Digital clustering in customer relationship management

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Abstract. The value of a customer is a key parameter of the creation of all business processes. A significant number of companies faces the problem of inconsistency and incoordination in the provision of services to their customers because of lack of relevant information. In the essay we attempt to analyse new interpretations of customer segmentation technology based on predictive analytics. Modern software platforms from the leaders of the IT industry allow real-time modelling and monitoring of customer lifecycle to prevent customer's "churn state". Proactive customer care provides the implementation of not only omni-channel interaction, but also the transition to the opti-channel paradigm of business, which on the basis of in-depth study of consumer experience offers every client an individual and the best channel for communication with the company.

1 Introduction

For the purposes of our research first we define the digital environment for the interaction of business and clients. According to the analytical and consulting company Gartner, which is specializing in information technology markets, there are currently ten strategic trends that form the basis of intelligent digital networks (Intelligent Digital Mesh).[1]

The first three are called Intelligence Everywhere and represent technologies and methods of data processing including advanced machine learning and artificial intelligence. These technologies enable to create intelligent hardware and software systems that can learn and adapt.

The next three technologies provide convergence between the real and digital world, and four more combine platforms and services that are necessary for consolidation of intelligent digital technologies.

As Gartner notes, about 50% of the existing customers of companies are not profitable just because of the inefficient interaction with them. [1] It is necessary to offer automation tools to accelerate and to simplify processes and hence to increase profitability. Fundamental changes are made by machine learning and neural networks as well as their accessibility on mobile platforms.

Artificial intelligence and advanced machine learning are already used in such intelligent systems as robots, driverless vehicles, applications, services of virtual personal assistants and intellectual advisers. Gartner believes that these systems will be marketed as

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intelligent products of a new generation as a basis for hardware, software and service solutions. [1]

2 Materials and methods

The essence of predictive analytics and its role in the consumer demand study. The fact is that the market situation is becoming more complicated due to the rapid development of high technologies and the increasing level of its accessibility, therefore more subtle tools are necessary to work with clients. A special role is played by the global trend towards the so-called collaboration of predictive analytics and customer relationship management (CRM). [2]

It is to be recalled that predictive analytics is connected with making forecasts. The steady increase in volume of information, both structured (for example in transactional systems) and unstructured, leads to substantial growth of the demand for its in-depth study and predictive analysis.

In this connection the approach to customer segmentation is changing, which is specific area of predictive analysis. Customer relationship management systems are necessary to understand clients, to monitor their actions, to coordinate resources and to support sales processes. The efficiency of all business processes will be greatly improved by logical separation of clients into understandable groups, including forecasting reorders, estimating seasonal fluctuations by customer types, customer lifecycle management, targeted marketing, selling additional or more profitable goods. [3]

Predictive analytics is based on the application of methods of statistical analysis. One should not identify such kind of analysis with calculations of average data. The result of the analysis is understanding of a data set, forecasts or recommendations concerning future actions. A special aspect of the predictive analysis is elimination of the influence of human intuition to make more reasonable decisions about future events.

The essential parameter of predictive analytics is the determination of a predictor or several predictors, that affect the predicted event (age and driving experience, occupational status and existence of loans in another bank). A set of predictors forms an analytical model for predicting an event in the future with the specified degree of probability. The less the number of such factors in the model, the lower the level of its accuracy. On the other hand, sophistication of a model with historical data can lead to its overfitting and reduction of its stability in the future.

Analytics will face the challenge of studying the ever-growing and increasingly heterogeneous data. Hence the need for automation of analytical processes.

For retail demand forecasting the following algorithms are used[3]:

- time series algorithms: for each category of goods it is important to use its own models that describe performance of variables in the most accurate way;
- associative algorithms serve as a basis for the next best buy model, that means to make customers exactly such offers that they will most likely respond. For instance, analysis of market baskets helps to determine which goods are most often in one order, and to suggest what else the customer can buy;
- segmentation algorithms allow not only to form customer groups, that differ as much as possible from each other, but also to explain patterns of such division. Thus, a company learns about its customers in a different perspective, forms a qualitatively new strategy for sales and interaction with customers;
- survival algorithms are used to calculate customer lifecycle and to predict customer attrition.

