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Title: Big Data Predictive Analytics

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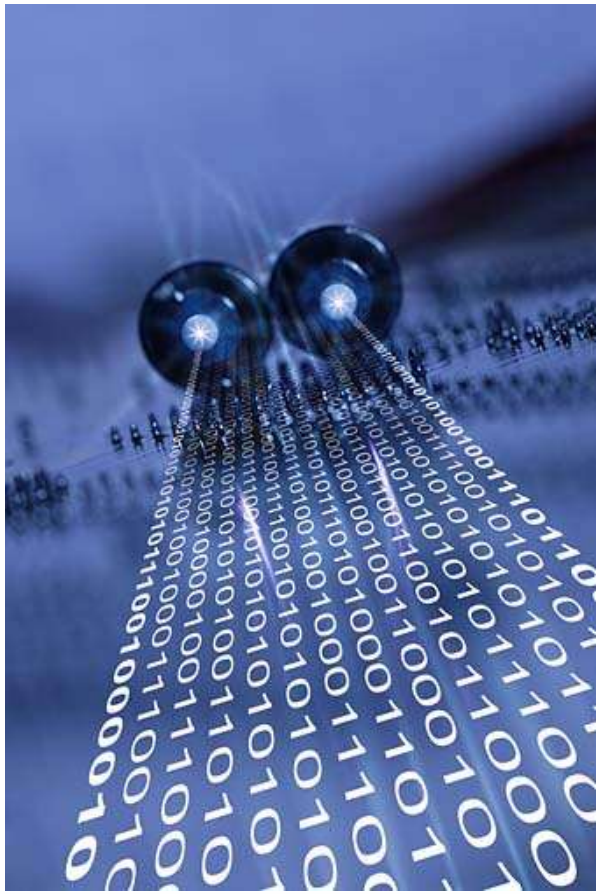
Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

What is Predictive Analytics?

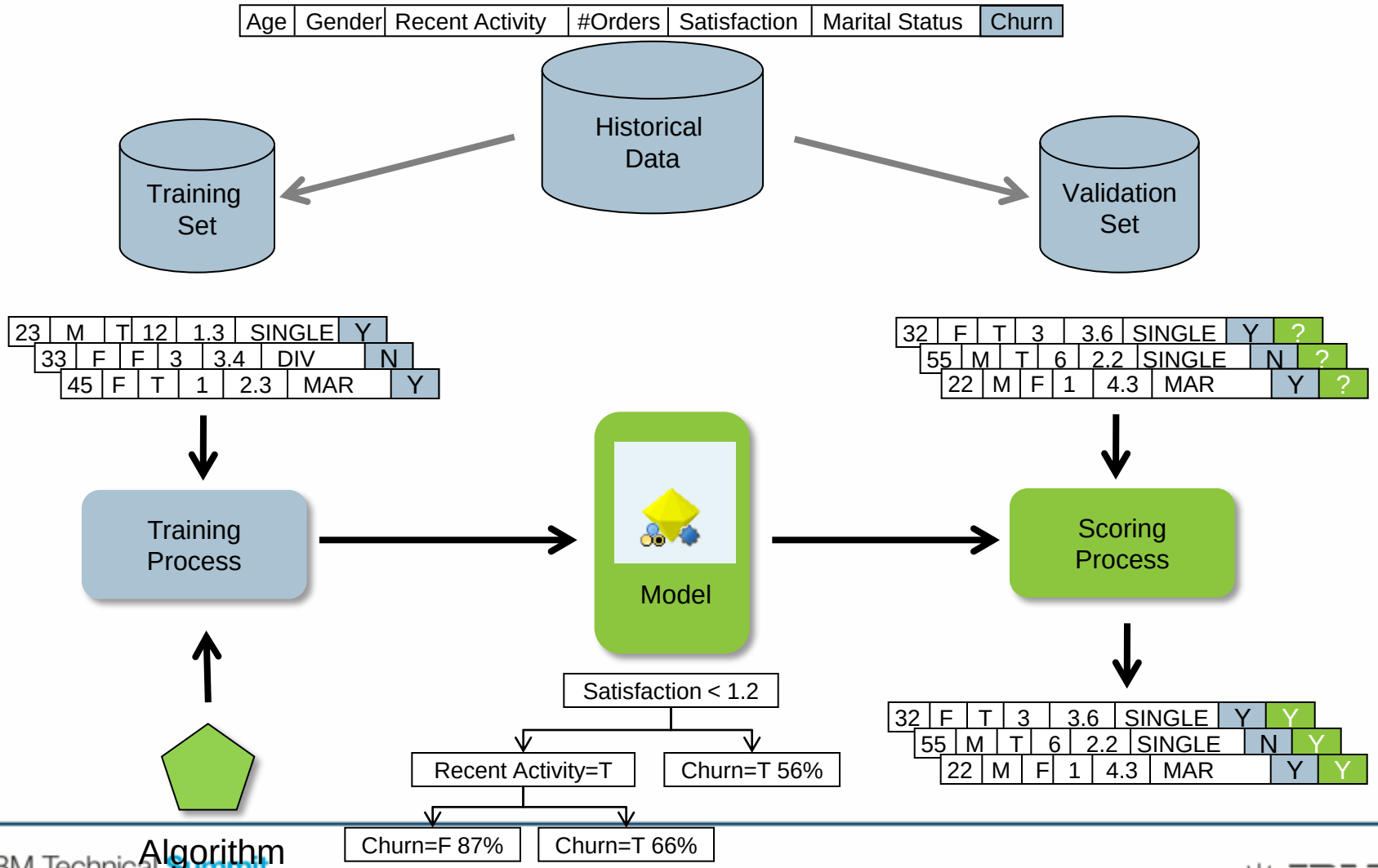


The application of statistical analysis of historic data to predict future trends, patterns, and behaviors to improve the outcomes in automated and human processes

