

Predictive Analytics on Big Data to Improve Insight, Decision Making and Profitability





INVESTOR'S BUSINESS DAILY

MONDAY, MARCH 24, 2008

INTERNET & TECHNOLOGY

Predictive Analytics Software Proves Its Presidential Timber

Obama Consultant Uses SPSS

The software provides way to "micro-target" residents likely to vote for your side

BY J. BONASIA

INVESTOR'S BUSINESS DAILY

Sens. Barack Obama and Hillary Clinton, locked in an epic battle for the Democratic presidential nomination, need any edge they can get. That's why the Obama team has adopted a powerful software system to zero in on likely voters



has been picked up by campaigns across federal, state and even local levels. The **Southern Political Information Network** (Spin) in Charlotte, N.C., uses micro-targeting to assist Democratic campaigns throughout the South.

In one such case, the approach helped elect an African-American woman to county commissioner in western North Carolina, says Carl Clark, executive director of Spin.

"We needed to find the people who were most likely to

The World is Changing and Becoming More...



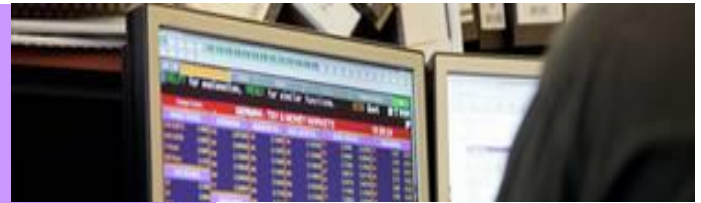
INSTRUMENTED



INTERCONNECTED



INTELLIGENT



The resulting explosion of information creates a need for a new kind of intelligence

...to help build a Smarter Planet



There is an Explosion in Data and Real World Events

1.3 Billion RFID tags in 2005
30 Billion RFID tags by 2010



Capital market data volumes grew **1,750%**, 2003-06



2 Billion Internet users by 2011



4.6 Billion Mobile Phones World Wide



Twitter process **7 terabytes** of data every day

World Data Centre for Climate
▪ **220 Terabytes** of Web data
▪ **9 Petabytes** of additional data



Facebook process **10 terabytes** of data every day



What is “BIG DATA”?

All kinds of data
Large volumes
Valuable insight, but difficult to extract
Often extremely time sensitive



- Existing sources of data continue to grow
- New sources of data are now available
 - detailed customer data
 - internet sources
 - instrumentation
- Data arrives at an increasing rate



Business Analytics can be applied to all big data problems

IBM Business Analytics

- Real-time Scoring
- Predictive Analytics
- Sentiment Analysis
- Real-time Monitoring



- Integrated
- Enterprise-ready
- Open Source Based

IBM Big Data Platform



Big Data Analytics – Already a Reality

Variety

Analyze **telemetry, fuel consumption, schedule and weather patterns** to optimize shipping logistics.



- Cognos Consumer Insight – Social Media Data
- SPSS Modeler in Netezza

Velocity

Analyze **100k records/second** to address customer satisfaction in real time



- Cognos Real-time Monitoring v10
- SPSS for very fast model scoring

Volume

Optimize capital investments based on **6 Petabytes** of information



- Analyze, plan, align with Cognos v10 on Hadoop and InfoSphere BigInsights



What can you do with big data Analytics?

Financial Services

- Fraud detection
- Risk management
- 360° View of the Customer



Utilities

- Weather impact on power generation
- Transmission monitoring
- Smart grid management

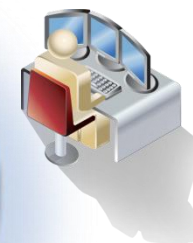
Transportation

- Weather and traffic impact on logistics and fuel consumption



IT

- Transition log analysis for multiple systems
- Cybersecurity



Health & Life Sciences

- Epidemic early warning
- ICU monitoring
- Healthcare monitoring



Retail

- 360° View of the Customer
- Click-stream analysis
- Real-time promotions



Telecommunications

- CDR processing
- Churn prediction
- Geomapping / marketing
- Network monitoring



Law Enforcement

- Real-time multimodal surveillance
- Situational awareness
- Cyber security detection



Applications for BIG Data Analytics are Endless

Neonatal Care



Trading Advantage



Environment



Law Enforcement



Radio Astronomy



Telecom



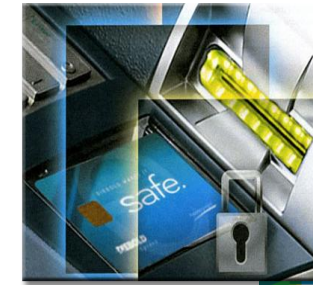
Manufacturing



Traffic Control



Fraud Prevention



3 Pillars Of Predictive Analytics

Customer
Analytics



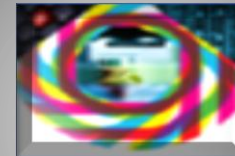
Attract
Retain
Grow

Operational
Analytics



Manage
Maintain
Maximize

Threat / Risk
Analytics



Monitor
Detect
Control



First Tennessee Bank



Predictive
Customer
Analytics

The problem....

Wasting thousands of dollars annually on its direct marketing campaigns by focusing on products rather than customer knowledge and behavior

Implementing predictive analytics....