3 The results of the research

3.1 Customer lifecycle as an object of predictive analytics

We shall enlarge upon the customer lifecycle, as it is directly related to segmentation. English expression "customer lifecycle" is known as the abbreviation CLF and defines the process of interaction between a customer and a company. This is a way of a client from getting to know a company and its products to making a purchase and completing the interaction (leaving). [4] Schematically CLF can be represented as follows:

1. Acquaintance – consideration – purchase.
2. Ownership (use) – evaluation (experience).
3. Repurchase or leaving.

If a customer makes a repeat purchase, then natural leaving is possible. Alternatively client attrition will be preventable and all efforts of the company will be aimed to keep customers.

4 main stages of evolution of relations between a customer and a service company are distinguished[5]:

- potential customer is an individual or an organization that is not yet a customer, but falls under a target market group;
- respondent is a potential customer who is interested in company's products and services;
- active client is an individual or an organization that purchases company's products or services at the moment;
- inactive client is a client, the cooperation with whom has ended for one reason or another.

For instance, the company Wargaming.net, a well-known developer of gaming platforms, creates its products exclusively on the basis of customer intelligence and presents customer lifecycle as follows[6]:

1. Potential client is characterized by awareness (he knows about existence of the product, but he is not interested in it) or by interest (he is interested in the product and compares advantages and disadvantages of competitors' products).
2. New client is a customer who chooses one out of many offers and makes a purchasing decision, gets acquainted with the basic options of the product and learns how to use it (purchase and acquaintance).
3. Loyal client starts using the product and learns all its functionalities, gets used to the product and develops behavioral patterns of usage, looks for opportunities to optimize the usage of the product or for getting additional non-standard opportunities (usage, habituation, optimization).
4. Customer development starts from the moment of purchase. It is characterized by the search for alternatives, it means that when optimization is not possible, the customer is looking for and considers the possibility of using other products, he is interested in other products.
5. Client retention is the most profound part of the customer lifecycle when he stops using the current product and proceeds to use other products.

A potential client analyses the expediency of making a purchase based on customer reviews of a company and a product, he consults with friends and buys the product. Further the company is interested in leading the customer to a second purchase. To prevent client attrition is what predictive analytics needed for.

It is important to predict customer behaviour under certain conditions. It gives an opportunity to develop new strategy of interaction with certain buyers' groups. With the help of predictive analysis, it is possible to cluster customers and to understand which

groups of customers need additional motivation to repurchase and for which it makes no sense to spend the advertising budget.

Customer lifecycle analytics also allows to identify clusters of customers who are interested in new products or services; who are ready to increase the check amount if there is an interesting offer; who prefer to buy not a single product, but several in one package; who did not make a purchase, but there are high chances that they will do if they get attention[5].

Such analytics allows to determine the value of a customer, which directly depends on the phase of the customer lifecycle. With the Pareto principle (the 80/20 rule) in mind it should be noted that without customer lifecycle analytics it is extremely difficult to determine who make 20% of those who bring basic profit. Here we come to the customer lifecycle management, for which the above-mentioned analytics is actually needed as the following tasks are being solved[5]:

- attracting new customers, determining the most "promising" cluster of target group, identifying the size of investments for the successful completion of the process and effective ways to attract such investments;
- retention of existing customers, identification of the most important values for the client, which form motivation for him to become a loyal client of the company.

For better understanding the importance of customer lifecycle analytics we present the opinion of the company EMARSYS, which developed one of the best marketing intelligence platforms based on customer lifecycle Smart Insight. It uses analysis, data processing and machine learning to make detailed visual reports, it gives new opportunities for a marketer, a tool to understand personalities of customers and to estimate efficiency of every step. The essence of customer lifecycle analytics is presented by the company with these three theses[7]:

- the key goal of every commercial enterprise is to maximize customer lifecycle value;
- the best strategy to maximize customer lifecycle value is to identify clients' personalities depending on a phase of a customer lifecycle and to optimize work concerning each of them;
- customer lifecycle analytics is what allows marketers to optimize their activities concerning these individuals due to: understanding customers, discovering new opportunities, implementing customer lifecycle automation tools and estimating real-time efficiency.

The result of customer lifecycle analysis and management is an increase in customer lifecycle value, which means maximum securing of loyal clients, their retention, reducing the possibility of customer churn and transformation of potential customers into loyal clients.

Exploring views of marketing directors IBM found common proposition about necessity for three conditions for success[8]:

- usage of data science for better understanding of individual and collective customer needs;
- creating positive consumer experience for clients;
- usage of the benefits of new technologies to provide attractive consumption possibilities on a more intelligent and efficient basis.

3.2 Clustering as a tool for predictive analytics

We believe that at the present stage of studying customers using smart products an important part of preparing for deep predictive analysis is not just segmentation, but clustering. Mechanical division of clients by age, sex, demographic, social and geographic characteristics no longer meets the requirements of the highly competitive market.

