Profitability Based Real-Time Decisioning

Credit Risk Modeling and Decisioning
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Terrance Barker, Staff Scientist
HNC Software
Agenda

- HNC and HNC Profitability Predictor Introduction
- Profitability Prediction Algorithm
- Going Beyond the Credit Risk Score
- Monthly versus Transaction Based Scoring
- Questions and Answers
HNC and HNC Profitability Predictor

Introduction
Who is HNC Software?

- Founded 1986
- U.S. offices
  - San Diego HQ
  - Chicago
  - Irvine
  - Los Alamos
  - Philadelphia
  - New York
- International offices
  - London
  - Singapore
  - Tokyo
- 1,000 + employees
- Initial Public Offering: June 1995 (NASDAQ symbol: HNCS)
- 2000 Revenues $254.9 million
HNC Profitability Predictor Uses HNC Technology

• HNC’s enhanced neural network technology provides core predictive model capability
• Transaction data provide additional information typically lost in summarization
• Models use account profiles
  – Updated with every transaction
  – Reflect entire account relationship
• Models and software are designed for real-time decisions using the most recent available information
## Revenue model
Expected revenue if account does not attrite and does not fall into collection

## Credit risk model
Expected loss due to failure to pay
Combines probability of loss with amount

## Attrition risk model
Expected loss of revenue due to a sharp and lasting reduction in balance and activity

## Cost computation
Expected operation & funding costs, using expense parameters & predicted transact, revolve, & delinquency behaviors

**Profit Calculator ties results together**
Profitability Overview

\[
\text{(Forecasted Revolving Revenue + Fees + Forecasted Interchange Revenue)} \less \text{less} \less \text{(Credit Risk Adjustment + Attrition Risk Adjustment)} \equals \text{Risk Adjusted Revenue}
\]

\[
\text{Risk Adjusted Revenue} \less \text{less} \less \text{(Cost of Funds + Operation costs)} \equals \text{Profit Forecast}
\]
Going Beyond the Credit Risk Score

• Credit risk score not the best measure of future profitability
• Multi-dimensional view of customer vital
• NPV and ROI based approaches
Managing Profitability: Using Credit Risk Predictions

Portfolio organized by Credit Risk score

Avg. Profit

% Bad
Managing Profitability: Using Credit Risk Predictions

Portfolio organized by Profit Score prediction

Avg. Profit

% Bad

Profitability Prediction

Low

High

Managing Profitability: Using Credit Risk Predictions

Portfolio organized by Profit Score prediction

Avg. Profit

% Bad

Profitability Prediction

Low

High
Most Common Uses

- **Profit Score**
  - Retention Queue
  - Segmentation Variable

- **Credit Risk Score:**
  - Minimal Acceptable level of risk
  - “Knock-out” criteria for Marketing Programs

- **Revenue Score:**
  - Needs based approach to credit line increases
  - Revenue reason codes used for targeting

- **Attrition Score**
  - Proactive Retention offers
  - Profit@Risk metric
Additional HNC Profitability Predictor Benefits Will Also Come From...

• **Revenue Score**
  - Tracking and Reporting - trending over time
  - Testing Validation - incremental change over control position

• **Profitability Score**
  - Prioritizing calls in VRU (best customers wait less)
  - Making it more difficult for unprofitable accounts to talk to a live representative
  - Reactive retention queue has on-line access to profit number; can tailor save offer
  - Best customers routed to best offer
# HNC Profitability Predictor and Basic Segmentation

<table>
<thead>
<tr>
<th>Risk</th>
<th>Revenue</th>
<th>Attrition</th>
<th>Generic Strategy</th>
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<td>Exit</td>
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<td>Maintain</td>
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<tr>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Selectively Defend</td>
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A Comparison of Profit Score v/s NPV

Organized by Profit Score

NPV Organized by HNC Profit Score
A Comparison of Profit Score v/s ROI

True ROI Organized by Predicted ROI

Organized by HNC Profit Score

Revlrs
Trans.
Other

OPPORTUNITY | RISK | EFFICIENCY
Monthly v/s Transaction Based Scoring
Transaction Data Improves Predictive Power
Transaction Based Neural Net Score is Stable Over Time

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## Benefit Over Monthly Score Increases with Time

### Worst 20% of Accounts

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<th>Dollar Based Performance Spread over Monthly Score</th>
<th>10 Months</th>
<th>12 Months</th>
<th>14 Months</th>
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<tbody>
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* 31 basis points higher than Monthly score
**Benefit Over Monthly Score Increases with Time (contd.)**

<table>
<thead>
<tr>
<th>Best 30% of Accounts</th>
<th>10 Months</th>
<th>12 Months</th>
<th>14 Months</th>
<th>19 Months</th>
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</thead>
<tbody>
<tr>
<td>C/O</td>
<td>6*</td>
<td>11</td>
<td>15</td>
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<tr>
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<tr>
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</table>

* 6 basis points lower than Monthly score
Benefit by Scoring and Decision Points

Comparison of Dollar Savings

- **Cycle-Cut**
- **Real-Time**
- **Daily Batch**

- Annual Dollar Benefit per Account
- Percentage of Accts Worked per Month

- $0.00
- $1.00
- $2.00
- $3.00
- $4.00
- $5.00
- $6.00

- 0.50% 1.00% 1.50% 2.00% 2.50% 3.00% 3.50% 4.00%
Questions & Answers