

Dynamic Predictive Credit Scoring

*With Multi-dimensional Analysis of
Nearest Neighbors*

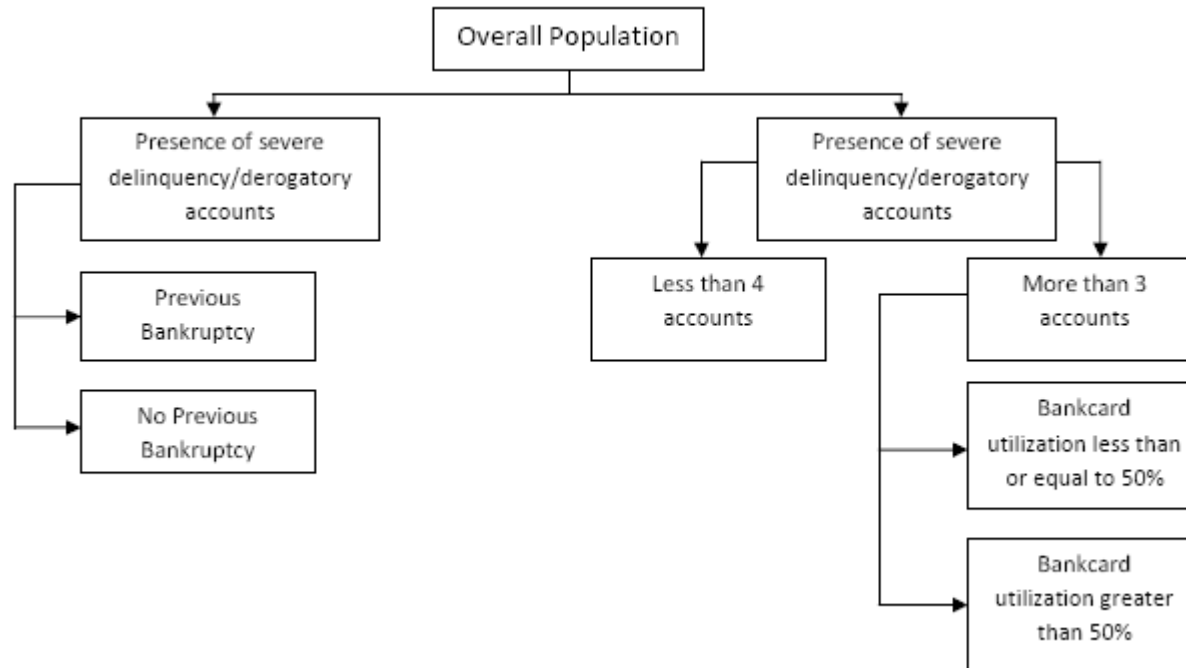
Craig M. Allen, Ph.D and Cherry Allen-Driscoll



