

Simplified Customer Segmentation Applied to an Outbound Contact Center Dialer

Telmo Ricardo Lopes Alberto, Pedro Mendes da Silva

Research and Development

Altitude Software

Oeiras, Portugal

{Telmo.Alberto, Pedro.Silva}@altitude.com

Abstract— Contact centers are a critical link between companies and their customers. In this context, outbound dialing represents a major business area for many companies, as they often need to reach a very large number of customers by phone or other media. In this scenario, it becomes a necessity to prioritize which customers should be contacted first, probably according to their expected business value. In this paper, we will keep our focus on customer segmentation for an outbound contact center dialer. This implies targeting different sets of customers (customer segments), with distinct priorities and staff for each segment, while taking into account all the business objectives. Our proposal is based on extending our existing outbound contact center management system to provide support for simplified customer segmentation in the context of outbound dialing. This system provides an interactive interface for handling typical contact center business requirements. Our main focus is enhancing the system’s user experience, so that it allows the user to manage customer segments and dialing effectively, by using schedules, key performance indicators, multidimensional statistics, business segment prioritization, customer contact prioritization, and staffing management. Ultimately, we have shown how it was possible to enhance an outbound dialer with customer segmentation concepts, focusing on schedules, KPIs, multi-dimensional statistics, business segment and customer contact prioritization by business value, and staffing. Users of the new module find that their staff productivity and responsiveness to events regarding contact list quality has improved dramatically.

Keywords-contact center; customer segmentation; dialer; near real-time business intelligence; business applications.

I. INTRODUCTION

Contact centers represent one of the main interfaces between companies and their customers [1]. Many contact centers need a large specialized staff to handle all the communications with the customers. They are currently not limited to phone calls as in the past, and have extended their reach to other media, such as email, chat and social networks [2][3].

In contact centers, we usually have two types of interactions, inbound (originated from costumers) or outbound (initiated from inside the contact center) [4]. For example, an outbound contact center can be focused on

dialing calls to a list of customers that have a debt to pay. The calls must then be delivered to contact center operators (also known as “agents”).

The work in outbound contact centers can be divided in several Outbound Campaigns, which take lists of customers and a list of business rules and try to deliver interactions between the most adequate agents and the selected customers, according to specific business rules.

Contact center management is a complex and demanding endeavor, with the need to connect business objectives, people and processes. Several business applications have been developed to handle this complexity and allow for optimized contact center management.

Customer segmentation is mainly the action of dividing a customer base into smaller sets of individuals, similar in specific ways relevant to marketing. These segments, allow companies to allocate the most appropriate marketing resources to specific groups of customers, in order to maximize the financial value generated [18]. Examples of implementation of the concept can be found in [8][9].

In the past years, customer segmentation has become a very important business requirement regarding obtaining new customers and increasing customer retention. Following this trend, the need to somehow integrate this concept in customer relationship management (CRM) systems, in general [25], and in contact centers management systems, in particular, arose. The underlying goal is nearly always profits maximization.

In this paper, we will focus on customer segmentation in the specific context of outbound contact center campaigns. Section 2 presents some details about our existing contact center management system. Section 3 details the customer segmentation concept. Section 4 describes how outbound campaign customer segmentation was integrated into our system, with the introduction of the Strategy Manager module. Section 5 presents some conclusions and future work.

II. CONTACT CENTER MANAGEMENT SYSTEM

Our previous research has been focused on developing a Contact Center Management System (Altitude uCI). A

general simplified overview of the current architecture can be found in Fig. 1.

Our Contact Center Management System is responsible for handling all interactions and events between customers and contact center staff. The dialer is responsible for delivering interactions to agents, without them having to perform manual dials. It offers support for predictive dialing [4], always respecting legislation (by avoiding silent calls) and business objectives.

All the contact center data (system tables, customer data) is stored in an external relational database management system (RDBMS). Working on top of the external database, we have our own application specific built-in Online Analytical Processing (OLAP) engine [5]. This is needed for real-time monitoring, using OLAP dimensions and cubes, extra details about this can be found in [19].

Our system includes client applications, mainly web and desktop applications for the agents (the contact center operators), and a specific web application for contact center supervisors and managers, designed to monitor all contact center performance in real time and react according to it. It also allows the user to perform all the system configuration tasks, as well as requesting and visualizing reports.