Blend customer segment profiles with profitability data to identify and target the most attractive segments

Results

- **3.1% increase** in marketing response rate through more accurate targeting of offers to high-value customer segments
- **20% reduction** in mailing costs and **17% reduction** in printing costs due to the ability to target the most attractive segment for specific offers
- **600%** overall return on its investment through more efficiently allocated marketing resources

Infinity Property & Casualty



The problem....

To provide a more systematic, efficient and accurate way to pinpoint fraud

Implementing predictive analytics....

Created a smarter claims processing workflow, which transformed the way Infinity's agents handle and route claims

Results

- Increase of **\$12 million** in subrogation recoveries with success rates in pursuing fraudulent claims **increasing from 50% to 88%**
- As much as **95% reduction** in time required to refer questionable claims for investigation
- **400% ROI** with six months of implementation

Memphis Police Department



Predictive Risk & Threat Analytics

The problem....

Faced with rising crime, frozen budgets, growing disenchantment among citizens

Implementing predictive analytics....

Predict future crime hot spots and deploy resources proactively

Results

- **15%** reduction in violent crime and a **30%** reduction in serious crime overall, including a 36.8% reduction in crime in one targeted area
- **4x** increase in the share of cases solved in the MPD's Felony Assault Unit (FAU), from 16% to nearly **70%**
- Overall improvement in the ability to allocate police resource in a budget-constrained fiscal environment

CLAIMS FRAUD AVOID LOSSES DUE TO FRAUD

CLAIMS HANDLER

Tuesday, 2011-08-9

- START
- Claim Handling
- Fraud
- Subrogation
- ALERT

Claim ID	<input type="text" value="1004788"/>	Customer ID	<input type="text" value="18985879"/>	SEARCH
-----------------	--------------------------------------	--------------------	---------------------------------------	---------------

Identification

Gender of Driver:

Age of Driver:

Cause Accident:

Claim Area:

Postal Code:

Phone Number:

Occupation:

Incident

Days since incident:

Number of vehicles:

Number of damaged vehicles:

Towing service used:

Number of people:

Number of injured people:

Number of witnesses:

Police report:

Damage

Claim type:

Incident description:

Damage:

Coverage

Comp & collision:

Property damage:

Liability property damage:

Liability bodily injury:

Uninsured motorists property damage:

Uninsured motorists bodily injury:

Person injury protection:

Medical payment:

Payment

Total reserve amount (initial provision):

Total property damage:

Total medical bills:

Suggested Action: Refer

H

FINISH

[Front-end configuration link](#)



START

Claim ID

Customer ID

SEARCH

http://9.119.83.41:9080/ - Predictive Analytics and Reporting for Claims - Windows I...

Risk Details

Customer: 18985879
Claim: 1004788

Overall outcome
Refer

Model outcome
Refer

Rule outcome
Standard

Predictive Analytics result

0.845168 Model value
 0.74 Model threshold triggered

Points
1

Business Rules
The policyholder's seniority with the insurance company is less than 1 year

Incident

Days since incident

Number of vehicles

Number of damaged vehicles

Emergency service used

Number of people

Number of injured people

Number of witnesses

Report

Damage

Collision & collision

Property damage

Property property damage

Property bodily injury

Uninsured motorists property

Uninsured motorists bodily injury

Person injury protection

Medical payment

Payment

Total reserve amount (initial provision)

Total property damage

Total medical bills

Suggested Action: Refer

H

FINISH

CLAIMS ANALYST



Stream1
fraud:25

(unsaved pro
Business
Data Und
Data Prep
Modeling
Evaluatio
Deployme



FRAUD_TRAINING



All
Automated
Classification
Association
Segmentation

Time Series C&R Tree Quest CHAID Decision List Linear Regression PCA/Factor Neural Net C5.0 Feature Selection Discriminant Logistic GenL



Step1: Data preparing and model selection.

EV data source

C5.0 model for rules revealing

FRAUD_TRAINING

IS_FRAUD

IS_FRAUD

24 Fields

IS_FRAUD

Partition

IS_FRAUD

IS_FRAUD

Analysis

[\$C-IS_FRAUD]

Analysis

[\$XF-IS_FRAUD]

Data Exploration

Auto classifier for model selection

Step2: Model Training

Streams Outputs

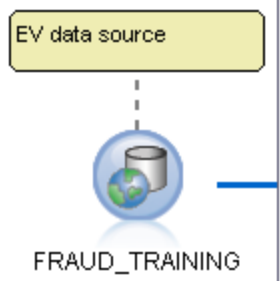
- Stream1
- fraud:25

CRISP-DM Class

- (unsaved pro
- Business
- Data Und
- Data Prep
- Modeling
- Evaluation
- Deployme



Step1: Data preparing and model selection.