MANN Method

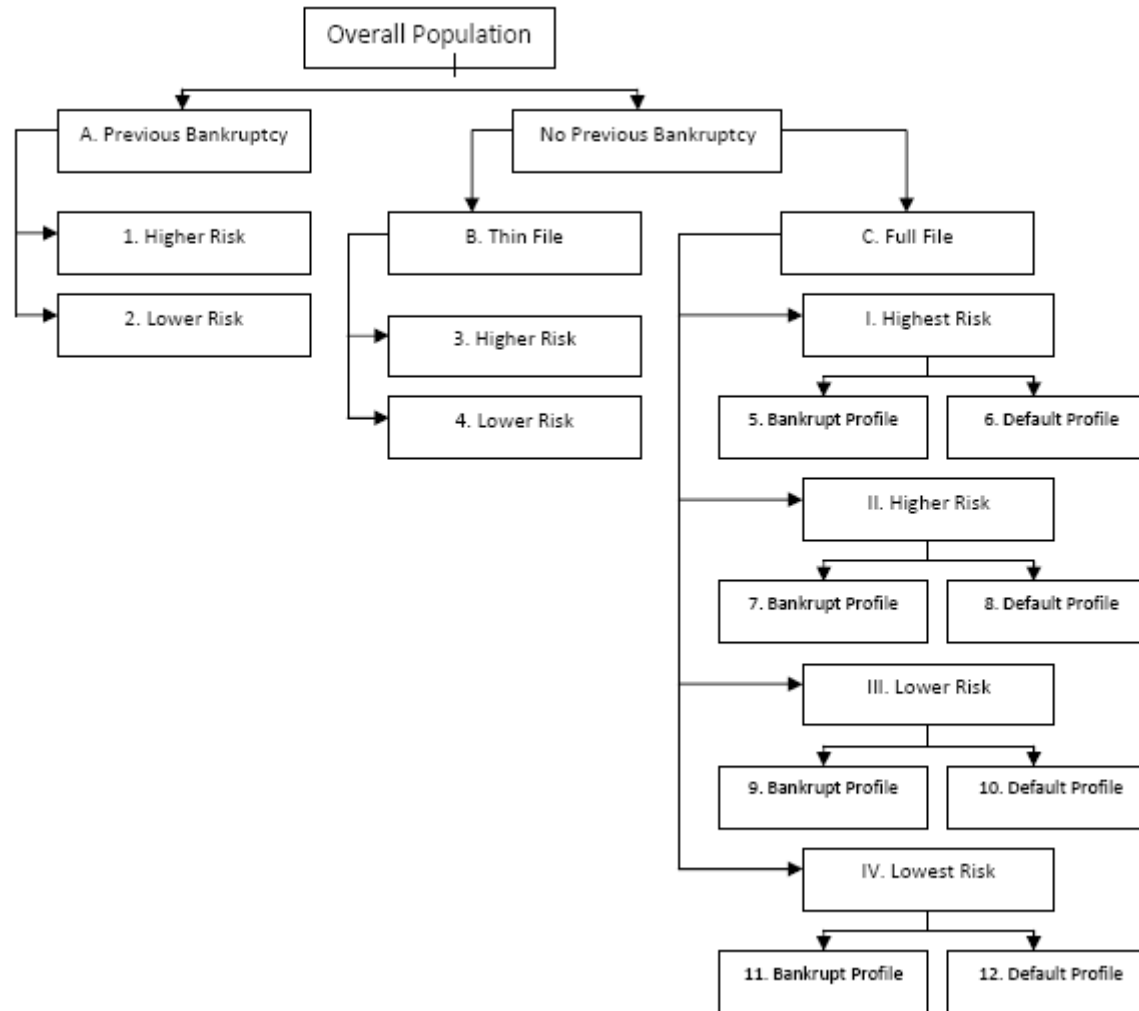
DYNAMIC SEGMENTATION

Traditional Segmentation Scheme*



* Vantage Score. (2006, May). *Segmentation for Credit Based Delinquency Models White Paper*. Retrieved July 21, 2009, from Vantagescore: <http://www.vantagescore.com/docs/segmentation.pdf>

Second Generation Segmentation*



* Vantage Score. (2006, May). *Segmentation for Credit Based Delinquency Models White Paper*. Retrieved July 21, 2009, from Vantagescore: <http://www.vantagescore.com/docs/segmentation.pdf>

Static Segmentation

Potential for arbitrary categories forcing the structure of data.

- Initial segmentation is not guaranteed to remain the most predictive.
- What signals when the world has changed?
- Re-assessment of categories forces the destruction of prior data structures.