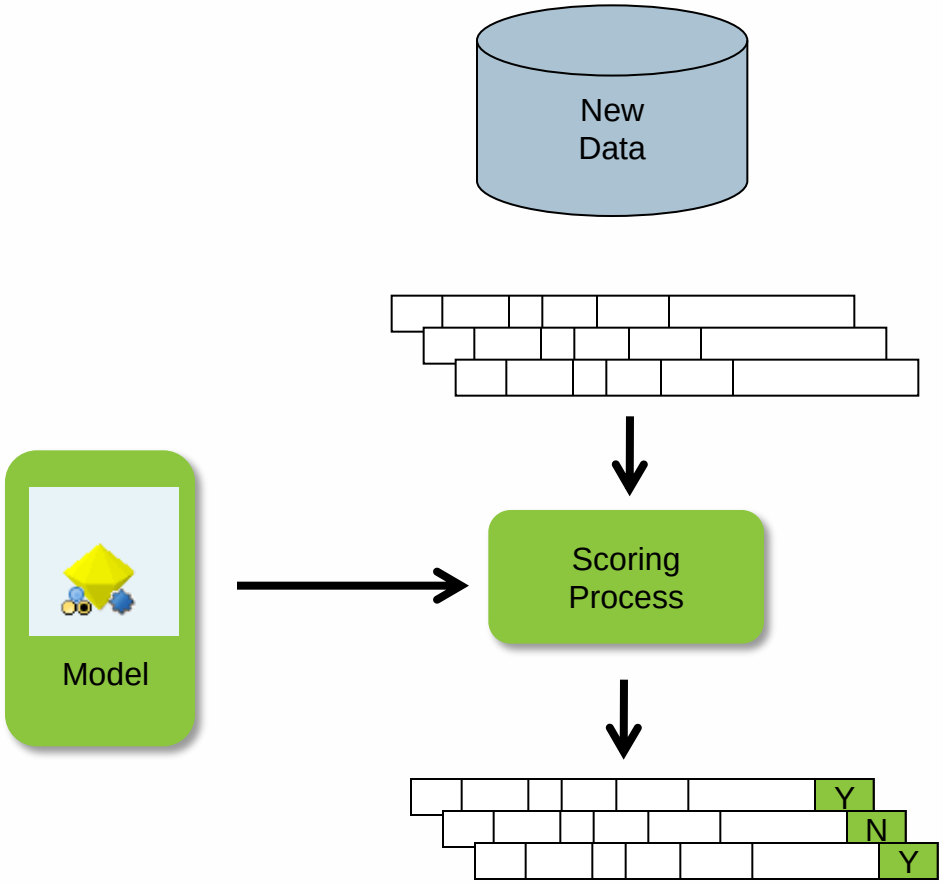
Predictive Algorithms

- **Classification**
  - Uses a known outcome field (target) and its relationship to predictor inputs to build a model that can predict the target value in new data
  - Linear Regression, Logistic Regression, C5.0, C&RT, QUEST, Neural Network, SVM
- **Association**
  - Builds a model that shows the patterns of entities (events, purchases, attributes) in a data set
  - Apriori, CARMA, Sequence
- **Segmentation**
  - Divides the data set into clusters of records that are similar
  - K-Means, Kohonen, TwoStep Cluster
- **Forecasting**
  - Produces future estimates for time based data
  - ARIMA, Exponential Smoothing

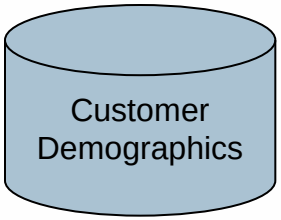
Model Building



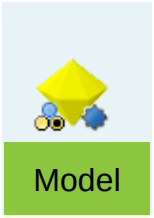
Predictive Scoring

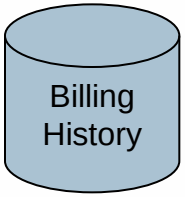


Data Exploration / Preparation

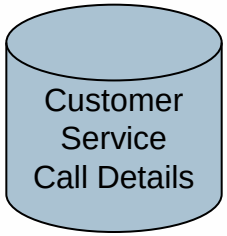


Age	Gender	Marital Status	Churn

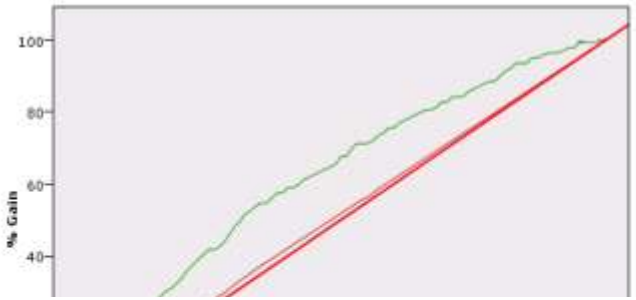


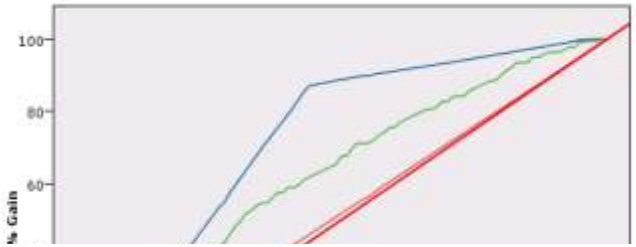


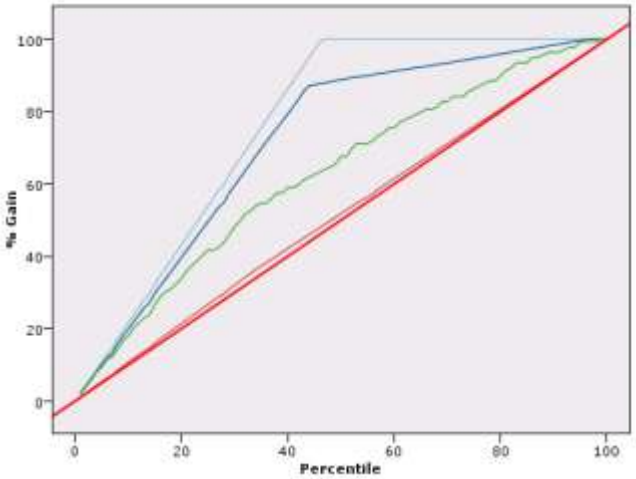
Age	Gender	#Late Pmt	#Orders	Marital Status	Churn



