Knowledge Solution for Credit Scoring

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SAS EMEA
Agenda

- What is and why do Credit Scoring
- Enterprise Miner Case Study
- Project Delivery
- Enterprise Miner Demo
What is Credit Scoring?

- Applying a statistical model to assign a risk score to a credit application or to an existing credit account
- Building such a statistical model
- Monitoring the accuracy of one or many such statistical models and monitoring the effect that score based decisions have on key business performance indicators
What is Credit Scoring?

- Applying
- Building
- Controlling
Application and Behavioral Scoring

- **Application Scoring:**
  Predict good/bad for credit applications
  Decide to accept or reject

Some benefits:
Reduce bad debt
Increase approval rate
Optimize approval process
Individualize pricing
Application and Behavioral Scoring

Behavioral Scoring:
Predict good/bad for existing credit accounts

Some benefits:
Estimate exposure and required capital allocation
Assess quality of business from different channels
Set credit limits
Target preventive actions
Value the debt book for collection
Application and Behavioral Scoring

- Application Scoring
- Behavioral Scoring
- Collection Scoring
Private and Business Customers

- Private Customers:
  Consumer loans
  Loans on dwellings

- Business Customers:
  Loans to Small Businesses
  Loans to non-publicly traded companies
  (Observe Basel Committee guidelines for Internal Rating Systems)
## Risk Scores and Marketing Scores

<table>
<thead>
<tr>
<th>Risk</th>
<th>Combination</th>
<th>Mktg/CRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>30/60/90 Delinquency</td>
<td>Resp/approve/delq</td>
<td>Response</td>
</tr>
<tr>
<td>Bankruptcy</td>
<td>Response/profit</td>
<td>Churn</td>
</tr>
<tr>
<td>Write-off</td>
<td>Risk/churn/profit</td>
<td>Revenue</td>
</tr>
<tr>
<td>Claim</td>
<td>Profit</td>
<td>Cross sell</td>
</tr>
<tr>
<td>Fraud</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collections</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Develop Models In-House

- Build more segment specific models for a larger number of purposes in less time
- Have the flexibility to modify models frequently
- Implement your own good ideas and best practices and keep the competitive advantage
- Build a data and skill base for all analytical tasks
- Analyze acquired scorecards
Benefits of Improving Scoring Accuracy

"In one project with which we have been involved, reducing the bad rate on a bank loan portfolio of 8 Million customers by just 0.25%, in which each "bad" means a loss of £1000, would lead to an overall saving of £20 million."

David Hand, Gordon Blunt, Mark G. Kelly and Niall M. Adams, Data Mining for Fun and Profit, Statistical Science, Vol 15, No 2, May 2000
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Scorecards and Other Predictive Models

<table>
<thead>
<tr>
<th>AGE</th>
<th>POINTS</th>
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<tbody>
<tr>
<td>Younger than 22</td>
<td>101</td>
</tr>
<tr>
<td>Until 27</td>
<td>109</td>
</tr>
<tr>
<td>Until 34</td>
<td>118</td>
</tr>
<tr>
<td>Until 44</td>
<td>125</td>
</tr>
<tr>
<td>Older than 44</td>
<td>130</td>
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<table>
<thead>
<tr>
<th>TYPE OF VEHICLE</th>
<th>POINTS</th>
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<tbody>
<tr>
<td>Car</td>
<td>111</td>
</tr>
<tr>
<td>Car and Motorbike</td>
<td>117</td>
</tr>
<tr>
<td>No vehicle</td>
<td>121</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIZE OF HOUSEHOLD</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>113</td>
</tr>
<tr>
<td>Non-Single</td>
<td>128</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ETCETERA</th>
<th>POINTS</th>
</tr>
</thead>
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<td>...</td>
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- Logistic Regression
- Decision Trees
- Neural Networks

Scorecards use Logistic Regression plus special data pre- and post-processing (grouping and scaling)
Process Flow Diagram
Interactive Grouping Node
Scorecard Node

For example:

good/bad odds = 50 / 1

=>

sum of points = 600

good/bad odds = 100 / 1

=>

sum of points = 620
Score Analysis Node

Effect of cutoff score changes on
- approval rate
- bad rate
- profit
- segment representation
Reject Inference

- Problem in Application Scoring: How to build a model for the through-the-door population when performance data is only available for accepts?
- SAS code is available for standard reject inference methods such as parceling and augmentation and variations thereof.
- The user can implement their own algorithms.
Decision Tree
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Define Business Problem / Make Data Available

- Scoring Purpose? Application or Behavioral Scoring? How to define good/bad?
- Segments: By customer type? By product? Create new segments? Exclusions?
- Create a SAS risk data mart with analysis ready data sets. Use SAS Access products and SAS Warehouse Administrator software for documentation and administration of the Extract/Transform/Load (ETL) processes.
Model Development

- Use Enterprise Miner software for
  - creating segments
  - building scorecards and other predictive models

- SEMMA methodology
  - Sample
  - Explore
  - Modify
  - Model
  - Assess

- Validate models on current population (population stability, characteristic analysis)
Implement and Review

- Decide on scoring strategies and cut-offs.
- Fully automate data mart update and scoring processes
- Create interfaces to front-end systems and middle-office systems such as strategy management and campaign management systems
- Use SAS OLAP reporting systems to monitor and analyze the performance of the scoring system (overrides, approval rates, bad rates) along various dimensions (geography, time)
Knowledge Solutions

Targeted Business focus

- Business Audience
- Solve a defined business pain
  - Churn Management, Credit Scoring
- With focused solution
- One industry or functional area (Telco, Banking)
Knowledge Solutions

Packaged Software, Knowledge and Consulting

- Enabling Technologies
  - IPP
- Knowledge Component
  - Data models, etc.
  - Knowledge Solution Experience Paper
  - Code segments and tools
  - Qualification
- Implementation Consulting
  - Delivery
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