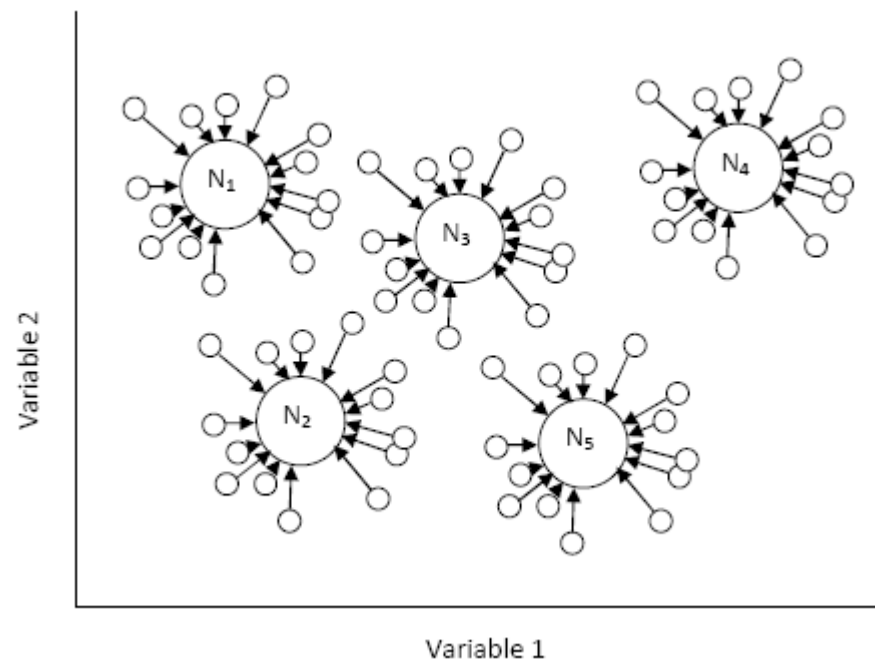
Static Segmentation is Inefficient

Static segmentation does not provide a broad solution for maximizing profitability of lending decisions.

- Not only if default, but when and how severe
- Many 'behaviors' impact credit risk
 - Origination quality (verifications &/or fraud)
 - Collection strategies (operational procedures & responsiveness)
 - Collateral quality (recovery value, excessive wear & tear)
 - Loan structure (timing of max gaps)

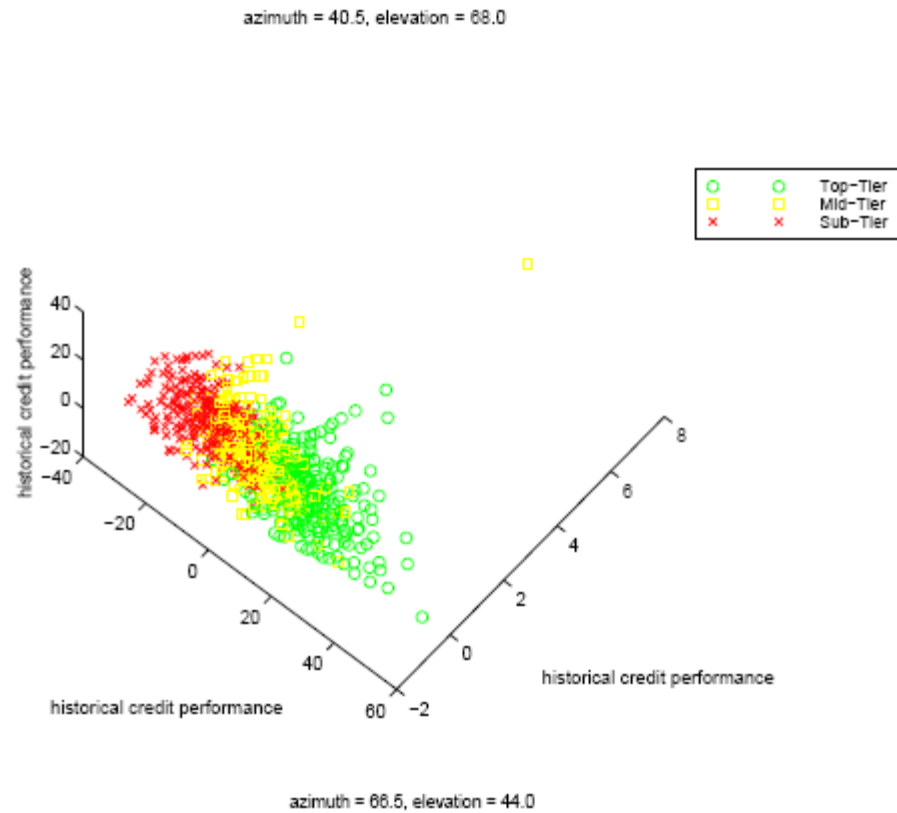
Dynamic Segmentation

Nearest neighbors are identified by their proximity to each other.



