Lecture 14
Data Mining Applications in BI and Case Studies

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Some Typical Business Problems

- Customer profiling
- Customer segmentation
- Direct marketing
- Customer retention
- Basket analysis (retail)
- Fraud detection
- Cross selling
1. Customer Profiling
Customer Profiling (1)

- **Question:**
  - what kinds of customers were profitable in last year?

- **Data:**
  - Customer details such as Age, Gender, Occupation, Salary Levels, Account, etc.,
  - Earnings from customers in last year.
Customer Profiling (2)

Data Mining Solution:

Divide customers into profitability categories according to earnings. Such as

- Highly profitable
- Profitable
- Non-profitable
- Loss
Customer Profiling (3)

Data Mining Solution:

2. Add a new field called profitability in each customer record and assign one of the four categories to that field.

3. Select the profitability field as the target field and the other fields describing customer details as independent fields.

4. Use a decision tree algorithm on the selected data to produce a set of rules.
Customer Profiling (4)

Example

IF age > 30 And
  Age <= 45 And
  Occupation = Professional And
  Salary level = between 50000 and 70000
Then Profitable

Size = 340, Confidence = 0.90
Customer Profiling (5)

- **Data Mining Solution:**
  5. Study all rules and identify some interesting ones.
  6. Select all the records identified by interesting rules and calculate the average earning from these customers.
  7. Identify profitable and loss customer groups and make some business decisions.
## Table 2. Statistical analysis of rules.

<table>
<thead>
<tr>
<th>Interesting Customer Groups</th>
<th>Average Calls</th>
<th>Average Spending</th>
<th>Age</th>
<th>No. of Customers</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule 1</td>
<td>230</td>
<td>120</td>
<td>35.6</td>
<td>20</td>
<td>0.82</td>
</tr>
<tr>
<td>Rule 2</td>
<td>180</td>
<td>110</td>
<td>30</td>
<td>32</td>
<td>0.80</td>
</tr>
<tr>
<td>Rule 3</td>
<td>135</td>
<td>90</td>
<td>32</td>
<td>927</td>
<td>0.69</td>
</tr>
<tr>
<td>Rule 4</td>
<td>97</td>
<td>60</td>
<td>24</td>
<td>3400</td>
<td>0.60</td>
</tr>
</tbody>
</table>
2. Customer Segmentation
Why Customer Segmentation?

- Consumers are not same. They need to be treated differently.
  - Different spending capability
  - Different spending potentials
  - Different behaviors
  - Different profitability
  - Different preferences
  - Different hobbies
  - Different life style
  - ...

- Segmentation is essential in marketing.
What is Segmentation?

- Customer segmentation is a process to divide customers into different groups or segments.
- Customers in the same segment have similar needs or behaviors so that similar marketing strategies or service policies can be applied to them.
Use of Segmentation

Customer segments are required in several business areas, for example

1. Marketing
2. Customer services
3. Products and service development
4. Sales promotion
5. Customer retention
Different Ways to Segment Customers

- Depending on the business objectives, customers can be segmented in different ways.
  - E.g., customers can be simply segmented by age groups and gender so that different services can be provided to customers in different age and gender groups.
  - This simple customer segmentation results in a small number of larger customer segments which cannot reflect more specific characteristics of some small customer groups which are often more profitable.
Data-driven Segmentation

- Segmentation of customers by analyzing customer data.
- Data mining provides techniques that enable the creation of small customer segments with more specific needs and behaviors
  - Decision trees
  - Clustering
Steps for Customer Segmentation

1. Define business goals
2. Identify data and attributes
3. Extract and preprocess data
4. Apply data mining techniques to create segments
5. Define measures to measure segments
6. Describe segments
7. Identify target segments
8. Define business actions on the target segments

This process is interactive and usually needs several cycles to result in useful segments.
Segmentation Strategies

Depending on the business requirements, one can use different strategies to segment customers. For example,

1. Large segment strategy
2. Multi-segment strategy
3. Small segment strategy
4. Niche strategy
5. Mass customization strategy
Segment Management

- Some segmentations are static
  - Demographic segmentation
  - Geographic segmentation
- Some are dynamic
  - Behavior based segmentation
- Segments are used to identify customers for analysis, promotion, etc.
- Properties of segments must be known to users
- Segments need to be updated over time
3. Direct Marketing
Direct Marketing (1)

- **Question:**
  - Select a customer mailing list for a product campaign

- **Purposes:**
  - Reduce the campaign cost and obtain a high responding rate.

