Homework 4, Business Analytics

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* Understand situation and need: Visa builds a marketing system which determines the best cards/products to offer for consumers to offer banks/merchants with marketing solutions.
* Data: The data are collected from internal resources. We get details of each transaction of Visa cards and characteristics of Visa card users, such as number of debit cards/credit cards/Visa cards, transaction frequency/amount.
* General approach: We try to build separate models to predict the profit of different cards/products brought by customers of different characteristics. Then we build a prediction matrix with customer and product dimensions and offer the solution of promoting card/product with the largest profit for each customer to maximize total profits.
* Procedures
  + Define predicted profits and variables
    - We merge Visa user information with transactions to match customers with all transaction records and reveal customer characteristics.
    - We look at the profits made by each customer in a time period (such as 3 months or 6 months) or whole-life expectancy. We calculate profits by aggregating revenue of each successful transaction minus service cost. We calculate separate profits for different cards/products for each customer.
    - We use the characteristics of customers and transactions as variables for models. We suggest using sex, age, address, deposit amount, number of debit cards/credit cards/Visa cards, transaction frequency/amount, consumption categories, transaction bank preference, merchant position, transaction channels (online or walk-in), transaction security, fraud frequency, default risk and estimated loss. If possible, we can add more variables. The time length of variables can be like 6 months or a year.
    - We divide our datasets by different cards/products and build statistic models for different cards/products. We can use regression model or neural network model. Using variables above and profits as input and divide testing and training sets, we get trained models for different products.
  + Build customer-product matrix and maximize recommendation
    - For each customer, we calculate predicted profits of each cards/products and fill the customer-product matrix. We try to select the one making possible maximum profit for each customer and make an offer to promote customers with the product. A suitable maximizing algorithm calculates the solution.
    - Before maximizing the profit, we add constraints to calculations, including excluding disallowed offers, maximum or minimum of offer amounts, etc. A better algorithm can calculate the best offers under constraints.
    - The matrix should be renewed each day to incorporate new customers and transaction changes. It’s possible we give offers at a frequency and change offers at a frequency. By renewing matrix every day, we can get a different suggestion for each customer, or we can select the second profitable product for each customer.