Dynamic Segmentation

Proximity measured in multi-dimensional information weighted space.



Dynamic Segmentation

- Data-centric segmentation of the borrower population into small clusters,
- Capable of multiple behavior measures, and not limited to the binary division of a population (or sub-population) into two, and
- Establishes of a truly dynamic predictive framework that easily adapts itself to volatile economic and behavioral environments.

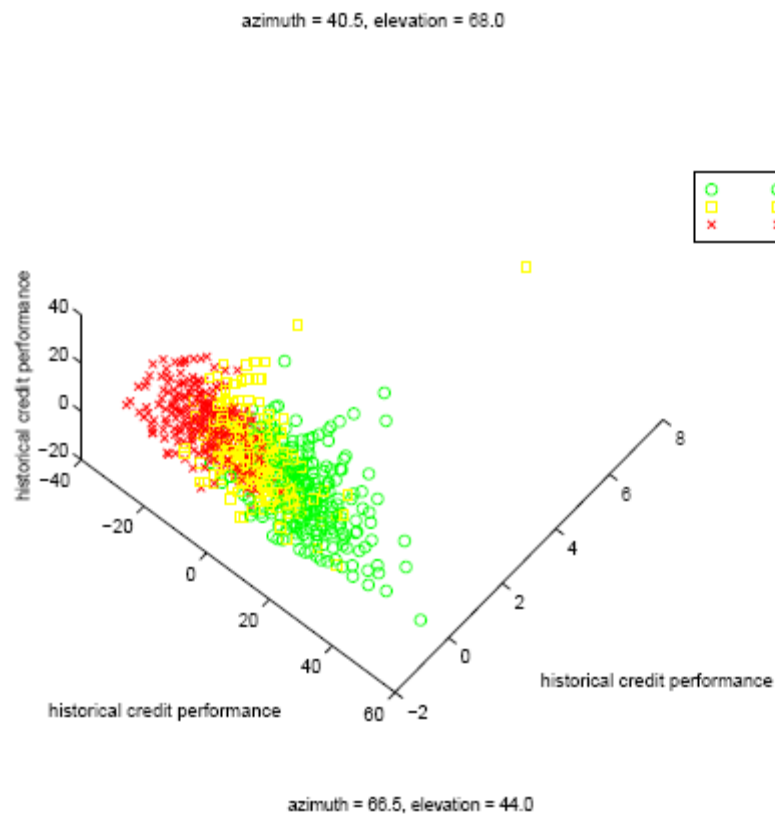
MANN Method

MULTI-DIMENSIONAL ANALYSIS OF NEAREST NEIGHBORS

Multi-dimensional Analysis of Nearest Neighbors (MANN)

- **Clustering Techniques** dynamically identify customer 'neighborhoods' and their uniquely predictive attributes relative to measured behavior.
- **Information** fully integrated from available data sources. Neighborhoods and behavioral forecasts are refined with each addition of data.
 - Monthly Payment Performance
 - Data Supplements
- **Dynamic Behavior Forecasts** continuously and consistently refresh behavior expectations.
- **Cash Flow Models** integrate loan level behavioral forecasts, collateral values and loan structures into **perspectives on profits.**