Age	Gender	#Late Pmt	#Orders	Marital Sts	Satisfaction	Churn

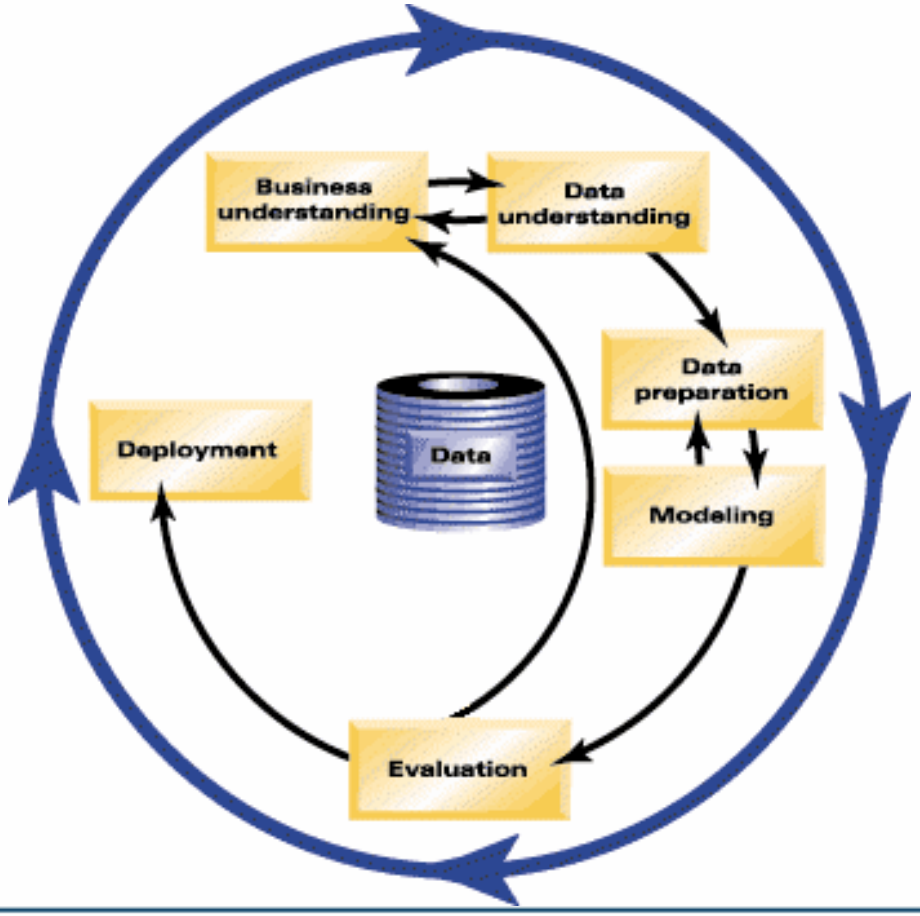






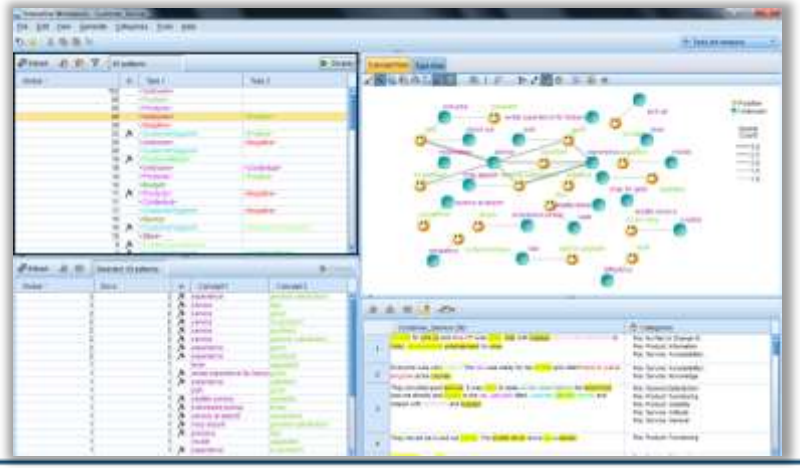
Data Mining Methodology – CRISP-DM

- Business understanding
- Data understanding
- Data preparation
- Modeling
- Evaluation
- Deployment