- **Data:**
  - Customer details and previous campaign data.
Direct Marketing (2)

Data mining solution:

1. Select customers from a previous campaign data.
2. Attach responded or non-responded identification to the selected customer records.
3. Divide the selected customer data into training, testing and evaluation data sets.
4. Use neural network or decision tree algorithms to build prediction models from the training data set.
5. Test and evaluate the models with the testing and evaluation data sets.
Direct Marketing (3)

- **Data mining solution:**
  6. Apply the models to customers to select a mailing list. All customers in the mailing list are predicted as potentially responding customers.
  7. Post product invitations to the selected customers.
  8. Collect and analyze the campaign results.
  9. Adjust the prediction models with the new data.
## Direct Marketing (4)

- Post evaluation of models

<table>
<thead>
<tr>
<th>Customer_id</th>
<th>Random</th>
<th>Model_1</th>
<th>Model_2</th>
<th>Responded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Customer Retention
Customer Retention (1)

- **Question:**
  - Find out what kinds of customers tend to churn and build a model which can predict the likely-to-churn customers.

- **Data mining solution:**
  
  Collect data about the customers who have churned.

  Select a set of customers who have been loyal.

  Merge the two data sets to form training, testing and evaluation data sets.
Customer Retention (2)

Data mining solution:

1. Use rule induction algorithms to induce rules from the training data.
2. Analyze the rules to understand characteristics of the churned customers and their profitability.
3. Use the model to predict the profitable but likely-to-churn customers.
4. Take some actions to retain these customers.
5. Cross Selling
Citicorp/Travelers Groups merger

Online Newshour April 7, 1998 reports

In the largest proposed corporate merger in history, the banking giant Citicorp and insurance titan Travelers will join forces. The new company, to be called Citigroup, would be the largest financial services company in the world...

One of the rationale for the merger

MARCUS ALEXIS, Northwestern University commented:
“ Well, they have competitive issues. There are certain synergies. Not only do customers like to get a full range of services from a single vendor but also there are certain economies in cross selling by them. “

(Online Newshour April 7, 1998)
Opportunities of Cross Selling

- Travelers Group can increase sales of insurance products from Citicorp customer base.
- Citicorp can increase sales of financial services from Travelers Group customer base.
- Customers get convenience by doing one stop shopping for both financial service and insurance products.
Cross Selling and up Selling

- **Cross selling** is the process of selling current customers new products after they purchased products of different categories
  - E.g., sell car maintenance products to customers who just bought new cars
- **Up selling** is the process of selling current customers upgraded products or services after they purchased products of same category
  - E.g., Sell mobile voice service users data service
How Cross Selling Works

- Assume a marketing manager in a bank has the following products for customers
  - Saving account
  - Check account
  - Standard credit card
  - Gold credit card
  - Primary mortgage
  - Secondary mortgage

- The manager wants to design a new campaign to customers who
  - Prepare to buy a new home
  - Prepare to refinance an existing home
  - Prepare to add a second mortgage
First Step

- Determine three offers to customers
  - New first mortgage
  - Refinance of first mortgage
  - Second mortgage

- Each customer is only made one offer

Question? How to match customers with offers?
Collect Historical Data for Analysis

- Data on existing customers
  - Demographic data
  - Account level data
  - Transactional information
    - Balance
    - Payment history
    - Purchases
  - Mortgage purchases
    - This data is crucial because we analyze the characteristics of customers who purchased mortgage and use them to identify the prospects of potential mortgage buyers
Classify Customers Based on Historical Data

- From the historical data set, identify the customers who have previously completed mortgage finance through the bank. Put them into one of the three classes
  - Class 1 --- Bought first home
  - Class 2 --- Refinanced first home
  - Class 3 --- Bought second house
- Name other customers as Class 4
Create a 60 days time window and select all transactions of the customers in the first 3 classes starting two months before they closed on their mortgage.