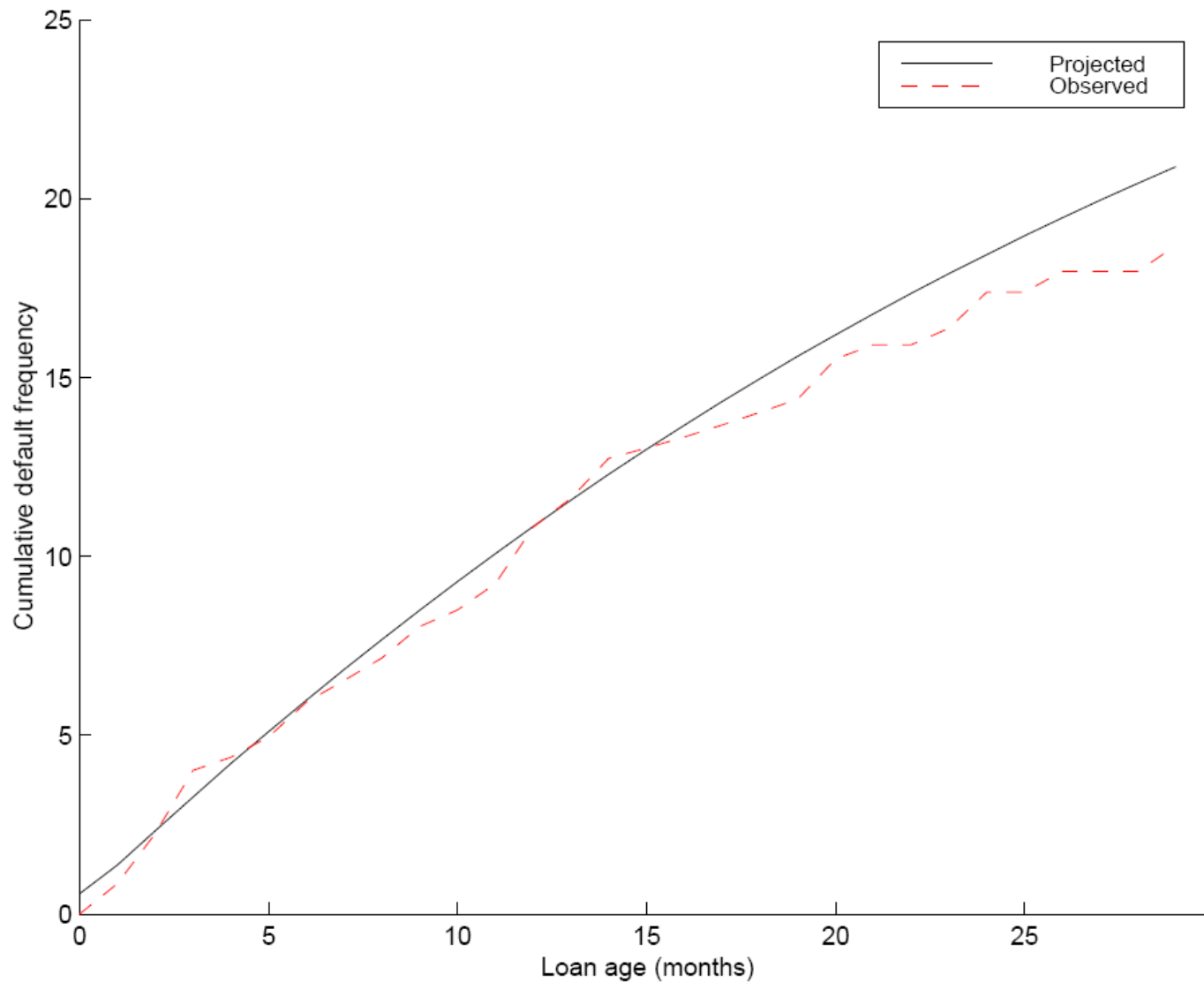
Multi-dimensional Analysis of Nearest Neighbors (MANN)



- Clusters represent borrower neighborhoods in their respective principal component dimensions.
- Coordinates are determined by the information weighted distance.
- Historical behaviors of nearest neighbors are analyzed and used to forecast any measured behavior.

Projected Behavior

frequently updated - based on the current histories of any given borrower's nearest neighbors.



