

Chapter 6.13

The Impact of Customer Churn on Social Value Dynamics

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ABSTRACT

Modern telecommunication service providers implicitly create interactive social networks of individuals that both depend on and influence each other through complex social relationships grown on friendship, shared interests, locality, and so forth. While delivering services on the individual basis, the network effects exerted from customer-to-customer interactions remain virtually unexplored and unexploited. The focus of this article is on customer churn, where social network effects are widely ignored yet may play a vital role in revenue protection. The key assumption made is that a value loss of a churning customer extends beyond his revenue stream and directly affects interaction within local neighbourhoods. The direction and strength of this impact are evaluated experimentally by direct measurements of the total neighbourhood value of the churning

customer along with other standard social network measures taken before and after the churn event.

INTRODUCTION

Social networks are one of possible representation of human communities, in which people interact and get into relationships with one another. These relationships are usually very complex and engage our feelings, emotions, likes and dislikes, etc. Besides, relationships in the social network result from cooperation and work or family dependencies. Simultaneously, social networks evolve: they change their structure; new communities arise while the others disappear; some relationships reinforce while the other abate (Leskovec, J., Backstrom, L., Kumar, R., & Tomkins, A., 2008).

In the real world, people depend on each other. Our choices and behaviour also influence

behaviour of the others (Fowler, J.H., & Christakis N.A., 2008). This is the crucial concept of recommender networks (Kempe, D., Kleinberg, J.M., & Tardos, E., 2003; Leskovec, J., Singh, A., & Kleinberg, J.M., 2006) and plays an important role in marketing (Leskovec, J., Adamic, L.A., & Huberman, B.A., 2007), in which people spread information and opinion about products through mutual, personal contacts.

Ability to predict changes and their consequences is crucial in every business. For that reason, dynamic analysis within the customer network especially in the telecommunication social network is very important. General concept of analysis of dynamic social networks was presented in (Berger-Wolf, T.Y., & Saia, J., 2006). In order to forecast such changes and investigate the evolution of social networks even physics and molecular modelling can be utilised (Juszczyszyn, K., Musiał, A., Musiał, K., & Bródka, P.). In some other approaches, clustering (Ebel, H., Davidsen, J., & Bornholdt, S., 2002), statistical analyses and visualizations (Berger-Wolf, T.Y. et al, 2006) or multi agent systems (Bocalettia, S. et al., 2006; Schweitzer, F., 2007) are used to get an insight into network dynamics. Dasgupta et al. tried to predict churn based on the analysis of relationship strength in the mobile telecommunication social network (Dasgupta, K., Singh, R., Viswanathan, B., Chakraborty, D., Mukherjea, S., Nanavati, A.A., 2008), whereas Gopal and Meher used typical prediction method – regression to estimate churn time and tenure for the same domain Gopal, R.K., & Meher, S.K., 2008).

This article tries to answer the following question: does our behaviour, as the customers, influence the others and are we able to evaluate this influence based on the available data about mutual contacts or not? In particular, we analyse the influence of churning customers on their neighbourhoods after the churn.

TELECOMMUNICATION SOCIAL NETWORK

Concept of the Telecommunication Social Network

Telecommunication data contains information about some customer activities, namely phone calls and each call can be treated as the evidence of mutual relationship (Kazienko, P., 2007)

A telecommunication social network TSN is the tuple $TSN=(M,R)$ that consists of the finite set of members (customers, nodes) M and the set of relationships R that join pairs of distinct members: $R=\{r_{ij}=(x_i,x_j): x_i \in M, x_j \in M, i \neq j\}$. Note that relationships in TSN are directed, i.e. $r_{ij} \neq r_{ji}$.

In practice, a single member corresponds to one phone number, which, in turn, is assigned to one social entity. In case of telecommunication, a social entity can be either residential (a family, single person) or business (a company, department in the organisation, a position or single employee in the organization).

Strength of Relationship

In order to calculate strength of relationship between two network members, two variants of strength of relationship were utilized. The first one – RN takes into consideration number of phone calls, whereas the second one RD – their total duration.

The former is calculated in Box 1 where: $N(y \rightarrow x)$ – the number of phone calls that member y initialized to member x .

Function $RN(y \rightarrow x)$ reflects the commitment of member x within y 's activities (performed calls). $RN(y \rightarrow x) \in [0;1]$. If member y has not made any calls to member x , $RN(y \rightarrow x) = 0$.

Another function of relationship strength $RD(y \rightarrow x)$ from member y to x is calculated based on a total duration of calls, as follows in Box 2

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