- Month of possible mortgage agreement
- Two month window preceding month of possible mortgage agreement

(Berson, et al 2000, Building Data Mining Applications for CRM, P268)
Aggregate Transactional Data Within the Two Month Window for Each Customer

- There are different ways of aggregating transactional data, depending on availability of particular data set, e.g.,
  - Total and average credit card weekly spending
  - Types of spending
  - Fund transfer
  - Popular destination account
  - Amount
  - Etc.

- Data aggregation results in a set of variables which represent individual customer behaviors
Modeling of Customer Behaviors

- Merge the aggregated variables together with other customer variables
- Select all customers of the first three classes
- Use a data mining algorithm to build a classification model
  - Decision trees
  - Neural networks
  - Other classification algorithms
Score Other Customers

- Extract transactions of Class 4 customers in the past two months
- Create the same set of aggregation variables
- Merge the aggregated variables with other variables
- Apply the model to score these customers
- The result will show the likelihood of each customer accepting each offer
# Example of Customer Matrix

<table>
<thead>
<tr>
<th>Customer ID</th>
<th>New mortgage score</th>
<th>Refinance score</th>
<th>Second mortgage score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1391193</td>
<td>0.2422</td>
<td>0.4926</td>
<td>0.0872</td>
</tr>
<tr>
<td>1401936</td>
<td>0.8600</td>
<td>0.4465</td>
<td>0.0982</td>
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<tr>
<td>1491969</td>
<td>NULL</td>
<td>0.9700</td>
<td>0.4453</td>
</tr>
<tr>
<td>1623144</td>
<td>0.7854</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>1701338</td>
<td>0.5063</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>1810529</td>
<td>0.8210</td>
<td>0.5014</td>
<td>0.6386</td>
</tr>
<tr>
<td>1940842</td>
<td>NULL</td>
<td>0.5057</td>
<td>0.9177</td>
</tr>
<tr>
<td>1980368</td>
<td>0.2226</td>
<td>0.1352</td>
<td>0.0888</td>
</tr>
<tr>
<td>2039145</td>
<td>0.2928</td>
<td>0.1732</td>
<td>0.5244</td>
</tr>
</tbody>
</table>

(Berson, et al 2000, Building Data Mining Applications for CRM, P271)
Launch the Campaign

- After customers for each offer are identified, the campaign can start.
- Proper channels need to be decided for different customers.
- The model can be rerun each month to identify new opportunities.
- The campaign result data are collected to further fine tune the model.
A Case Study: Segmentation With Decision Tree Techniques
Objectives

- Segment existing customers based on spending behaviors.
  - E.g., high spending segment, low spending segment
- Build segment profile
  - E.g., mid-spending high frequency segment
    - Female dominate, high school education, below 40 years old
- The profile is used
  - Marketing
  - Classify new customers
Segmentation Steps

1. Set up the goals
2. Select data
3. Preprocess data
4. Analyze data
5. Build models
6. Analyze models
7. Deploy the results
Goals

1. Segment customers based on spending behavior
2. Segment customers based on credit revolving
3. Segment customer based on the card usage status
Target Area and Time Window

- One city
- 12 month
Data Selection

- **Customer basic data**
  - (Demographic data) - static

- **Spending behavior data**
  - (Transaction data) - dynamic

- **Data source**
  - Bank’s credit database
Detail Data

- Customer data
- Data about the bank and branches
- Data about the products
- Data about the account
- Transaction data
- Payment data
- Interests, risk, etc.
Data Preprocessing

