Offer Assignment with SAS Marketing Optimization (Paper # 069-31)

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What does SAS Marketing Optimization do?

Employs mathematical techniques to solve an optimization problem that decides *which direct marketing offer* to send to *which customer* so as to *maximize total expected return* (or optimize some objective) while simultaneously satisfying various *business constraints* and *customer contact policy restrictions*. 
MO Model (An example)

Customers

Offers

Visa Classic / Direct Mail
Visa Classic / Call Center
Visa Classic / Branch

Visa Gold / Direct Mail
Visa Gold / Call Center
Visa Gold / Branch

Home Equity Loan / Direct Mail
Home Equity Loan / Call Center
Home Equity Loan / Branch

Cost=$3.00
Expected Return=$5.50

Cost=$2.25
Expected Return=$4.90

Cost=$1.00
Expected Return=$3.90

Data Mining and Predictive Modeling
MO Model (An example)
Constraints

- Aggregate Business constraints such as:
  - campaign and communication *budgets*
  - channel *capacity* limits
  - minimum or maximum *cell size*

- Contact Policy constraints such as:
  - limit on *total* contacts per customer
  - limit on contacts per customer *through a specific channel*
  - limit on contacts per customer in a *rolling time period*
A Simple Example with 3 Campaigns

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<thead>
<tr>
<th>Customer</th>
<th>Camp1</th>
<th>Camp2</th>
<th>Camp3</th>
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Prioritization

Constraints:

1. Each customer must get an offer from at most one campaign

2. Each campaign must target at most three customers

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Objective = 655
## Rules Approach at the Customer Level

**Constraints:**

1. Each customer must get an offer from at most one campaign
2. Each campaign must target at most three customers

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**Objective = 715**
Optimization

Constraints:

1. Each customer must get an offer from at most one campaign

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Objective = 745
What Makes the Problem so Hard?

- Typical Problem Scale
  - Millions of customers
  - Scores of offers

- Number of Choices
  - Customers x Offers

- Resulting in *hundreds of millions* of possible choices and *millions* of constraints.

- MO uses heuristic approximation techniques combined with general purpose optimization algorithms to find an approximately optimal solution.
Data Flow

MO takes as input:

- A list of **Customer prospects** (extracted from a Campaign Management System such as SAS Marketing Automation (MA))
- A list of **Communication Details** (from SAS MA)
- **Customer/Communication Predicted Response and/or Expected Value Matrix** (using predictive modeling - SAS Enterprise Miner)

And produces as output:

- A list of **optimal Customer/Communication assignments** (to be executed by a Campaign Management System such as SAS MA)
- **Scenario analysis and optimization reports** (provides analytical insight on how business constraints and customer contact policies affect total return)
Marketing Optimization provides…

- Analytics - a set of mathematical algorithms that gives an (approximately) best possible assignment of offers to customers from an astronomical set of possible assignments.

- GUI - an easy-to-use high-level framework to define marketing optimization scenarios and to analyze and compare various scenarios. (Designed for the persona of a Marketing Analyst with some analytical knowledge of models.)
Example Business Problem: Overview

- 4 marketing campaigns
- 21 different communications
- 3 channels (direct mail, call center, branch)
- Customer-level model scores for each communication include:
  - Expected value
  - Propensity to respond
- Possible objectives:
  - Maximize expected profit
  - Maximize expected number of responses
Examples of Aggregate Constraints

- **Budgets:**
  - Spend at least $220,000 for a specific campaign.
  - Spend at most $10,000 for a specific communication.
  - Spend at most $75,000 for a specific subset of communications to high-risk customers in the west.

- **Cell Sizes:**
  - Make at most 15,000 offers for a specific campaign.
  - Make at least 1,000 offers for a specific communication.
  - Make at least 6,000 offers during the month of January.
  - The expected number of responses to Visa Card offers should be at least 1,000 (based on propensity to respond).
Examples of Aggregate Constraints (continued)

- **Channel Capacities:**
  - Make at most 4,000 hours of calls through the call center.
  - Make at least 1,500 hours of calls through the call center.

- **ROI:**
  - Ensure an overall ROI of at least 40%.
  - Ensure an ROI of at least 70% for a specific campaign.

- **Customized Constraints:**
  - The average credit score for customers who are made a mortgage offer should be at least 660.
Examples of Contact Policy Constraints

- Make at most 4 offers in total.
- Make at most 1 Visa Card offer.
- Make at most 1 call in any consecutive two-month period.

Applying the contact policy constraints:
- Contact policies are applied *per customer*.
- You can apply several contact policy constraints simultaneously.
- You can apply different sets of contact policies to different customer segments.
Product Demonstration
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