The link between the contact center and the customers is provided by the Public switched telephone network (PSTN) and by the Internet. PSTN provides the link for calls and faxes from/to customers, and the Internet provides interactions through social networks, chat, email, and VOIP (voice over IP).

Our system enables contact center stakeholders to manage the contact center according to business goals, using business intelligence technology and concepts (BI). BI is a collection of decision support technologies for the enterprise aimed at enabling knowledge workers to make better and faster decisions [5].

A Key Performance Indicator (KPI) is a measure or metric that evaluates performance with respect to some objective. It is routinely used by organizations to measure both success and quality in fulfilling strategic goals [17].

The system allows business users to track near real-time business KPI, using visual dashboards. Also, often those KPI are associated to specific goals, and trigger special events or actions, if the goal is either reached or failed. Some industry standard KPIs are built into the system (for example: Conversion Rate [6]).

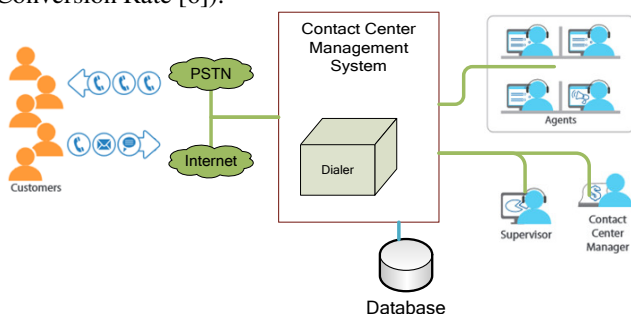


Figure 1. General overview of our contact center management system

III. CUSTOMER SEGMENTATION

The concept of customer segmentation is a key marketing notion. The main goal of separating customers into different segments inside the same campaign is to be able to differentiate marketing activities towards these segments [7].

Extensive research has been done on customer segmentation (both in general and for specific fields), but, ultimately, it is up to the business manager to decide which parameters should be used to perform distinctions between customers and to decide at which segment each customer belongs. Depending on the goal, some simple criteria like gender, age group, geographical location, income, and previous sales are good indicators to be used when segmenting.

For example, “expected profit greater than X” might define a segment. As most companies want to maximize profits (or some other quantity, for example, sales), marketers quickly realized that a segmentation should ensure that better customers are separated from the remaining customers [7]. The concept of customer lifetime value and fidelity is also mostly used in segmentation [8][9].

Regarding the definition of which segments to use, and the attribution of customers between each of them, there are several techniques available. These techniques include K-means (more details for this method can be found in [21]), Two Step, and Kohonen networks [20]. Statistical mixture models, like Latent Class Analysis (LCA), can also be used (a recent example of this method usage can be found in [22]).

Customer segmentation techniques can be generically used for marketing purposes. Some consumer markets customer segmentation types include [20]:

- Value based.
- Behavioral.
- Propensity based.
- Loyalty based.
- Socio-demographic and life-stage.
- Needs/attitudinal.

Industry-specific customer segmentation methodologies have been developed, which include data specific for each field. For example, for the banking industry, there are specific techniques for segmenting credit card holders and specific techniques for segmenting retail banking customers. This also applies to other industries, such as the retail industry, telecommunications industry, and the electrical power industry [20] [10].

In recent years, with the arrival of social media channels, the issue of customer segmentation in this new context has captured research attention. Issues include how to integrate and correlate all the new social data with data from other sources, for example, with market research data and Customer Relationship Management (CRM) data, and also how to match social media identities with all that data already collected in the corporate databases [23][24]. In the

same field, we have seen an interesting proposal for automatic customer segmentation applied to social CRM systems [25].

A correct combination of customer segmentation with the right marketing options for each segment will lead to maximized profits. In the context of contact centers, the main goal is to optimize business results by choosing the right contacts to dial at the right time, maximizing the success/cost ratio of outbound campaigns.

IV. STRATEGY MANAGER

“Strategy Manager” is a component that tries to add simplified customer segmentation for outbound contact center dialers to our system. Visually, it is mainly composed of a visual dashboard (Strategy Center), a calendar (Strategy calendar), and a monitoring area. The user can control the dialer behavior by specifying which segments should be contacted first and which agents should handle the interactions. Near-real time information about the progress in each segment is available, so that the user can act upon it.