- Select data and convert to the format required by the data mining tool
- Data checking
  - Errors
  - Distribution
- Data transformation
  - Date of birth to age
  - Decompose compound field into atomic fields to identify customer position
- Derive new data fields
Data Analysis Steps

- Customer spending category
- Customer spending frequency category
- Customer spending behavior category
- Customer revolving category
- Customer card usage status category
- Customer risk category
Use of Analysis Results

- Design category classes.
- Use each category as a segmentation target by assigning each customer a category class.
Customer Spending Variable

- Divide customers into three classes according to their spending in the past 12 months.
  1. High spending \( (\text{Average monthly spending} > 5000 \text{ HK$}) \)
  2. Mid-spending \( (\text{Average monthly spending} > 2500 \text{ HK$}) \)
  3. Low spending \( (\text{Average monthly spending} \leq 1000 \text{ HK$}) \)
Spending Frequency

1. Frequent spending (Spent on credit card in more than 6 months in the past 12 months)
2. Infrequent spending (Spent on credit card in 6 months or less in the past 12 months)
Customer Spending Behavior Classes

1. High spending and high frequency
2. High spending and low frequency
3. Mid-spending and high frequency
4. Mid-spending and low frequency
5. Low spending
Decision Tree Data Partition
Model and Segment Applications

- **Model application**
  1. Assign new customers to segments

- **Segment application**
  1. Identify target customers for marketing
  2. Test different promotion methods
Doctor Fraud Detection
A Case Study
Health Insurance - Test Monitoring Study

- **Scope**
  - Determine if GP's were ordering inappropriate pathology tests and if yes, which ones.

- **Approach**
  - Examine patient records for pathology tests across all GP's for test ordering patterns (sequences and associations). Determine if some combination of tests was inappropriate.
Health Insurance continued

- Details
  - Used 18 million patient visits records to pathologists. (in one visit there could be up to 20 tests)
  - Used IBM’s association discovery algorithm to see which tests were performed with other tests
  - Found that when Test A was performed the confidence level that B will be performed was strikingly high for some pathologists than others
  - But experts told that another, and cheaper, Test C was indicated with Test A.
  - This is an indication of mis-coding of tests by the lab, possibly fraudulent, to earn a few more dollars
Health Insurance continued

Results

- This mis-coding could not have been detected otherwise.
- It is expected to save the customer in excess of $1M per year.
Practitioner Classification Study

Scope
- Examine the patterns of pathology test ordering among the General Practitioners in order to customize their monitoring according to the type of practice.

Approach
- From the records of patient visits create profiles of each GP. Then create clusters of these test-ordering profiles using neural segmentation.
Health Insurance continued

- Details
  - Used 18 million patient visits records to the 10,000 GP's in the region
  - Created test ordering profiles for each of these practitioners
  - Used self-organizing feature maps to create 16 segments of profiles
  - Using prior experience rated segments from most honest to most dishonest
Results

- Some unknown and surprising patterns were discovered.
- For example,
  - All part-time doctors fell into one segment
  - Only 2 segments contained all female GP's (even though no information about the gender of the practitioner was known a priori)
- Study gives a basis for tracking of practices on a more customized fashion
Credit Card Pattern Analysis
A Case Study
Credit Card Pattern Analysis

- **Scope**
  - Discover spending patterns in credit card accounts for special marketing programs
  - Build models that focus on different aspects of cardholder behavior
Approach

- Used neural segmentation and unique data representation and transformations to create seven focused models
- Created fuzzy "degree of membership" function to represent to what extent each cardholder belonged to each segment
- Built high performance code to score the models against 4 billion credit card transactions
- Characterized each customer segment
Credit Card Pattern Analysis continued

Used 9 variables to describe financial behaviors

- Average Cash Sales
- Average Retail sales
- Average Balance (ANR)
- Behavior Score
- Customer Tenure
- Depth of Relationship
- Credit Utilization
- Payment Ratio
- Special Variable, No_pay_no_owe
Credit Card Pattern Analysis

Overlay variables give personality to the segments found.

