Abstract
The abundance of data has led some to believe that classic statistical techniques are no longer relevant for problem solving. This poster illustrates how to use the data mining tasks in SAS® Enterprise Miner™ to segment bank customers. Using customer behavioral metrics, a segmentation was developed to market new digital products and services to existing customers. Clustering techniques can be used to classify customers into groups that share common characteristics (demographic, balances, products, etc). Often this analysis technique is called segmentation when there is no clear separation of groups. In marketing, segmentation is used to understand how to market to customers in more customized communications. SAS® Enterprise Miner™ allows the users to run clustering algorithms, create segment profiles, and create scoring code.

Method (Segmentation Analysis)
It is a common problem/goal in the marketing world to group customers into "like" groups. These groups are often marketed to in different ways. Segmentation analysis using statistical clustering techniques was done to define these groups. Often in segmentation there is no clear separation of groups.

Analysis Goals
Build a practical solution to target customers for digital products and services

Analysis Steps
1) Gather customer data relevant to the business objective (demographic, balances, products, transactions, etc)
   – Verify that attributes are not prohibited for the business use and follow legal and compliance guidelines
2) Create logical combinations of variables (e.g. % of products opened online) and summarized variables (e.g. average balance of the past 6 months)
3) Examine variable distributions: StatExplore Node
4) Remove outlier and bad data: Filter Node

Analysis Steps Continued
5) Reduce the number of variables used in the segmentation model: Variable Clustering Node
   – Variable clustering reduces dimensionality and decreases variable redundancy in a data set
   – Models built with too many redundant variables can become unstable
6) Iteratively build segments: Cluster Node
   – Select clustering options
     • Specification method was set to "User-Specified" setting (k-means)
     • The value of k is often subjective; in this case 10 was chosen to be maximum value of segments to manage/support
   – Examine distance plots
   – Examine summary statistics
   – Examine cluster profile
7) Profile final segments: Segment Profile Node
8) Score population: Score Code Node
   – Implementation of the segmentation can start through the Score Node. The score node provides SAS Code for all steps needed to create your new segments on a given dataset
   – The SAS Code provided can be copied and augmented to run outside of Enterprise Miner by adding the given code to a DATA STEP.

Notes: Steps 1 and 2 were done in SAS v9.2 ; Steps 3-8 were done in SAS Enterprise Miner v7.1
The purpose of the segmentation is not only to communicate in differentiated ways, but also to track movement between the segments (or clusters).

Results continued:

- Segment profiles show how the segments/clusters differ from one another.

Conclusions:

- An unsupervised learning technique such as clustering also requires subject matter knowledge to be successful. One should not just take a massive number of variables and "dump" them into a procedure.

- The goal to provide a data-driven solutions can not be accomplished without a partnership with a business sponsor.
  - In this project, a customer segmentation based on behavioral attributes was implemented by working with internal partners to develop strategies to target customers with "best" digital service.
  - For example, segments six and seven will be given the same digital offer but through different channels.
  - The Customer Intelligence team will monitor campaigns that utilize these behavioral segments; as well as, the natural migration between segments.

- SAS® offers the tools needed to develop advanced analytic solutions to create value for our business.
  - Base SAS enables working with large customer databases.
  - Enterprise Miner’s interactive nature allows for building multiple variations of a model quickly.

Population Distribution by Segment:

- Segment 1: 7%
- Segment 2: 12%
- Segment 3: 26%
- Segment 4: 5%
- Segment 5: 7%
- Segment 6: 22%
- Segment 7: 100%
Using SAS® Enterprise Miner™ for Behavioral Segmentation

Adraine Upshaw

BBVA Compass - Customer Intelligence

References

Note: All URLs cited or quoted here were accessed in Aug. 2016.

Acknowledgments

Thanks to the following team members on the project:
• Emmett Cox, BBVA Compass, Birmingham, AL
• Edgar Enciso, BBVA Compass, Houston, TX
• Mathieu Lesort, BBVA Compass, Birmingham, AL

Disclaimer: This information is provided by the author as a courtesy and an example only. Users are responsible for validation of their own results. Author and BBVA Compass make no representations or warranties as to fitness for use. SAS® Enterprise Miner is subject to licensing requirements.