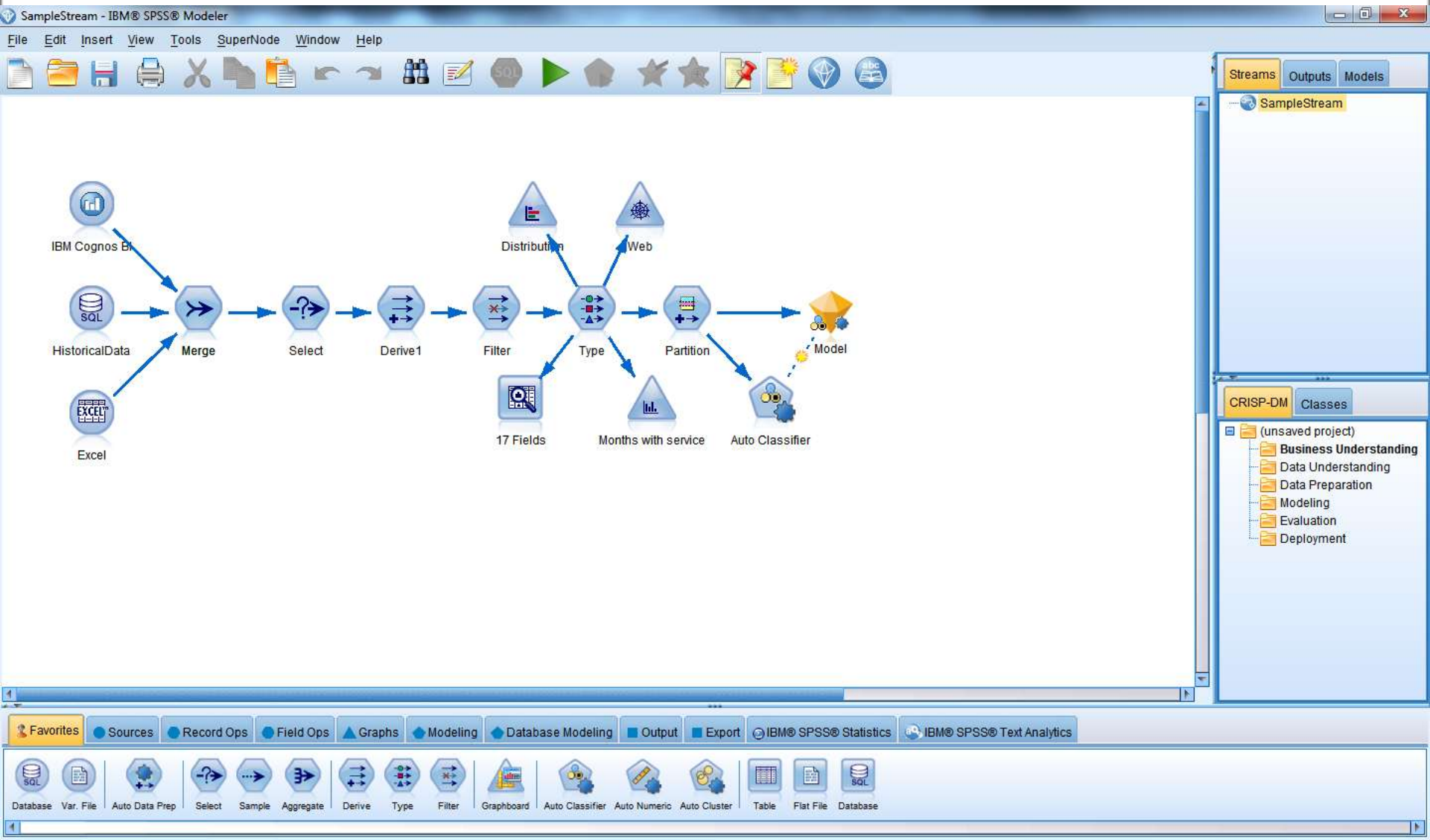


IBM SPSS Modeler

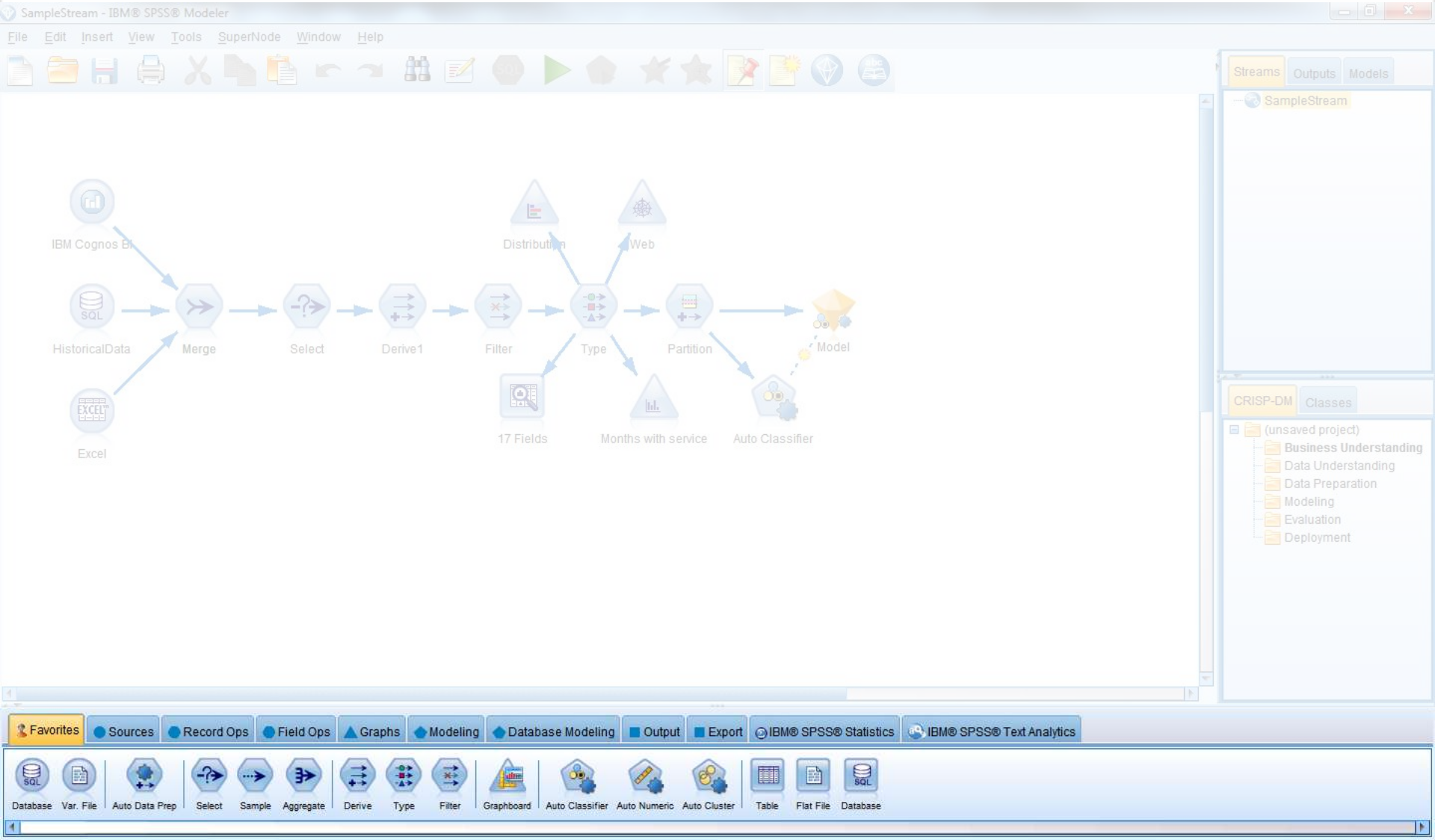
- High-performance data mining and text analytics workbench
- Easy-to-use, interactive interface without the need for programming
- Automated modeling and data preparation capabilities
- Access ALL data – structured and unstructured – from disparate sources
- Natural Language Processing (NLP) to extract concepts and sentiments in text
- Entity Analytics ensures the quality of the data and results in more accurate models
- Leverage existing investment in Cognos, Netezza, InfoSphere and System Z