- Sales Utilization
- Residence Code
- Photo ID
- Annual Fee waive
- Overlimit flag counts
- Gold card flag
- # returned checks
- Bonus points
- Source channel
- Profession
- CNR
- Attrition flag
- Marital Status
- $ and # of local & Int'l retail sales
- $ and # of local & Int'l cash sales
Computed avg. transactions in separate merchant category codes for each customer and overlaid these.

- Airline
- Hotel
- Car Rental
- Supermarket
- Auto
- Restaurant
- Store
- Household
- Electronics
- Services
- Phone Computer
- Taxi Rail
- Clothing
- Travel agent
- Entertainment
- Bars/Night Clubs
Credit Card Pattern Analysis

The financial segmentation revealed unique groups of customers, each with its individual usage pattern.

<table>
<thead>
<tr>
<th>Category</th>
<th>Low-risk Transactors</th>
<th>Medium-risk Revolvers</th>
<th>Inactive Transactors</th>
<th>Low-risk Inactive Transactors</th>
<th>Shoppers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk Transactors</td>
<td>10.9% 30 120</td>
<td>7.9% 180 60</td>
<td>4.1% 30 240</td>
<td>3.5% 20 280</td>
<td>1.0% 100 10</td>
</tr>
<tr>
<td>Revolver w/RC</td>
<td>0.8% 150 10</td>
<td>3.6% 70 60</td>
<td>9.8% 200 10</td>
<td>1.1% 20 190</td>
<td>0.8% 240 50</td>
</tr>
<tr>
<td>Revolver w/RC</td>
<td>1.7% 50 60</td>
<td>5.8% 140 30</td>
<td>6.5% 40 120</td>
<td>2.4% 60 30</td>
<td>0.5% 170 40</td>
</tr>
<tr>
<td>Low-risk Transactors</td>
<td>1.0% 30 100</td>
<td>10.2% 90 100</td>
<td>0.8% 40 120</td>
<td>0.5% 130 20</td>
<td>1.3% 30 80</td>
</tr>
<tr>
<td>Affluent Shoppers</td>
<td>2.3% 170 60</td>
<td>4% 460 20</td>
<td>2.3% 100 40</td>
<td>12.4% 30 140</td>
<td>4.2% 20 240</td>
</tr>
<tr>
<td>Affluent Revolving ATMers</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
</tr>
<tr>
<td>Revolver w/RC</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
</tr>
<tr>
<td>Revolver w/RC</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
<td>0% 0 0</td>
</tr>
<tr>
<td>Revolving ATMers</td>
<td>4% 460 20</td>
<td>2.3% 100 40</td>
<td>12.4% 30 140</td>
<td>4.2% 20 240</td>
<td></td>
</tr>
</tbody>
</table>

Data mining: Tech. & Appl. 69
Credit Card Pattern Analysis continued

- Affluent Shoppers...

<table>
<thead>
<tr>
<th>Affluent Shoppers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.84%</td>
</tr>
<tr>
<td></td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>66</td>
</tr>
</tbody>
</table>
Credit Card Pattern Analysis continued

- have a very distinct profile, and...

Income for Affluent Shoppers is $100K
Credit Card Pattern Analysis
continued

- They have very concentrated levels of spending.
  - Affluent Shoppers - 5.9% of customers

<table>
<thead>
<tr>
<th>Customers</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.9%</td>
<td>65%</td>
</tr>
<tr>
<td>Bonus Points</td>
<td>Airlines 42%</td>
</tr>
<tr>
<td>50%</td>
<td>29%</td>
</tr>
<tr>
<td>Bars &amp; Nightclubs</td>
<td>Gold Cards</td>
</tr>
<tr>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>
Credit Card Pattern Analysis continued

- These behaviors suggest business opportunity for the bank.
  - A reward/retention activity may be to waive the annual fee for a year
  - Encouraging a subset of this segment to consume at the same level as the remaining segment will yield potentially $2.1MM additional CNR
  - An acquisition promotion tied to most-used hotels might prove very effective: "sign up for a Gold Visa and get a free night"
Credit Card Pattern Analysis

continued

Medium risk revolvers...