IS_FRAUD

Estimated number of models to be executed: 9

Fields Model **Expert** Discard Settings Annotations

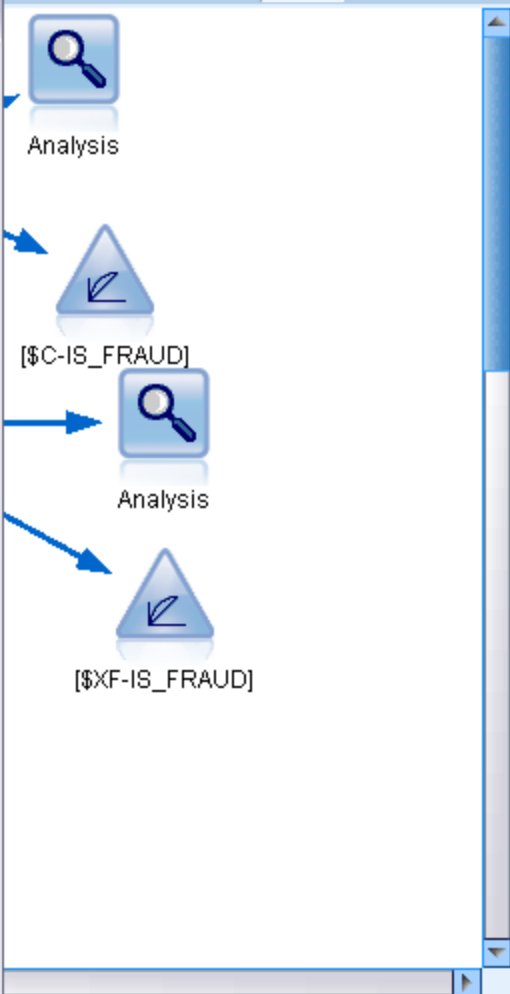
Models used:

Use?	Model type	Model parameters	No of models
<input checked="" type="checkbox"/>	C5	Default	1
<input checked="" type="checkbox"/>	Logistic r...	Default	1
<input checked="" type="checkbox"/>	Decision ...	Default	1
<input checked="" type="checkbox"/>	Bayesian...	Default	1
<input checked="" type="checkbox"/>	Discrimin...	Default	1
<input type="checkbox"/>	KNN Alg...	Default	1
<input type="checkbox"/>	SVM	Default	1
<input checked="" type="checkbox"/>	C&R Tree	Default	1
<input checked="" type="checkbox"/>	Quest	Default	1
<input checked="" type="checkbox"/>	CHAID	Default	1

Restrict maximum time spent building a single model to minutes

Stopping rules... Misclassification costs...

OK Run Cancel Apply Reset



Streams Outputs

- Stream1
- fraud:25

CRISP-DM Class

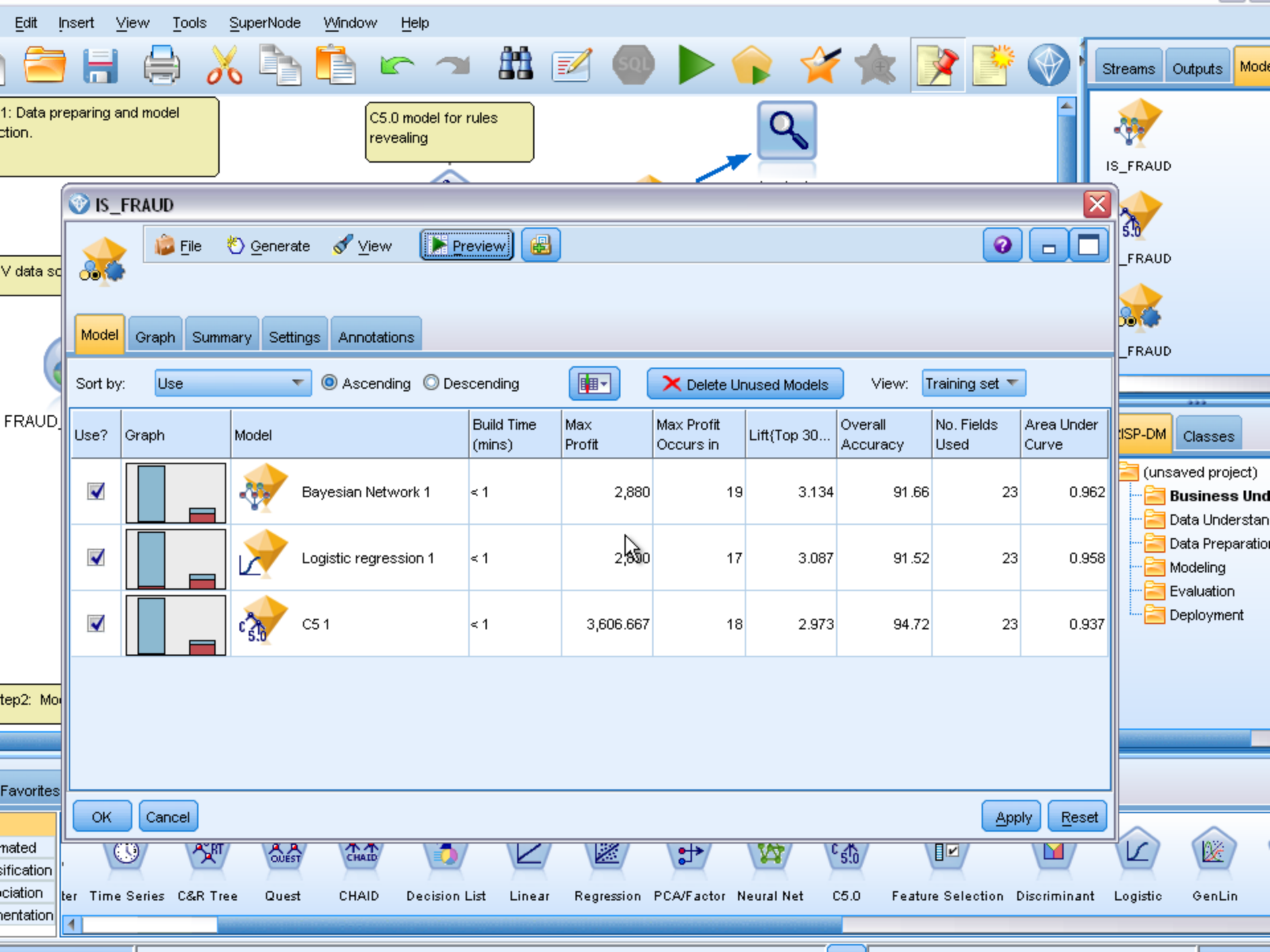
- (unsaved project)
- Business
 - Data Understanding
 - Data Preparation
 - Modeling
 - Evaluation
 - Deployment