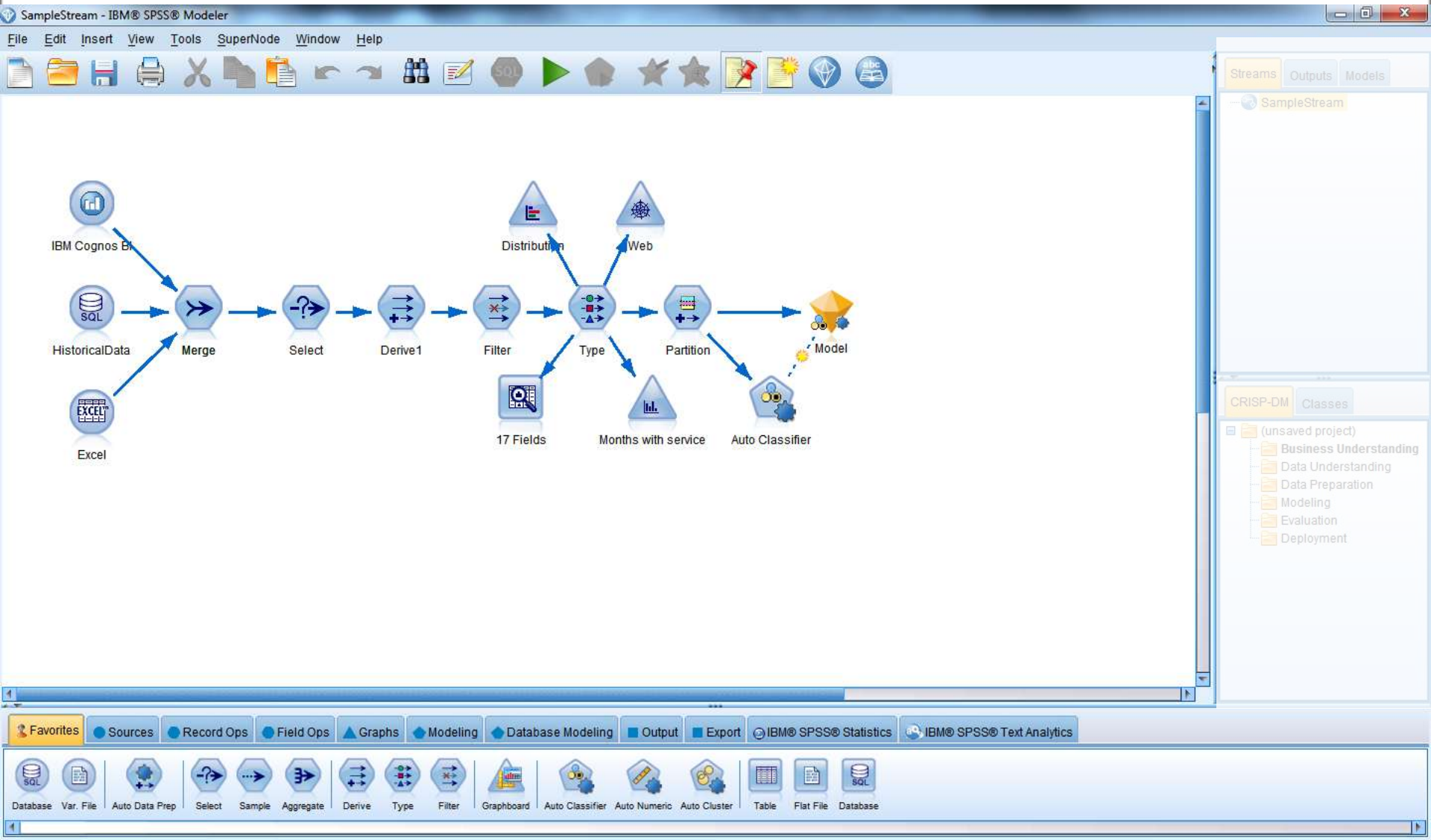
Modeler User Interface



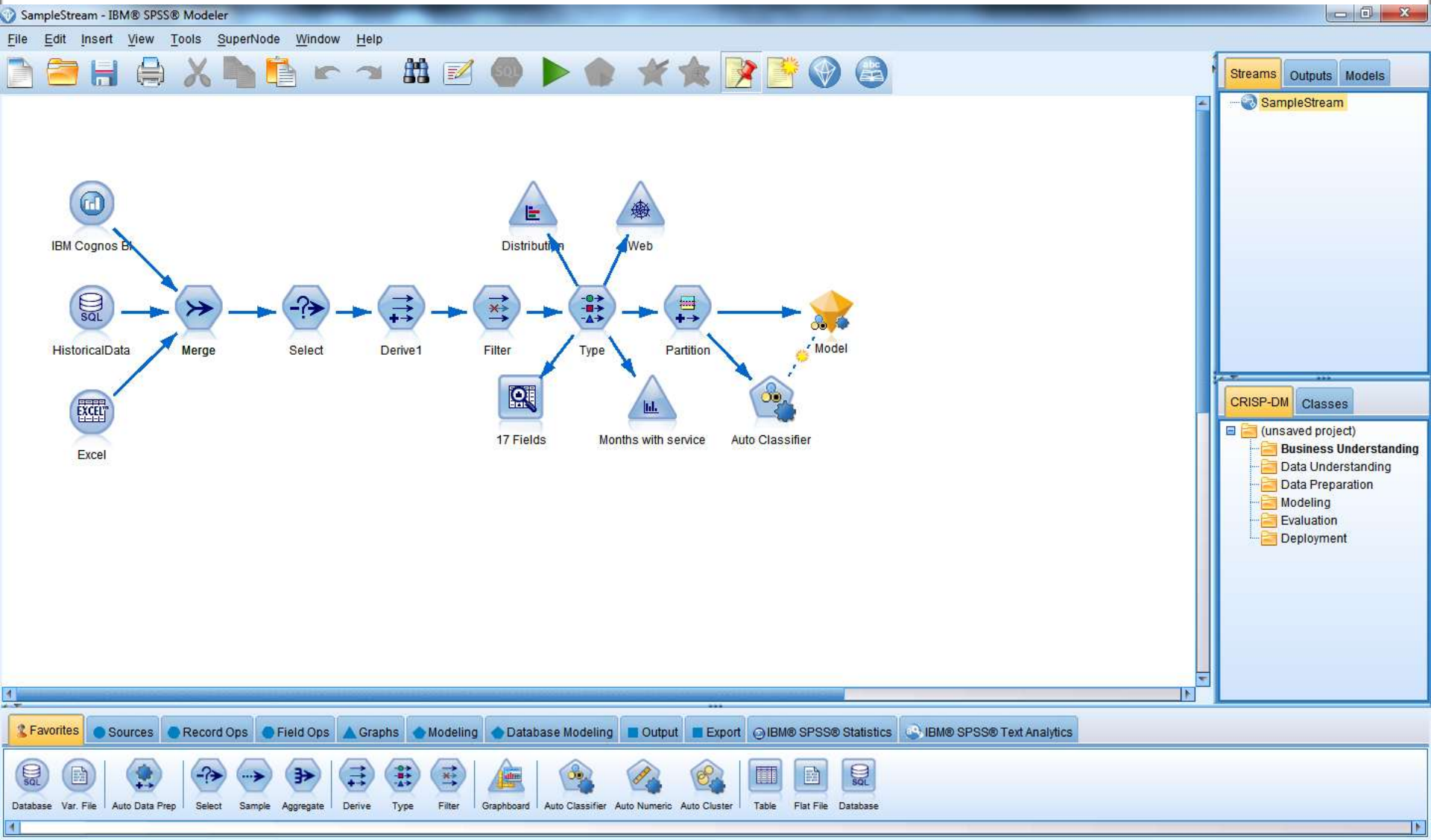
Modeler User Interface – Nodes Palette



Modeler User Interface – Stream Canvas



Modeler User Interface – Managers Pane & Project Pane



Big Data Analytics

- **What capabilities are important for organization's dealing with big data?**
  - Better outcomes
  - Utilizing existing IT investment
  - High performance and Scalable

- **Where would you use it?**
  - Performance on large volumes of data
  - Deployment and execution of analytics within an organization
  - Benefit of in-database mining
  - Support for database vendor algorithms via helper applications
  - Scoring adapters