Clustering on the contrary allows software to identify the most significant parameters of consumer behavior, while increasing the accuracy of individual offers on the basis of data of a particular group.

The ability to extract useful knowledge and then to monetize them is a key success factor in the market. We will show the differences between conventional data mining and advanced analytics that not only answers the question "what is happening?" (when, who, how, how much), but also explains why it happens (will it happen again; what if...?; what we did not think about, but we could ask or think about it). These differences are expressed in the basic functions of analytics. For instance, in traditional data mining they are represented by reports (metrics, dashboards, KPIs), by creating queries on the fly, by real-time analytics, data slices, data navigation, automatic monitoring and reporting.

Advanced analytics functions are expressed in a static and quantitative analysis, extraction of unstructured data, predictive models. big data analytics, text analytics, scenario modeling.

Customers clustering based on predictive analytics solves the following business tasks[9]:

1. Improved processes for meeting consumer requirements, increasing customer loyalty: client experience review, that allows to determine customer needs and opportunities to improve customer satisfaction; identification of key positive and negative drivers; active monitoring of client relations when interacting with a company.

2. Improving the efficiency of brand and reputation management: prompt case detection of situations that can be negative for a company and reactions to them before customers will share their experience with their friends or the information gets into mass media; customer response to a negative side at the time when it is still possible to fix this.

3. A modern approach to product lifecycle management: collection of information about customer preferences regarding products and their benefits; use of strong and weak features of competing products; collection and in-depth analysis of emerging trends, their identification and use; increase of product lifecycle by identifying opportunities to use "no name" products, customer segments and product lines; identification of customer reactions on a product yield in real time.

3. Sales and marketing efficiency improvement: identification of opportunities for up sale and cross sale; a personalized offer for customers that use the Internet channel; measuring the impact of promotions and campaigns; measuring effect of price changes; identification of the most high-profile trends.

4. Significant improvement of customer service: reduction of "middlemen" listening to a customer, reduction of distortions, reduction of churn; reduction of volume of internal communications, automation and efficiency improvement of processing customer requests; early identification of recurring queries and making an acceptable solution; improvement of quality of a knowledge base for independent problem solving by a client.

5. Planning and design efficiency improvement: automation of tasks concerning feedback collecting, its categorizing and reporting; reducing inevitable mistakes by manual categorization and feedback processing; reducing feedback processing costs; more time and efforts are spent on business development and increasing revenue, rather than on feedback processing.

The commercial effect of use of predictive analytics is confirmed by the results of the McKinsey study: companies that use customer intelligence get 126% more profit than those who do not analyze their clients. [10]

Customers clustering based on predictive analytics can be divided into four major processes[10]:

- data mining (transaction data, personal purchase histories, data of customer flows);
- analysis of customer opinions (in-depth interviews, social media, focus groups);
- behavior analysis (geotargeting, client activity maps, customer experience);

- preemptive actions (new products and business models, churn prevention, customer lifecycle management).

Clustering, or as it is also called advanced segmentation, allows to build an effective communication strategy with existing and new customers, to increase financial returns from promotional offers, to save marketing budget, to position and promote new products and services effectively.

The company Zirer & Co, that specializes in loyalty management, Data Mining and Customer Experience, presents a rather interesting classification of analytical technologies and defines the role and place of predictive analytics in it:

1. *Descriptive analytics. What is happening and how to segment?* Elements: Customer profiles; Cluster analysis; conjoint analysis (a product is conventionally decomposed into a set of attributes. The statistical method used to study consumer preferences, which allows to determine the best configuration of new or existing products)
2. *Analysis of client behavior. Who are the most valuable customers?* Elements: Profitability of client groups (ABC-analysis); Customer lifecycle segmentation; RFM-analysis (Recency, Frequency, Monetary) — customer segmentation in sales analysis by loyalty; Conjoint analysis.
3. *Scoring models. How to make promotional actions effective?* Elements: Propensity scoring (propensity for purchase); Response modeling; Association analysis; Sequential patterns.
4. *Diagnostic analytics. Why is the churn increasing?* Elements: Churn analysis; Cohort analysis; Customer lifecycle analysis.
5. *Predictive analytics. What customers will leave and why?* Elements: RFM-analysis; Customer churn modeling; Scoring models.
6. *Prescriptive analytics. Which customers to retain and how?* Elements: The formation of the Next Best Offer; Scoring models; Anti Fraud.