Favorites Sources

- All
- Automated
- Classification
- Association
- Segmentation

Output Export IBM® SPSS® Statistics

Time Series C&R Tree Quest CHAID Decision List Linear Regression PCA/Factor Neural Net C5.0 Feature Selection Discriminant Logistic GenL



IS_FRAUD

File Generate View Preview

Model Graph Summary Settings Annotations

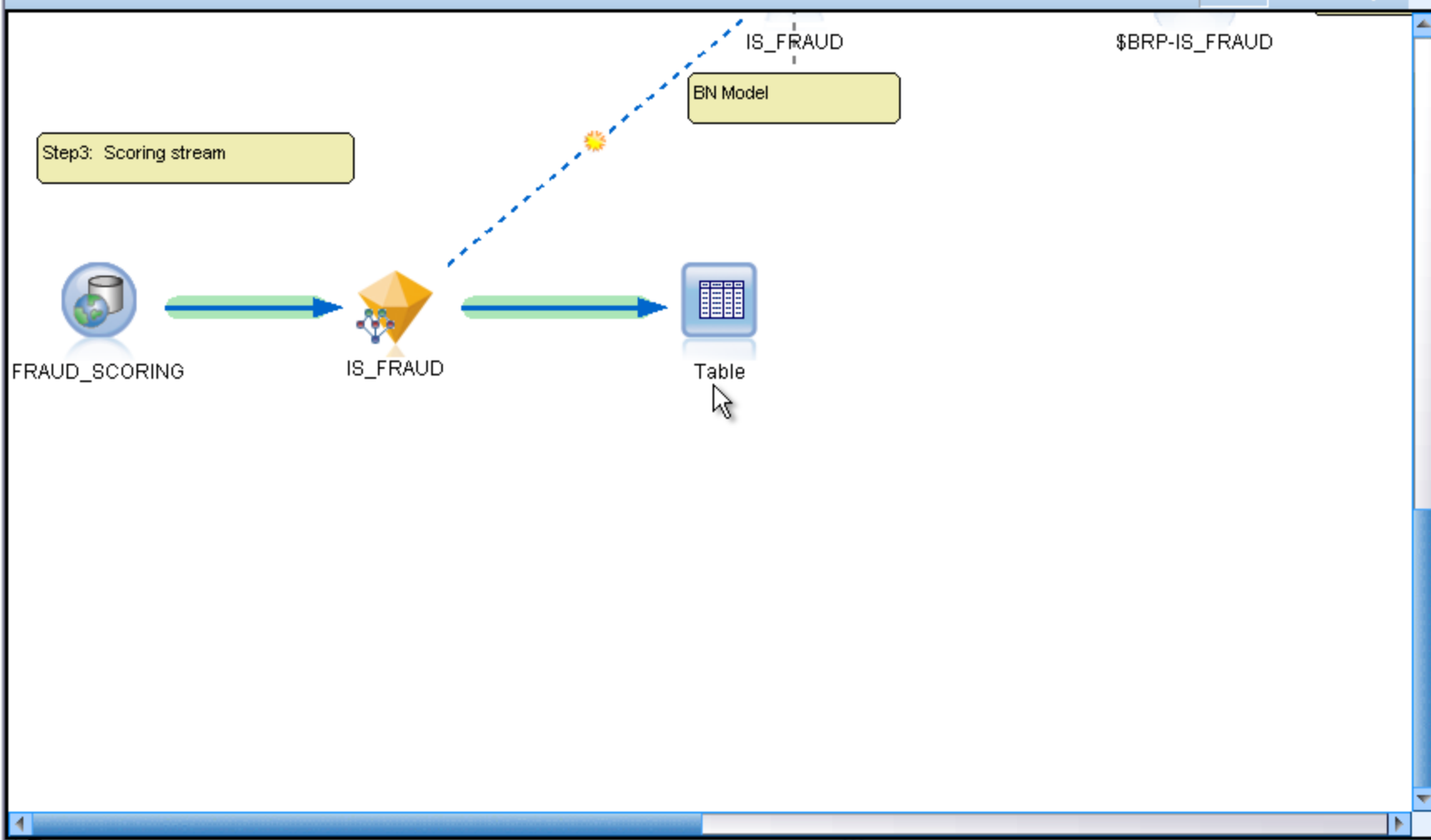
Sort by: Use Ascending Descending Delete Unused Models View: Training set