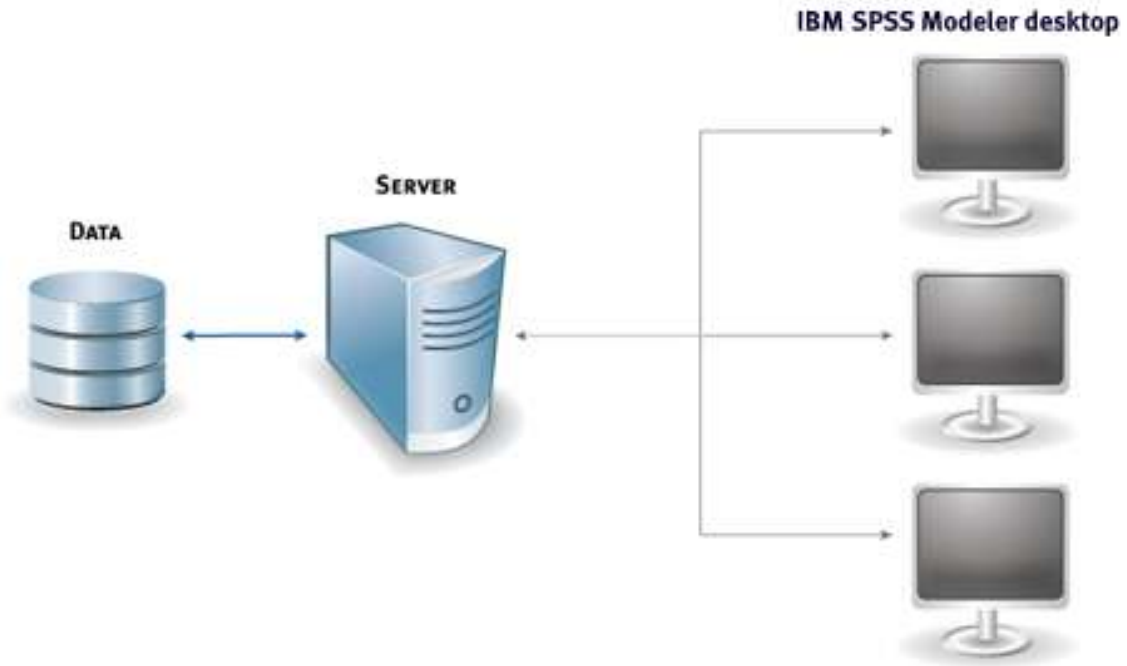
Big Data Analytics

- Volume
  - Move Analytics to the Data
  - Hadoop & MPP Databases
- Velocity
  - Deploy Analytics Inside of Transaction Systems
  - InfoSphere Streams – WebSphere – DB2 z/OS
- Variety
  - Text Analytics – extract concepts and sentiment
  - Video & Image – identify subject – facial recognition

In-Database Support with SPSS Modeler Server

- All the features of IBM SPSS Modeler
- Large volumes of data
- High performance
- Administration and security options

- **In-Database via…**
  - SQL pushback
  - In Database Algorithms
  - Scoring Adapters
  - SQL scoring



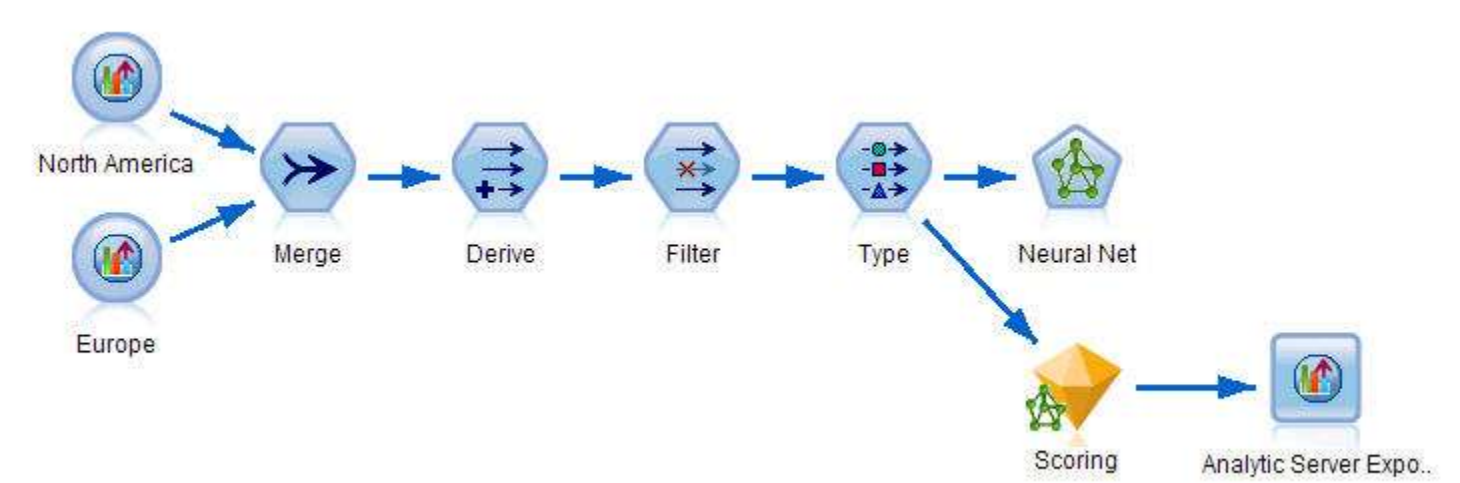
Helper Applications in SPSS Modeler

- Modeler Server supports integration with data mining and modeling tools that are available from database vendors, including
- IBM Netezza
- IBM DB2 InfoSphere Warehouse
- Oracle Data Miner
- Microsoft Analysis Services