The examined classification confirms the integratedness and continuity of all analytical technologies in the field of customer research. Zirer & Co. also mark market basket analysis or affinity analysis separately out (the study of interconnection between events that happen together). The market basket analysis allows to determine, which products are most likely to be sold together. Such analysis is used in retail, when there is no opportunity to register a personalized purchase histories. The most important characteristics of affinity analysis will be presented in terms of business tasks that it performs:

- Search for typical buying patterns using associative links. What is the structure of typical food baskets? The solution of the problem is in making a list of items for promotional campaigns; improving planograms; adjusting of merchandising and lay-outs, including those in online stores and recommendations in electronic catalogs.
- Inventory management. How to avoid out of stock/ over stock? Stock planning – management of network profitability.
- Up-sell promotions and Cross-sell promotions. Here we should find answers to many questions: How will a promotional campaign for a product N affect sales of other products/categories and vice versa? What are the hidden connections between categories? What are the hidden connections between products? What categories should be sold together? Search for solutions is connected with an increment in operational characteristics; planning effective promotions; creation of a catalog to promote special categories and products.
- Client segment analysis. In what client segments what type of purchases is to be observed? What promotions are worth to be conducted in different client segments? Up-sell and Cross-sell promotions must be planned for priority segments, as well as creation of customized promotional materials for each segment.

Thus, the aim of market basket analysis is the search and discovery of an association between different events, rules for quantitative description of a mutual connection between two or more events. These rules are called association rules.
The base element of association rules is a transaction, and its typical example is a purchase of goods by a customer in a supermarket. A customer usually buys a set of goods and this raises the question: is the purchase of one product in a basket the consequence of or reason for buying another product, are these events connected? This connection is established by the association rules.

Thus, professional management of a client base is impossible without advanced analytics. If earlier business was mainly aimed at energetic pushing of its product, now in the conditions of crisis and stagnation of the economy a client will cooperate with a seller, if he is sure that the company or brand is focused on satisfying his requirements and solving real-life problems, providing an adequate level of service and meeting deadlines.

Cluster analysis can provide hundreds of consumer clusters of different sizes, which is important for global business, but not all of them are of interest to medium and small businesses in terms of financial returns. Therefore, the rule of combining simple and complex, that is the classical marketing segmentation with socio-demographic characteristics and advanced segmentation based on predictive analytics, remains important.

The company Data Mentors determines the following predictive parameters[10]:

- response modeling is a methodology that allows to assess the degree of customers receptivity to marketing promotions and to predict the likelihood of purchases. Key target: to define the list of buyers who will respond to the promotion in the very near future. For such customers special offers are made;
- evaluation of the propensity of a customer to a particular product: the purchase history of a customer is analyzed, that allows, in contrast to surveys, to determine true preferences and to create customized special offers to such clients;
- modeling of churn: the consumer behavior is studied to predict the "state of churn" and to plan measures of retention of financially prospective clients. Key target: to mark customers with an ending lifecycle out before their leaving and to revive their purchasing activity.

Summing up the preliminary result, we can distinguish the advantages of advanced customer segmentation for business[10]:

1. Understanding customers and forming the basis for the development of product strategies.
2. Effective communication strategy with a small marketing budget.
3. The increment in operational characteristics: conversion, average check, revenue.
4. The opportunity of building relationships with customers and their retention.
5. Analysis of promotions conducted for different client groups, adjustment of assortment, merchandising, inventory management.
6. Satisfaction of customer needs, achievement of loyalty, strengthening the competitive position of a brand.

3.3 The experience of the largest IT companies in the development and use of customer digital clustering

According to SAP, only 16% of the companies analyse intentions of clients and make suggestions in real time, and 80% of companies do not have enough information about their customers. Only 28% of companies use personalization across different channels. At the same time 70% of the customers are ready to provide personal information and personal

data in exchange for personalized attractive offer, 91% of the marketing staff set themselves a task of improving customer experience through personalization[11].

SAP represents the customer lifecycle in the aspect of predictive analytics in the following way[11]:

1. Events and interactions in all channels: loyalty program, events, analytics, location; sales and services; financial profile; site processing; social media, mobile banking.
2. Aggregation and study of data.
3. Intelligent predictive analytics (behavior, scoring, association, insights, enrichment).
4. Personal targeting and orchestration (how services should interact with each other by messaging).
5. Campaign execution in all channels (mobile and social networks, digital channels, personalized Commerce, contact center, benefits and opportunities, messengers, e-mail, SMS); feedback collection.