MANN Method

FLUID OPERATIONS

Measure Multiple Behaviors

Dynamic neighborhoods offer insights into any (measurable) behavior

- Payment Patterns
 - Default, delinquency, prepayment
- Collateral
 - Excessive wear and tear, costs of repossession
- Response Rates
 - Collection strategies
 - Marketing strategies

Behavior measures can consider timing

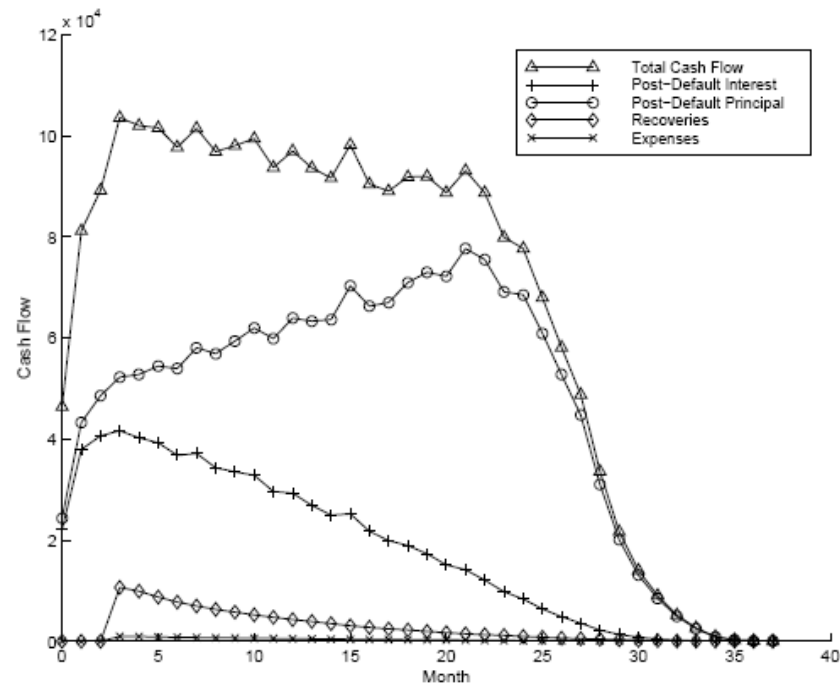
- Defaults by month 3,6,9, 12 or ...
- Delinquent for [x] months

Facilitate Profitability Measures

Loan Level Cash Flow Scenarios

CASH FLOW WITH 125% OF HISTORICALLY ESTIMATED DEFAULTS

| Variable | Value |
|---------------------------|--------------|
| Total Balance | 1,988,272.52 |
| Tot Cash Flow | 2,545,507.27 |
| Exp Def Balance | 149,346.21 |
| Active Loans | 254 |
| Defaulted Loans | 1 |
| Scenario Def Factor | 1.25 |
| Minimum Def Multiplier | 0.19 |
| Maximum Def Multiplier | 0.65 |
| Wtd Avg Def Multiplier | 0.38 |
| Gross Pct Def Bal | 7.51 |
| Net Pct Def Bal (rec/exp) | 3.05 |
| Pct Default | 8.98 |
| Wtd Pct Default | 9.19 |
| Price | 100.0 |
| Portfolio Yield | 21.42 |



Behavioral forecasts integrate into cash flow scenarios to determine the expected net present values of contractual cash flows based on borrower, collateral and loan type combinations.

Consistent Surveillance

Initial method for behavior forecast is continuously and seamlessly updated given seasoned loan performance.

- Monthly servicer tape adds new behavior variables.
MANN maps to the servicer tape to streamline data refresh.
- Current data supplements refresh collateral and economic variables.
- Behavior expectations are consistently refined
to ensure revenue and cash flow forecasts remain accurate.
- Significant changes and trends are monitored
to allow proactive management of marketing and servicing strategies.
- Current perspective is maintained
with statistically significant guidance to mitigate future risks.

Dynamic Framework

Dynamic design easily adapts itself to volatile economic and behavioral environments.

- Dynamic clustering redefines most similar neighbors (no static categorizations).
- Preemptive and consistent approach to measuring how and when the world is changing.
- The process evolves as new data feeds are incorporated (you don't start at square one).

For More Information

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