SPSS Modeler and Netezza

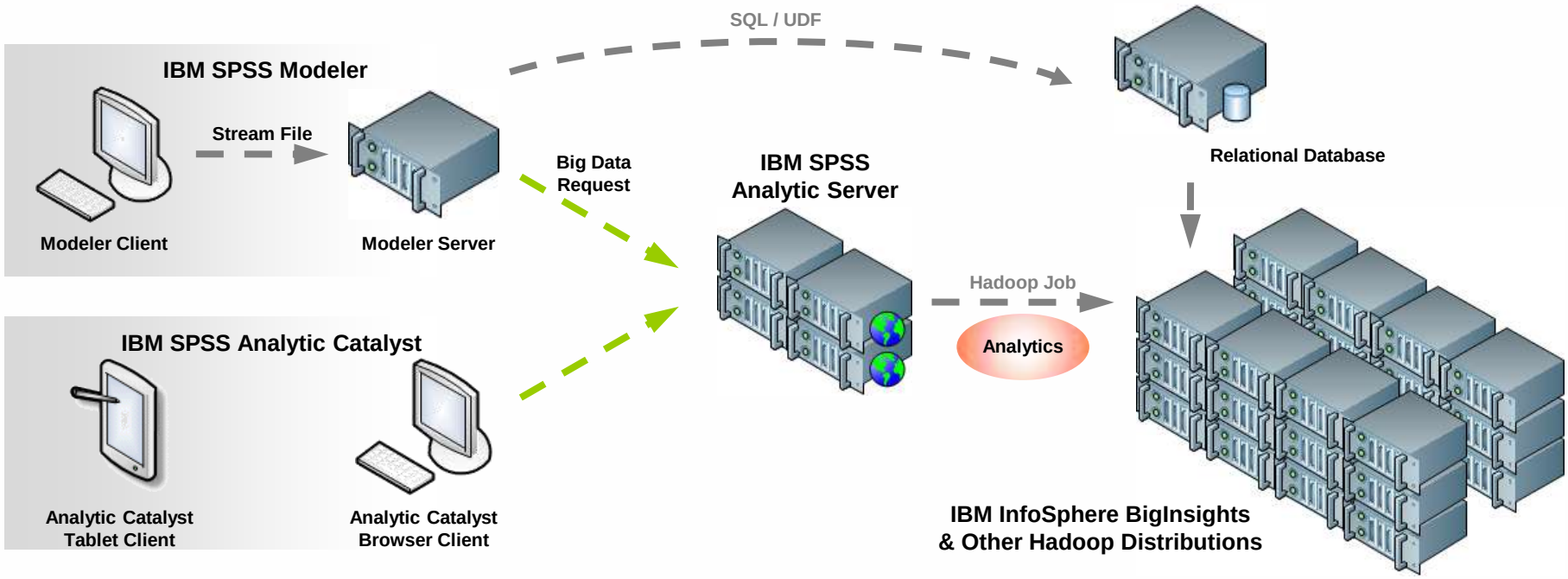
- Modeler supports integration with IBM Netezza, providing the ability to run data mining algorithms to be directly in the IBM Netezza environment from the Modeler user interface.
- The following algorithms from Netezza Analytics are supported within Modeler
  - Bayes Net
  - Decision Trees
  - Divisive Clustering
  - Generalized Linear
  - K-Means
  - KNN
  - Linear Regression
  - Naive Bayes
  - PCA
  - Regression Tree
  - Time Series

Predictive Analytics for Hadoop-based Distributed Systems



- **IBM SPSS Modeler enabled for big data analytics**
  - Multiple data access paths: file, database, HCatalog
  - Distributed processing of transformations, select model building & most model scoring
  - No Map/Reduce coding required
  - Federation with traditional RDBMS
  - R function support for distributed systems
- **Text Analytics for big data**
  - Scoring of text analytics models against distributed data sets
- **Integrated & open architecture**
  - Asset lifecycle management via Collaboration and Deployment Services
  - Support for BigInsights, Cloudera, Hortonworks & Apache Hadoop distributions

Big Data Architecture



- Modeler Server utilizes Analytic Server for Big Data
- Analysts define analysis in a familiar & accessible workbench to conduct analysis, modeling & scoring over high volumes of varied data
  - – Federation of heterogeneous data sources to use legacy & external data in model building & scoring
  - – Transformations, sampling & write-back of output to big data systems

Big Data Analytics Architecture

Analyst

Netezza

Customer History

Customer Demographics

Explore Data & Build Predictive Model

BigInsights

Smart Meter Logs

SPSS Analytic Server

SPSS Modeler

Data at Rest
Analytics

Data In Motion
Scoring

Deploy Predictive Model for Scoring

InfoSphere Streams

Smart Meters

IBM SPSS Modeler Script

- Macro language for building / editing / running a Modeler Stream
- Execution Options
  - Command Line
  - Interactively from IBM SPSS Modeler Interface
  - Scheduled from IBM SPSS Collaboration & Deployment Services
  - Web Service invocation from IBM SPSS Collaboration & Deployment Services

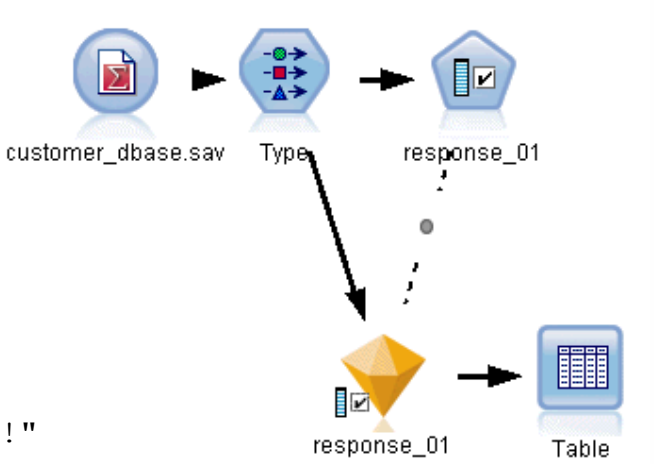
Script Example

```
create stream 'featureselection'
create statisticsimportnode
position :statisticsimportnode at 50 50
set :statisticsimportnode.full_filename = "$CLEO_DEMOS/customer_dbase.sav"

create typenode
position :typenode at 150 50
set :typenode.direction.'response_01' = Target
connect :statisticsimportnode to :typenode

create featureselectionnode
position :featureselectionnode at 250 50
set :featureselectionnode.screen_missing_values=true
set :featureselectionnode.max_missing_values=80
set :featureselectionnode.criteria = Likelihood
set :featureselectionnode.important_label = "Check Me Out!"
set :featureselectionnode.selection_mode = TopN
set :featureselectionnode.top_n = 15
connect :typenode to :featureselectionnode
execute :featureselectionnode

create tablenode
position :tablenode at 250 250
connect response_01:applyfeatureselectionnode to :tablenode
execute :tablenode
```



Questions

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