Use?	Graph	Model	Build Time (mins)	Max Profit	Max Profit Occurs in	Lift(Top 30...	Overall Accuracy	No. Fields Used	Area Under Curve
<input checked="" type="checkbox"/>		Bayesian Network 1	< 1	2,880	19	3.134	91.66	23	0.962
<input checked="" type="checkbox"/>		Logistic regression 1	< 1	2,600	17	3.087	91.52	23	0.958
<input checked="" type="checkbox"/>		C5.1	< 1	3,606.667	18	2.973	94.72	23	0.937

OK Cancel

Apply Reset

Time Series C&R Tree Quest CHAID Decision List Linear Regression PCA/Factor Neural Net C5.0 Feature Selection Discriminant Logistic GenLin



Stream

Outputs

- IS_FRAUD
- IS_FRAUD
- IS_FRAUD

CRISP-DM

- (unsaved)
- Business
- Data
- Data
- Model
- Evalu
- Deplo

CLAIM OPERATIONS MANAGER



Vi

Choose your functional area:

Claims Triage Simple



Claims triage decision

Decide who should deal with a new incoming claim, based on a combination of complexity, retention and fraud.

New

Go

Claims Complexity

Claims complexity analysis

Assess the complexity level of a claim and allocate appropriate recourse.

New

Go

Claims Triage Retention



Customer retention management

Decide what to do when customers tend to leave the company and choose other company's service or how to avoid that.

New

Go

Claims Fraud and Subrogation

Claims fraud and subrogation referral decision

Decide how likely a claim will be able to avoid payment due to fraud. Evaluate any opportunity to recover losses from a third party.

Fraud_Detection_DM

Go

Gallery

Show on application home page



Projects

SimpleTriag...

Last modified
2011-08-24 14:09:51
Last saved
2011-08-24 12:07:21

Lock project (other users will be unable to edit)

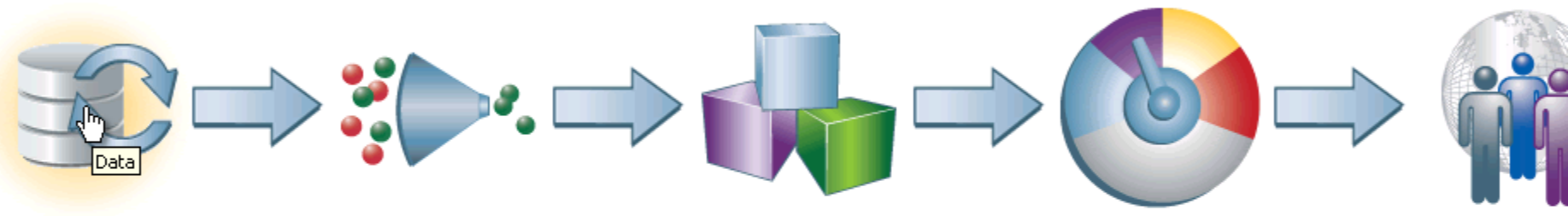
FraudDetection



Hide Home page from non-administrators

Default tab visible after opening:

Home



Data

Select the data that you want to process.

For example, this may include information about current customers and records from previous claims.

Refresh

No objects are currently stored in the cache.

Lock project (other users will be unable to edit)

Hide Data tab from non-administrators

Lock all Data options

▼ Project Data Model

Data source: OPERATIONAL_CLAIMS_DATA Refresh data scan Expression Manager

<input checked="" type="checkbox"/> Operational	Field name	Measurement	Values
<input checked="" type="checkbox"/>	ID_CLAIM	Continuous	[1001830.00,1006829.00]
<input checked="" type="checkbox"/>	ID_EVENT	Continuous	[2293561.00,2793245.00]
<input checked="" type="checkbox"/>	ID_POLICY	Continuous	[11.00,104253.00]
<input checked="" type="checkbox"/>	ID_POLICY_NUMBER	Continuous	[50105000.00,100000000.00]

▼ Data Sources

Project Data Sources Add a data source

Name	Preview	Compatible	Copy	Remove	<input type="checkbox"/> Lock
OPERATIONAL_CLAIMS_DATA		Project Data Model			<input type="checkbox"/>

My Data Sources Add a data source

Name	Preview	Copy	Remove
------	---------	------	--------



Mark as

Data

Global Selections

Define

Combine

Deploy

Lock project (other users will be unable to edit)

FraudDetection



Hide Global Selections tab from non-administrators

Lock all Global Selections options

Manage Global Selections

[Find an existing rule](#) [Create a new rule](#) [View selection logic](#)

[Export](#)

Rule name - Include/Exclude Remove

1 Claims where cause of accident is Natural Causes

Exclude



- Data
- Global Selections
- Define**
- Combine
- Deploy

Lock project (other users will be unable to edit)

FraudDetection



+ Add a new Claim Area Import Export

Collapse all Expand all

- Auto Claim
 - Refer
 - Standard
 - Fast Track



Hide Define tab from non-administrators

Lock all Define options

- ▶ Define Interaction Points
- ▶ Auto Claim Properties
- ▶ Choose Who This Claim Area Applies to
- ▶ Use Rules to Decide Which Action is Triggered
- ▶ Use a Model to Decide Which Action is Triggered

