve wealthy information without big data technology.

The major trends of big data in telecommunication industry in 2014 are using big data technology in service promotion purposes for clients, especially online TV, tactical marketing like subscribers’ churn management, sdp platforms improvement and optimization of network infrastructure.

According to the report of Kazakhtelecom JSC for 2015 [5] year we can notice that Kazakhtelecom organized IV International scientific-practical conference for the purpose to develop info communication technology, opportunities around big data. By this given report we can safely conclude that there is a big interest in big data integration into industry. Churn prediction and customer retention are still crucial problem for customer service providers and choice of model defines position in telecommunication market. By statistics approximately 44% of customers change their providers every year.

Big data is positioned as solution to the question how to process and retrieve wealthy information. Further, in the next sections models and recommendations are considered in detail.

**Churn prediction modeling**

Big data techniques are especially adopted under problems in management science like churn prediction. Big data is a collection of approaches and methods to automatically retrieving wealthy information from either structured or unstructured huge datasets. Big data techniques which are used to gain useful information from raw data can be trained based on historical data and further implement predictions on certain issues. In this case historical data is used to train model to classify as churner and non-churner. Accuracy of churn prediction model is directly depends on data set how large it is and structure of the data set to train churn prediction model. Each technique demonstrates different conclusions in subscribers’ attrition modeling. For instance, Mozer et al. (2000) found that neural networks performed significantly better than logistic regression for predicting customer attrition, whereas Hwang et al. (2004) reported that the latter outperforms

the former. Furthermore, most of these studies only evaluate a limited number of classification techniques on a single churn prediction data set. Therefore the issue of which classification

technique to use for churn prediction remains an open research

issue, in which the benchmarking experiment described in this

paper aims to provide further insights [1].

Customer service providers are provided every day with information through their subscribers’ devices connected to internet and network usage, and telecommunication industry is in good position to identify their customers’ expectations and needs. Processing acquired information is vital to limit subscribers’ churn.

It is noticeable that telecommunication companies own their network According to this there is an opportunity to do analytics through big data techniques by identifying network issues and fixing them in real time, service improvements for the benefit of users. Such kind of issues can be positioned as cause of dissatisfaction and finally churn. For instance, customer started to experience poor audibility or network connection issue, analytics, performed trough big data, can provide opportunity for customer service providers to immediately troubleshoot caused network problems.

Finding a way to forecast clients’ wants and needs in provided service or in sales is able to improve revenue and profits by customers’ satisfactions and accordingly limit client attrition. While interaction with customer across sales and service channels it should be taken in account to define methods in offerings a new service or update existing one.

In addition customer oriented business model big data opens new business perspectives and revenue streams using services of retailers and advertises. It is powerful integration to use big data to predict customers’ wishes and expectations and then offering and selling new products in the way of customer retention.

Telecommunications companies which have already integrated big data techniques into their business process have solutions in scalability of information base and requirements for real-time. They use improved technologies like Hadoop to operate huge number of data within less amount of time. This is and real advantage comparing with traditional technologies.

All communication service providers meet with large volume of data and acceleration how they increase. Also those data vary and differ from each other. It is extremely important to process this data to use them in network capacity monitoring and customer experience in network usage in real time.

The incoming data set are structured and unstructured. The main task of customer service providers is to collect and then manage them.

**Recommendations and future work**

Survey in big data techniques clearly gives understanding that big data is right thing for telecommunication industry. Analysis of coming data is important to identify potential churners and focus on customer retention activities. This paper is aimed to give recommendation to extract more wealth from big data.

Social media analysis. Social network is the right way to acquire most of customer feedback to services and deeper insights customers’ needs and expectations. Also social media analysis is the way to monitor resonation from subscribers by providing new services. New ideas comes from customer requirements analysis.

Analysis data from call-centers. By transcription into plain text call-center conversations between operator and customer provides implement sentiment analysis retrieved information from client. There can be text classification like client needs and expectations and problems caused in providing services.

It is important to start analysis of existing data. Customer service providers are everyday provided information from clients with different classification. And the first thing for telecommunication companies is to extract wealth information from existing data.

Big data blueprint development. Before, to be engaged in big data the first thing is to implement blueprint in using big data. Blueprint comprises requirements and strategy in embedding big data in business model. It is important to consider business model expectation and current IT structure of company. It helps to get common vision how company tries to imbed big data in process.