Before the integration of this concept in our system there was no notion of business segment associated with a customer list. The only available option was to specify a Structured Query Language (SQL) filter applied directly to the database to select which customers are contacted while the filter is in place. Thus, the user could not monitor progress on each customer segment individually nor use a different staffing for each segment. Priorities between segments were also impossible to achieve without manual intervention.

A. Strategy Center

A matrix-like user interface control was selected after several design and usability test iterations. It was named “Strategy Center”, and is shown in Fig. 2. It is a dashboard, showing near real time important business information, and providing access to the business segmentation configuration operations. It is now an important part of our contact center management tool. The matrix is mainly composed of three sections:



Figure 2. Screenshot of the Strategy Center interface .

- **Contact Lists:** these are the matrix rows. They usually represent different lists of customers to be contacted. Normally, different contact lists represent different input files from customer list data sources.
- **Business Segments:** these are the matrix columns. These contain a filter to specify which customers from the existing contact lists should be contacted.
- **Strategy Cells:** these are the matrix cells, the intersections between business segments and contact lists. They represent the set of customers from a given contact list that match a business segment filter.

With the help of several visual indicators, the user can, at each moment, in each matrix cell, monitor:

- How many customers were already contacted.
- How many customers were not yet contacted.
- If a matrix cell is being targeted (Started or Stopped).
- What is the status of all of the conditions that are currently being used to control the automatic running status of each cell (schedules and KPIs).

More globally, in the matrix top and left cells, the user can also monitor how customers are distributed across the contact lists and business segments. Finally, the user can also monitor the dialing business performance and change the dialing strategy.

B. Business Segments

The main configuration parameter for a business segment is the segment filter. The filter is defined in the user interface, using logical operators, combining customer data fields which can range from demographic data (age, gender, income, etc.) to specific business fields (previous sales, customer category [11], etc.). It is up to the user to define thoroughly which segments will fit best their business goals, and which customer attributes should be used in the filter to define their positioning.

C. Dialer Management using Business-oriented Rules

The user can fine-tune the dialer behavior by selecting different policies for each strategy cell.

For each cell, there are two main operation modes, the manual and automatic modes:

1) *Manual mode:* the dialing for a given cell is totally controlled by the user. The user manually selects the “Start” and “Stop” operations.

2) *Automatic mode:* the dialing for a given cell is automatically controlled by one or a combination of conditions configured by the user, according to specific business strategies:

a) *Schedule:* the period of time during which the customers from one cell should be contacted.

b) *KPI*: the dialing for a given cell is controlled by the value and objective of a user-defined KPI.

c) *Maximum customers contacted*: the dialing for a given cell is controlled by the value and objective of this built-in KPI.

D. Monitoring

It is possible to monitor the dialing process in real time, having individual performance data in every cell, and aggregated statistics for the contact lists and business segments. At each moment, we can tell how many customers were contacted (successfully or not) and how many are left. The monitoring operations are supported by a multidimensional data model [5].

KPIs also enable the user to examine the performance of each cell at any time and whether the business objectives are being met, and dynamically respond accordingly.

Additionally, the user can access more real-time and historical indicators, with options to navigate to other monitoring screens containing tables or charts. Historical-data reports are also available.

E. Staffing

It is often necessary to assign specific agents to specific business segments. For example, a debt collection contact center manager can decide to assign contacts with a larger debt to a set of highly skilled agents. Another example would be to segment customers by education level and let customers with a college degree be handled by agents with a college degree [12].

Strategy Center provides a mechanism for staffing, which includes assigning skills to agents and assigning skills to business segments. The system then matches the required agents to the assigned business segments.

F. Business segment prioritization based on business value

Different business segments can provide different expected business values. For example, consider an outbound contact center where a customer list is sorted in descending order by Customer Lifetime Value (LTV) and then split by percentile [13], as shown in Fig. 3. It is then expectable that each segment will have a different business value and that a user may want to target better valued business segments first.

Considering this idea, operations have been implemented in the Strategy Manager so as to allow the user to set sequences of business segments to be dialed. When defining the sequence, the user also defines which business goals control the transition from one business segment to the next.

