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Machine-Learning System For Recurring Subscription Billing

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MACHINE-LEARNING SYSTEM FOR RECURRING SUBSCRIPTION BILLING

ABSTRACT

A system and method for recurring billing of periodic subscriptions are disclosed. The system attempts to maximize a metric like long term customer retention while tailoring the subscription billing to the customer, using machine learning. The system is initially trained with a set of training data -- a large corpus of records of subscription billings -- including successes, billing failures, and customer cancellations. Any available metadata about the users or the type of subscription is also attached and may be used as features for the machine learning model. Such metadata may include, for example, customers' age, gender, demographics, interests, and online behavioral profile/history, as well as metadata to identify the type of service being billed, such as music subscriptions, delivery subscriptions or other types of subscriptions, or the payment instrument. The system is used to predict the subscription model for a given user with relevant user-related constraints, while optimizing acceptability to that user.

BACKGROUND

Subscription billing systems generally bill a fixed amount to a user's form of payment (e.g. credit card) once per month around the same date. Payments can fail due to insufficient funds, or users can decide to cancel the service in response to seeing a charge on their bill. A machine learning-based system can chunk the amount it needs to bill into different amounts and bill them at different times to maximize long term retention of subscribers.

DESCRIPTION

A system for recurring billing of periodic subscriptions and method of billing are disclosed, as illustrated in FIG. 1 and FIG. 2. The system attempts to maximize a metric like long-term customer retention while tailoring the subscription billing to the customer. The system
takes constraints such as "bill customers $30 per month, while never falling more than 1 month behind". The system has flexibility to chunk payments into different amounts that it determines optimal, scheduled at different times of day and different days of the month, within its overall billing constraint. The system as shown in FIG. 1, is initially trained with a set of training data -- a large corpus of records of subscription billings -- including successes, billing failures, and customer cancellations. Any available metadata about the users or the type of subscription is also attached, to be used as features for the machine learning model -- for example, customers' age, gender, demographics, interests, and online behavioral profile/history, as well as any metadata to identify the type of service being billed (e.g. differentiating between music subscriptions, delivery subscriptions and other types of subscriptions). Such metadata may also pertain to the payment instrument and method -- debit card, credit card, third-party billing service, etc.

FIG. 1: Machine learning system for recommending subscription billing

The method of optimizing subscriptions for a user is further illustrated with reference to FIG. 2. The system trains on input data to build one or several predictive models. These could be for example, to predict success of the current charge attempt, success of future charge attempts,
and future cancellations, etc. These predictions can be run over all possible combinations of billing increments for a future period of time, (e.g. a year or a quarter) that satisfy the system's constraints (e.g. bill $100 total per year), to choose the set of amounts to bill, and the times to bill them that will maximize long-term retention. For example, the system may learn that certain types of users maintain a low balance in their billing account, and that payment success rates are higher when a $30 monthly amount is billed in 10 $3 increments. It may also learn that billing at certain times of the month or days of week is more likely to succeed, since these times coincide with common scheduled deposits. For longer subscriptions like a once-per-year charge for storage, the system may learn that certain users are less likely to cancel if billed small weekly or monthly amounts, whereas others are less likely to cancel if billed once per year.

![Diagram](image)

**FIG. 2:** Method of using machine learning system for subscription billing

Once the accuracy of the predictions is determined to be high, the system may be launched into usage on live traffic. It then optimizes billing per user based on its predictions,
while maintaining both a control group of users who are billed in a static way, and also an exploratory group of users on whom constant exploration of billing styles may be attempted (not based on model predictions but rather at random). The model could continue to retrain on the ongoing results of billing data over time.