Simulate

Test



Mark as default

Lock project (other users will be unable to edit)

Add a new Claim Area Import Export

Collapse all Expand all

- Auto Claim
 - Refer
 - Standard
 - Fast Track

Hide Define tab from non-administrators Lock all Define options

- Define Interaction Points
- Auto Claim Properties
- Choose Who This Claim Area Applies to
- Use Rules to Decide Which Action is Triggered

Simulate
Test

Reminder: Apply when no rules hit

Find an existing rule Create a new rule Add annotations OR Split OR Export




Rule name -	Risk points	Sort	Remove
1 <u>The policyholder's senior...</u> P_SENIORITY <= 1	1	▲▼	✖
2 <u>Luxury vehicles and vehi...</u>	2	▲▼	✖
3 <u>Young male driver with t...</u> P_CLAIMANT_AGE < 25 P_GENDER = M O_RISK_WEIGHT >= 3	2	▲▼	✖
4 <u>Old female with the car i...</u>	2	▲▼	✖
5 <u>A loss event shortly after...</u> B_DAYS_ACCIDENT_AND... B_DAYS_ACCIDENT_AND_POLICY_EFFECTIVE <= 14	3	▲▼	✖
6 <u>Loss occurred shortly bef...</u>	4	▲▼	✖
7 <u>Number of claims greate...</u>	2	▲▼	✖
8 <u>Insured has a known fra...</u>	5	▲▼	✖
9 <u>One or more third partie...</u>	5	▲▼	✖
10 <u>...</u>	3	▲▼	✖

1	<input type="checkbox"/> The policyholder's senior...	1	▲▼	✖
	P_SENIORITY <= 1			
2	<input checked="" type="checkbox"/> Luxury vehicles and vehi...	2	▲▼	✖
3	<input type="checkbox"/> Young male driver with t...	2	▲▼	✖
	P_CLAIMANT_AGE < 25			
	<input checked="" type="radio"/> P_GENDER = M			
	O_RISK_WEIGHT >= 3			
4	<input checked="" type="checkbox"/> Old female with the car i...	2	▲▼	✖
5	<input type="checkbox"/> A loss event shortly after...	3	▲▼	✖
	B_DAYS_ACCIDENT_AND...			
6	<input checked="" type="checkbox"/> Loss occurred shortly bef...	2	▲▼	✖
7	<input checked="" type="checkbox"/> Number of claims greate...	2	▲▼	✖
8	<input checked="" type="checkbox"/> Insured has a known fra...	5	▲▼	✖
9	<input checked="" type="checkbox"/> One or more third partie...	5	▲▼	✖
10	<input checked="" type="checkbox"/> Late Notice: Date report...	3	▲▼	✖
11	<input checked="" type="checkbox"/> There were no witnesses...	2	▲▼	✖
12	<input checked="" type="checkbox"/> No Police report and hea...	2	▲▼	✖
13	<input checked="" type="checkbox"/> Vehicle has heavy dama...	1	▲▼	✖
14	<input checked="" type="checkbox"/> Excessive medical expen...	2	▲▼	✖
15	<input type="checkbox"/> High anomaly index	5	▲▼	✖
	fraud anomaly(\$O-An...			
16	Remainder	0	▲▼	

Add Action Add annotations

	Sum of Points >= ↓	Allocate to	Remove
1	5	Refer	✖
2	1	Standard	✖
3	0	Fast Track	


Lock project (other users will be unable to edit)

 Add a new Claim Area  Import  Export

 Collapse all  Expand all

- Auto Claim
 - Refer
 - Standard
 - Fast Track

Hide Define tab from non-administrators

 Lock all Define options


- Define Interaction Points
- Auto Claim Properties
- Choose Who This Claim Area Applies to
- Use Rules to Decide Which Action is Triggered
- Use a Model to Decide Which Action is Triggered

Simulate



Test



 Find a model  Build a model

Model	Target	Measure	Remove
fraud.str	IS_FRAUD	Specify field...	

 Add Action  Add annotations

	Field (\$BRP-IS_FRAUD) >=	Allocate to	Remove
1	0.74	Refer	
2	0.2	Standard	
3	Remainder	Fast Track	