We cannot but dwell on the development of IBM in the area of predictive analytics to make more well-reasoned decisions and improve business results. Integrated software solution IBM Predictive Customer Intelligence uses predictive analytics methods to transform data into information that helps to predict what customers will need and what that they will do in the future.

Models SPSS Modeler (Statistical Package for the Social Sciences) are used to inform the decision-making process by quantitative processing of relevant information, such as data that describes 8:

- the situation with the customer outflow;
- customer's propensity for interaction in a particular channel, such as the Internet, mobile app or phone;
- the identity of the customer to customer segment, which is characterized by a high level of financial literacy.

Models are trained using standard data sets and then unfold to perform quantitative assessments.

If the traditional practice of customers segmentation classifies them into groups for the campaigns targeting to promote products to retain clients and also to support cross-sales and sales of the more expensive product, IBM Predictive Customer Intelligence raises this marketing practice to a higher level by segmenting of the customers according to their values during the lifecycle and by providing recommendations for customer retention.

IBM proposes to consider IBM Predictive Customer Intelligence work as a scenario of where a telecommunications company interacts with a specific customer, named Bill, who is a small business owner and has one mobile account that he uses for business and personal communications[8].

The telecommunications company considers Bill to be a valuable customer, because he uses large quantities of data and is very active socially. The telecommunications company has a range of data about Bill that includes demographics, geographic location, calling patterns, use of the website, survey and poll results, call center conversations and so on.

The telecommunications company is also using IBM Predictive Customer Intelligence to continuously monitor Bill’s data and extensively analyze it in detail. The company has identified Bill's marketing segment, his lifetime value, social influence and churn risk[8].

Overall, the company is considering Bill as a satisfied customer. However, IBM Predictive Customer Intelligence alerts the telecommunications company to two larming issues. First of all, Bill has had his third dropped call of the day while on the phone with a new client. And secondly, he has also been on the phone with a competitor and on the competitor’s website. IBM Predictive Customer Intelligence determines that the company may attract Bill to itself by means of Bill’s preferred method of interaction[8].

With the multiple models are running in the background, the team of the telecommunications company can determine that the focus of the interaction with Bill should be based on decreasing churn and increasing customer lifetime value.

The telecommunications company uses Bill's smartphone to make him an offer to update his phone, since the recommendations of IBM Predictive Customer Intelligence determines that such an offer is preferable to other alternative actions. In this scenario, SPSS Modeler was used to uncover the patterns and anomalies in Bill's behavior and score him on his propensity to churn. To determine Bill's sentiment, the company used the function of the text analytics to understand the context using advanced techniques of intelligent processing of the text which is written in a natural language[8].

4 Conclusion

Thus, as the key digital results of clustering on the base of advanced analytics, we can distinguish:

- faster decision-making from the moment of receiving important information to the action;
- quick and simplified creation of marketing campaigns, reducing of marketing costs while increasing customer satisfaction;
- a single view of the customer in online and offline touchpoints and data acquisition in real time for targeting the most profitable customers and potential customers;
- seamless integration with sales processes and digital communication channels.

Advanced analytics Customer Experience and digital clustering ultimately are aimed at the creation of the opti-channel interaction with the client. It is to be recalled that, this trend evolved from multi - and omni-channel:

1. Multi-channel - support for many channels (websites, apps, social networks).
2. Omni-channel support for many channels, channel hopping support, a single CRM.
3. Opti-channel - support for many channels, hopping support channel, channel optimization, personalization, AI, Big Data, Machine Learning.

Omni means "single one", that means, the distribution of a unified approach in communicating with the client on all channels, the correction of problems and inconveniences in their matchmaking. In addition, Customer Experience has become a fundamental element of all intellectual systems of learning clients. Main goal: to provide the client with all the necessary through any channel and switching between channels (channel hopping) should be seamless, without the need to restart the process of reviewing and purchasing from scratch[12].

However, practice has shown non-obviousness of the value of many channels for the customers. The problem of choice for many customers has proved difficult to solve, that means, customers would prefer to immediately receive the most suitable channel.

Thus, the company needs to get more personalized information about customers and customers need one, the most convenient channel for communication. In fact, it is an endless circle that always returns us to the point of the satisfaction of customer needs and solving his problems. In place of omni-channel comes opti-channel that requires the use of artificial intelligence and predictive analytics. Digital clustering in opti-channel trend provides analysis of sales history, customer purchasing behavior and the creation of individual offers for each customer or groups of customers. The business operates with a single database of customers that allows to apply the same standards of communications for all sales channels, creating a unified communication space.

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