<table>
<thead>
<tr>
<th>MEDIUM RISK</th>
<th>REVOLVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.7%</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>47</td>
</tr>
</tbody>
</table>
Credit Card Pattern Analysis continued

- ... are bank's core customers, responsible for $21MM annual CNR.
- Medium Risk Revolvers - 18% of customers

<table>
<thead>
<tr>
<th>Customers</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>18%</td>
<td>35%</td>
</tr>
<tr>
<td>Total ANR</td>
<td></td>
</tr>
<tr>
<td>CNR</td>
<td>34%</td>
</tr>
<tr>
<td>Attritors</td>
<td>7%</td>
</tr>
<tr>
<td>Airline</td>
<td>6%</td>
</tr>
</tbody>
</table>

Data mining: Tech. & Appl.
Credit Card Pattern Analysis

continued

- Medium-risk revolvers are loyal and profitable customers.
  - These customers should be rewarded with high level of service
  - Take preemptive action in a competitive market
Credit Card Pattern Analysis continued

Affluent Revolving ATMers.....

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Affluent</td>
<td>4.0%</td>
<td>461</td>
</tr>
<tr>
<td>Revolving</td>
<td>ATMers</td>
<td>30</td>
</tr>
</tbody>
</table>

Data mining: Tech. & Appl. 77
Credit Card Pattern Analysis
continued

Affluent revolving ATMers constitute a very distinct & desirable type of customers.

Income for Affluent Revolving ATMers is $80K
Credit Card Pattern Analysis

continued

- Affluent Revolving ATMers account for $11M of CNR.
  - Affluent Revolving ATMers - 4% of customers.

<table>
<thead>
<tr>
<th>Customers</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>23% Local Cash</td>
<td></td>
</tr>
<tr>
<td>17% Gold Mastercards</td>
<td></td>
</tr>
<tr>
<td>5% Retail</td>
<td></td>
</tr>
</tbody>
</table>
Credit Card Pattern Analysis

continued

- Their unique spending, profitability & attrition profiles present potential of increased business.
  - Acquiring one such customer is more profitable than acquiring 14 Transactors
  - We suggest a comprehensive survey of this customer set via incentives, or focus groups to learn more about them and build a predictive model for a targeted acquisition campaign
Credit Card Pattern Analysis continued

- Affluent Revolving ATMers and Medium Risk Revolvers account for 52% of CNR.
Credit Card Pattern Analysis
continued

- Results of our financial segmentation suggest incentive campaigns to increase bank's profitability.
  - Acquire Affluent Shoppers through a campaign tied to hotels.
  - Potential for $2.1MM additional CNR by targeting one subset to consume at the same level as the rest of the segment.
  - Reward core, loyal & profitable customer segment with better service.
  - Survey Affluent Revolving ATMers, build predictive models to conduct a targeted acquisition campaign.
Appendix
Target Industries

- Finance
- Retail
- Insurance
- Telecommunications
- Utility
- Government
Finance

- Market Segmentation
- Default Prediction
- Relationship Banking (CRM)
  - Cross Selling (Services Bundles)
  - Targeted Offers
- Customer Acquisition
- Customer Profitability Projection
- Credit Card Fraud
- Stock Market Prediction
Retail

- Market Basket Analysis
  - Store Layout
  - Flyer Layout
  - Web Page Design
  - Shelf Arrangements
  - Follow On Sales (over time)
- Credit Card Operations
  - Customer Selection
  - Fraud Analysis
- Cashier Fraud
- Store Location
Telecommunication

- Churn Management
- Targeted Marketing / CRM
  - Product Cross Selling
  - Product Bundles
- Market Segmentation
- Customer Identification
- Long Distance / Local Service Prediction
Insurance

- Policy Retention
- Targeted Marketing / CRM
- Claim Fraud
- Customer Profitability
- Cross selling
- Premium setting
- Risk analysis
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