Simulation

Simulation Data Source

OPERATIONAL_CLAIMS_DATA

Simulation Date

2011-09-08 02:53:43 15

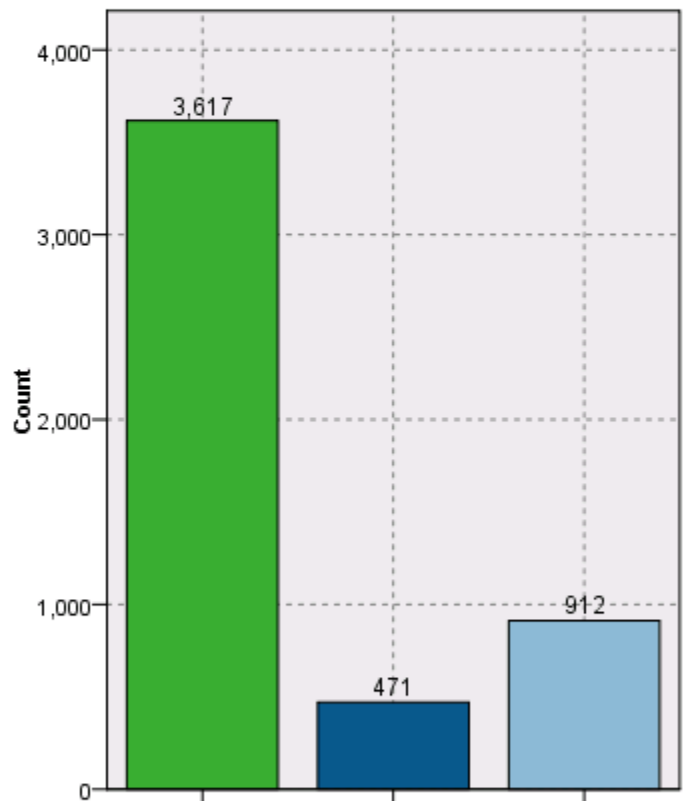
Run

Claim Area Action Rule

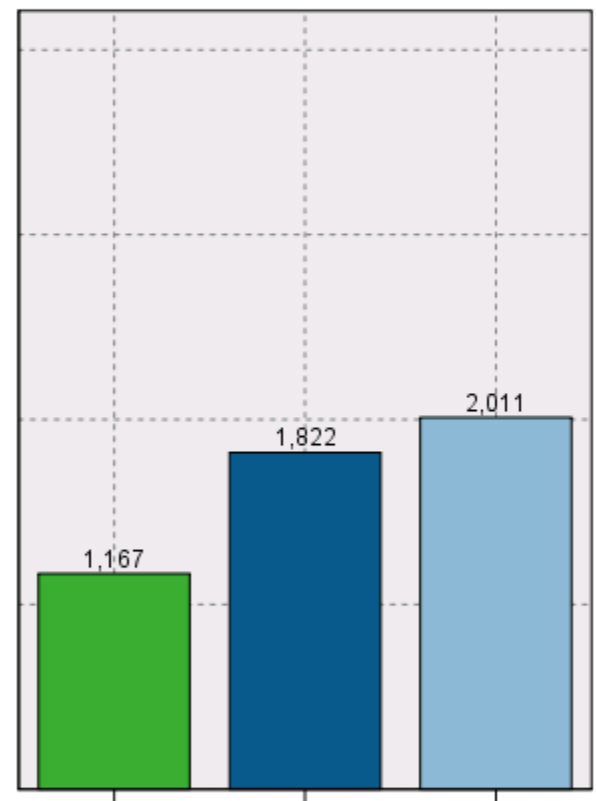
Data source: OPERATIONAL_CLAIMS_DATA

Total Simulation Records: 5000

View: Count



Model based Action



Rule based Action



Mark as

Lock all Combine options

Hide Combine tab from non-administrators

Auto Claim

Use same matrix for all interaction points No interaction points

Combine matrix		Model actions		
		Refer	Standard	Fast Track
Rules actions	Refer	Refer	Standard	Fast Track
	Standard	Refer	Standard	Fast Track
	Fast Track	Standard	Standard	Fast Track

Matrix colors


- Refer
- Standard
- Fast Track

What
Te

Simulation Data Source

OPERATIONAL_CLAIMS_DATA


Simulation Date

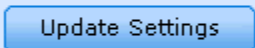
2011-09-08 02:56:09 

Claim Area

Auto Claim






Combine matrix		Model actions			Results		
		Refer	Standard	Fast Track	Action	Count	Percentage
Rules actions	Refer	Refer	Standard	Fast Track	Fast Track	3617	72.3
	Standard	Refer	Standard	Fast Track	Refer	453	9.0
	Fast Track	Standard	Standard	Fast Track	Standard	930	18.4
						5000	100

Name: Run 2 



Total Simulation Records: . 5000

Display Number of runs retained: 1


Action	 Run1 	Distribution
Fast Track	3617	
Refer	453	
Standard	930	
Total	5000	

WhatIf?

Simulation Data Source

OPERATIONAL_CLAIMS_DATA


Simulation Date

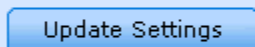
2011-09-09 02:05:04  15

Claim Area

Auto Claim








Combine matrix		Model actions			Results		
		Refer	Standard	Fast Track	Action	Count	Pe
Rules actions	Refer	Refer	Standard	Standard	Fast Track	1067	21
	Standard	Refer	Standard	Standard	Refer	453	9
	Fast Track	Standard	Standard	Fast Track	Standard	3480	6
						5000	1

