Contact Center Management Using Data Analytics
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Introduction
- This research studies a Contact Center data set of a major U.S. insurance company
  - The problem
    - Richness of Data
      - Covering multiple phases of a call with detailed attributes, e.g., transactions originated from different medium of contacts such as web and the Interactive Voice Response (IVR) system. Call center intent (both Nominal and Actual), detailed call reasons subtypes.
    - Massive Data
      - Sets with more than 62 million records
  - The goal
    - Predictive models using customers' profile for target variables, beyond estimating the arrival rate, which has been the typical target variable studied in the call center literature

Research Goals:
- Predict the call arrival rate

Call Flow Diagram:
- Customer greeted with open-ended question approach
- Interactive Voice Response (IVR)
- Call Routing Platform (CRP)
- Contact Documentation Platform (CDP)
- Customer interacts with an CRM in order to get service
- Self-Service or Transfer to a representative

Data Description:
- From 1-Jan-2015 to 31-Dec-2015 for all states in the United States and Canada

Feature Generation:
- Payment Method
- Policy Type

Literature Review
- Target Variable: Call Arrival Counts

Target Variable: Call Arrival Counts

Research Goals:
- Determine the outcome of a call arriving at the IVR system
- Predict now likely a policyholder will call in different time horizons: next hour, days, or weeks

Scalable Data Analytics Method
- Mixed-effect logistic model
- Lasso Method
- Subsampling

Feature Ranking and Selection Results
- Top 10 Features Selected
- Training Accuracy = 85.99%
- Test Accuracy = 85.63%

Contact Documentation Data
- Time between UK and MB - Same Day
- Time between UK and MB - 7 Days
- Business Day of the Month
- Day of the Year

Applications
- The results can provide various managerial insights into policyholders' behavior seeking to make more effective use of customer data and segmentation.
- The selected features describing the customers and their motivations for calling and decisions such as being transferred during calls can lead to policy and operational recommendations. It guides managers to improve the waiting time of customers, to more accurately predict the number of CRMs necessary to handle calls at any time, and better understand the customers’ usage of the websites, and consequently, design more effective marketing strategies according to the customers’ characteristics and behavior.
- The developed algorithm is scalable and can be adopted for big data analytics in other decision making problems and business segments.

References
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- Taylor (2012)
- Shen et al. (2010)
- Shen and Huang (2007)
- Brown et al. (2005)
- Shen et al. (2004)
- N. of customers: 150
- N. of features: 129
- N. of samples: 62

Train
Test
Feature
Accuracy
Intercept
3.2059
0.0000
0.0400
Training Accuracy = 85.59%  Test Accuracy = 85.63%

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Hide Up To
Transfer to a representative 75%