In the future work we are tuned to implement customer churn prediction using machine learning approaches and compare prediction accuracies of deep learning algorithms and decision tree algorithm.

**Conclusion**

Churn prediction model is positioned as the major activity in telecommunication industry and big data must be the crucial aspect as the future of telecommunication companies to extract more beneficial information and pass new business challenges. Systematic analysis and acquiring wealth information based on the historical data about customers opens new ways for telecommunication industry in customer retention methodologies. The benefit of big data for customer service providers is to keep ahead in the way of competition, discover new services and finally improve economical assets. The key solution is to invest in customer retention.

**REFERENCES**

1. Verbekea W., Dejaegera K., Martensb D., Hurc J., Baesens B. European Journal of Operational Research “New insights into churn prediction in the telecommunication sector: A profit driven data mining approach”. – 2012. -p. 218.
2. Qureshi S.A., Rehman A.S., Qamar A.M., Kamal A., Rehman A. Digital Information Management (ICDIM), Eighth International Conference “Telecommunication Subscribers’ Churn Prediction Model Using Machine Learning”. – Islambad, 2013.
3. Lee E., Kim J., Lee S. Industrial Management & Data Systems “Predicting customer churn in mobile industry using data mining technology”. – 2017.
4. Umayaparvath V., Iyakutti K. International Journal of Computer Applications “Applications of data mining techniques in telecom churn prediction”. – 2012.
5. https://telecom.kz/media/upload/49/2016/06/07/d3dbcabfa08b3d55af7248f87ca8f52a.pdf (Annual report of “Kazakhtelecom” JSC for 2015).
6. https://telecom.kz/media/upload/1/2015/07/03/39d1d073402550ccf5f111aa9c1bf44b.pdf (Annual report of “Kazakhtelecom” JSC for 2014).

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**Телекоммуникаяилық индустрияда абоненттредің жылыстауын болжауын үлкен деректерді қолданып моделдеу**

**Түйіндеме.** Тұтынушылардың байланыс қызмет корсетушілерін ауыстыру мүмкіндіктері пайда болғалы бері, абоненттердің жылыстауы телекоммуникациялық индустрияда маңызды және негізгі проблемаға айналды. Коммуникация саласындағы бәсекелестіктің артуына сәйкес телекоммуникация индустриясында бизнес модель абоненттерді жұмылдырудан гөрі абоненттерді ұстап қалуына көңіл аударылуына мәжбүрленді. Себебі жаңа абоненттерді жұмылдыру казіргі абоненттерді ұстап қалудан гөрт, бес есе артық шығынға алып келеді. Телекоммуникациялық индустриядан баска еш бір сала өз тұтынушылары жайлы үлкен ақпараттқа ие емес. Тұтынушылар жайлы жиналған деректердің байланыс қызмет корсетушілеріне үлкен экономикалық актив алып келу мүмкіндігі бар. Абоненттердің іс-әрекеттерін талдау пайдалы деректері талдау мен жаңа көздерін ашуға негізделген.

**Түйін сөздер:** Үлкен деректер, жылыстауды болжамдау, телекоммуникациялық индустрия, іс-әрекетті талдау, тұтынушыларды ұстап қалу.

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**Моделирования прогнозирования оттока абонентов, в телекоммуникационной индустрии используя большие данные**

**Резюме.** В то время, когда у потребителей есть возможность менять сервис провайдеров, отток абонентов является основой проблемой в телекоммуникационной индустрий и признана как ключевой. В связи с повышением конкуренции в коммуникационной сфере, бизнес модель в телекоммуникационной индустрий сфокусирована на удержание абонентов чем привлечение новых абонентов. Данное явление объясняется тем? Что привлечение новых абонентов обходится на четыре, пять раз дороже чем удержание новых существующих абонентов. Ни одна индустрия не обладает стольким количеством данных о своих клиентах как телекоммуникационная индустрия. Уточнения данных которые предоставляют абоненты могут служить для сервис провайдеров как улучшения экономических активов. Поведенческий анализ абонентов основана на приобретение полезных данных и открытию новых путей прибыли.

**Ключевые слова:** Большие данные, прогнозирования оттока, телекоммуникационная индустрия, поведенческий анализ, удержание абонентов.