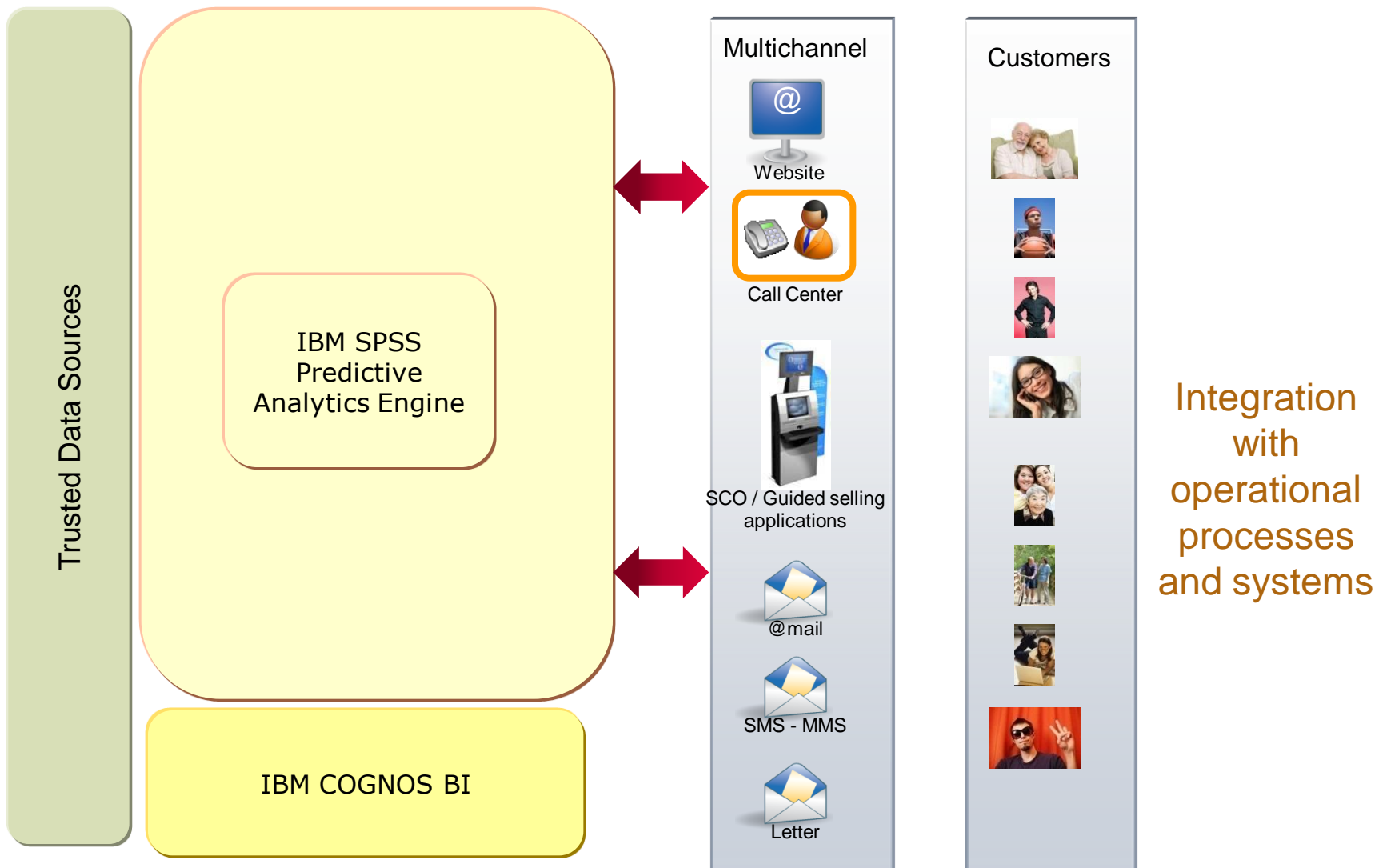
Name: Run 3 



Total Simulation Records: 5000

Display Number of runs retained: 2

Action	 Run1 	 Run 2 	Distribution
Fast Track	3617	1067	
Refer	453	453	
Standard	930	3480	
Total	5000	5000	



3 Pillars Of Predictive Analytics

Customer
Analytics



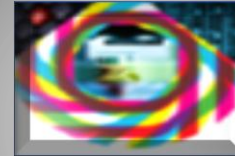
Attract
Retain
Grow

Operational
Analytics

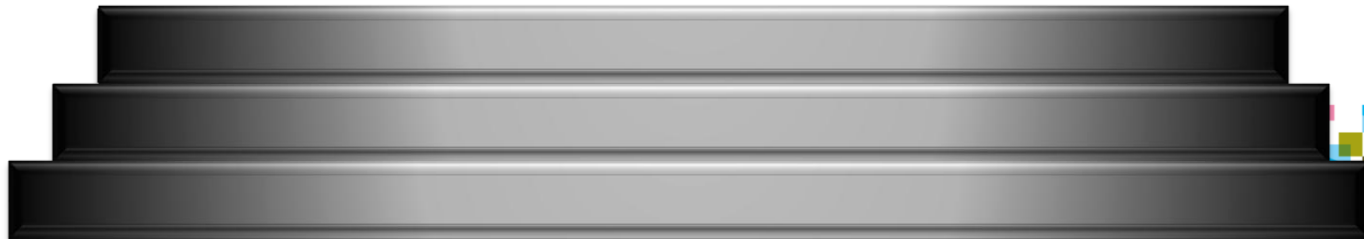


Manage
Maintain
Maximize

Threat / Risk
Analytics



Monitor
Detect
Control



IBM®

IBM Smartphone Event Application

Question:

Which option below is one of the three pillars of Predictive Analytics on Big Data?

- a) Customer Analytics
- b) Financial Analytics
- c) Sentiment Analytics



Answer.....

Question:

Which option below is one of the three pillars of Predictive Analytics on Big Data?

- a) Customer Analytics**
- b) Financial Analytics
- c) Sentiment Analytics

Answer is (a)



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