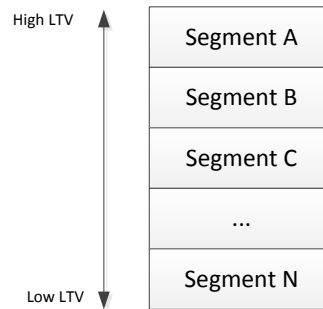


Figure 3. Business segment prioritization based on LTV.

G. Contact prioritization based on business value

Even after customers are segmented, they can still have a different individual expected business value. For example, each customer can have a different expected lifetime value, as suggested in [9]. So, it may be useful to contact customers with the higher expected value first (Fig. 4).

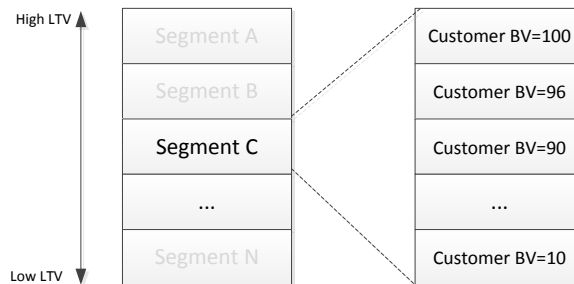


Figure 4. Contact prioritization according to business value.

In order to satisfy this requirement, the Strategy Center provides an operation to sort the contacts by a user-defined business value, which can be derived from each contact’s attributes.

H. Multi-channel

As stated previously, contact centers are not restricted to telephony interactions and businesses find it important to be able to reach customers in multiple media [2][14]. Having this idea in mind, the Strategy Manager provides a mechanism to reach customers from a given segment through several media.

For example, suppose a contact center manager wants to define that, for “Business Segment X”, after trying to reach a customer by phone by a maximum number of tries he should be reached by email instead. This behavior can be configured in Strategy Manager by defining a set of media rules for a given business segment.

V. CONCLUSION AND FUTURE WORK

In this paper, we presented a module that implements customer segmentation for outbound contact center dialers with a focus on business intelligence. We presented a Contact Center Management System (Altitude uCI), where the module was added, and provided an overview of customer segmentation concepts. We have shown how it was possible to enhance an outbound dialer with customer segmentation concepts, focusing on schedules, KPIs, multi-dimensional statistics, business segment and customer contact prioritization by business value, and staffing. Some of our customers have been integrating their customer segmentation in the new "Strategy Manager" module, and their staff productivity and responsiveness to events regarding contact list quality has improved dramatically, as they can now monitor each segment's quality in terms of dialing and sales success and change dialing priorities and staffing accordingly and in real-time.

In the future, our research will be focused on enhancing the dialer with "best time to call a given customer" estimations, so that the probabilities of desired business outcomes are maximized. This may include classification modeling data mining techniques, possibly using decision trees (or other classification method) applied to the customer attributes, providing a classifier for call success or failure, in a given schedule [15]. In this scenario, the classifier also outputs a probability for "call success" for each customer. This probability output from the classifier can then be used to order customers by success likelihood.

Additionally, automatic customer segmentation mechanisms will be addressed. These will allow a customer list to be automatically segmented, with minimal user input. For example, automatically segmenting (binning) customers based on LTV intervals. The user would only select the field where to perform the binning [20]. Another possibility will be to use unsupervised machine learning techniques, to find related customer segments. Namely, K-means, Two Step, and Kohonen networks techniques can be used to automatically find customer segments. Additionally, a decision tree classification method could be applied to these segments, in order to find a human intelligible description for each cluster, which is also usable as a filter in the Strategy Manager business segments [20].

Adding more native support for marketing related customer segmentation types is also a future possibility. This would include support for segmentation types like Value-Based Segmentation, Behavioral Segmentation, Propensity-Based Segmentation, Loyalty Segmentation, Socio-demographic and Life-Stage Segmentation integrated into the system, automatically guiding the user into finding the right segments and providing the corresponding filters to the Strategy Manager [20] [8][9].

The addition of marketing related customer segmentation concepts and processes for specific industries is also a possibility. Banking [20], telecommunications, and electric power industry [10] could be considered, among others.

Better expressivity between business goals and KPIs may also be addressed, as proposed in the Business Intelligence

Model research literature [16][17]. This may allow better business rules for prioritizing business segments.

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