



SAS® Data Mining Solutions

Fast, scalable predictive analytics for the enterprise





Delivering insights that pay off in smarter business decisions

■ Challenges

- Inefficient marketing campaigns.
- Difficulty measuring customer value and predicting profitability.
- Unable to maximize cross-selling opportunities.
- High customer attrition/churn.
- Stagnant or declining revenue and profitability.
- Need to detect and deter fraud.
- Can't make credit risk decisions fast enough.
- Inability to understand and predict customer needs, motivations and behaviors.
- Rising costs for warranty services; difficulty predicting service and parts needs.

“Our team needs the best tools to effectively mine vast amounts of data, visually explore new features and track models through production for feedback and improvement. We found SAS to be the best solution for our needs.”

Marty Ellingsworth

President of the ISO Innovative Analytics Unit, ISO

Whether it's used to drive new business, reduce costs or gain the competitive edge, data mining is a valuable asset for every organization. By using data mining techniques to analyze the data that is accumulating and filling vast data warehouses, organizations can harness more insight from their large data stores to drive proactive decision making. SAS data mining software can surface patterns and trends in your data that you may never have thought to look for.

Data mining is the process of selecting, exploring and modeling large amounts of data to uncover previously unknown patterns **with speed and scale**.

Predictive analytics is the process of applying quantitative techniques to uncover patterns and relationships in data that can help business people and researchers understand historical trends and predict future outcomes. Predictive analytics and data mining typically involve:

- Data preparation to fix errors, merge tables and reformat data as needed for model creation.
- Exploratory data analysis to discover relationships and anomalies.
- Variable transformation enrichment and selection to help better focus the modeling process.
- Model building using competitive algorithms to search for a combination of data that reliably predicts the outcome.

- Testing and validation of the champion model to ensure that the model generates output as expected and generalizes well when applied to new data.
- Deployment of the model and results into applications and databases to optimize business processes and improve business decisions.
- Monitoring the model performance to ensure the model is predicting well and does not need recalibrating.

SAS offers the most comprehensive data mining solution, taking you from raw data to accurate, business-driven analytical models with a seamless, efficient process. You can create highly accurate predictive and descriptive models to help your organization understand not only what has happened, but what will likely happen next.

SAS wraps a powerful platform of advanced predictive analytics with:

- **Data integration** technologies for cleaning and organizing the input data.
- **Premier enterprise business intelligence** systems that convert the information hidden in your data into an understanding of the relationships and patterns, which leads to proactive decision making.
- **Services and training** that enable you to quickly reap the benefits of your data mining endeavors.

SAS® data mining reaches across all industries

Because data mining technologies and predictive analytics bring value to all industries, these techniques are widely used around the world, and usage continues to grow.

- **Credit card, financial services, insurance and telecommunication companies** use SAS data mining to detect and reduce fraud, measure credit risk, maximize cross-selling, optimize marketing campaigns and identify the most profitable business strategies.
- **Governments and the public sector** use SAS data mining to improve service and performance, detect fraud and waste and detect criminal activities and patterns.
- **Healthcare providers** use SAS data mining to predict the effectiveness of surgical procedures, medical tests and medications, and to improve patient services.
- **Manufacturers** use SAS data mining to identify factors leading to reduced quality and failures in production, as well as to optimize parts, service planning and distribution.

- **Retailers** use SAS data mining to assess the effectiveness of coupons and special events, predict which offers are most appropriate for different consumers, determine which products to stock where, and build brand loyalty.
- **Transportation companies** use SAS data mining to predict how customers will respond to price changes and new services, which customers are at risk of leaving for a competitor and how much revenue will be generated by new locations.

A world of success

SAS customers represent many of the most innovative and successful organizations in the world. Hundreds of companies globally, including American Honda Motor Co., The Dow Chemical Co., Eli Lilly and Company, Hartford Life, Healthways, RCI Global Vacation Network, Telstra AP, Verizon Wireless and The World Wildlife Fund, use SAS data mining tools for CRM initiatives.

Visit www.sas.com/success/index.html to read how leading organizations around the world are using SAS to harness their data and generate new insights for improved decision making.

■ Solution

SAS offers the industry's most comprehensive data mining solution based on an integrated platform for delivering better answers, faster. Our solution enables organizations around the world to:

- Understand and predict customer needs and behavior.
- Measure customer profitability and value.
- Increase response rates for marketing campaigns.
- Improve cross-sell/up-sell programs.
- Reduce customer attrition and churn.
- Reduce fraud.
- Detect criminal activities and patterns.
- Minimize credit risk.
- Set pricing strategies in a highly competitive market.
- Optimize sales revenue.
- Improve quality control processes.
- Develop new products.
- Improve program performance and brand planning.
- Identify optimal site locations.
- Identify adverse drug effects.



Predictive modeling for success—the benefits of SAS® data mining solutions

■ SAS positioned in the Leaders quadrant for customer data mining applications

SAS is positioned in the Leaders quadrant in Gartner Inc.'s Customer Data Mining 2008 Magic Quadrant. (Source: Gartner, Inc., *Magic Quadrant for Customer Data-Mining Applications* by Gareth Herschel, July 1, 2008). According to Gartner, "Leaders are vendors that can meet the majority of requirements for most organizations. Not only are they suitable for most enterprises to consider, but they also have a significant effect on the market's direction and growth."

■ Top-ranked data mining

For three consecutive years *Intelligent Enterprise* readers voted SAS as Best Data Mining Toolset vendor. (Source: *Intelligent Enterprise*, January 1, 2007). In 2008 the magazine instead presented its Editors' Choice Awards and named SAS to its elite "The Dozen" list "of companies that will matter most to intelligent enterprises in 2008." The magazine said analytics set SAS apart, saying, "the dominant player in analytics will continue to stand apart from BI-only vendors." (Source: *Intelligent Enterprise*, January 1, 2008).

Achieve an efficient, integrated data mining process that identifies trends, opportunities and threats

SAS provides GUI-driven, Java-based data mining products that support all of the steps necessary to address business problems in a single, integrated solution, as well as code-based products for legacy programmers who enjoy full control of each syntax statement. The GUI-driven products support the integration of customized SAS code, enabling organizations to leverage legacy work and years of accumulated experience.

Build more models faster with easy-to-use interfaces and a unique workflow environment

SAS data mining interfaces eliminate the need for manual coding and dramatically shorten model development and maintenance time. Yet they are not black box solutions. With SAS you can add your own proprietary business scenarios and embed custom SAS code into your model flows. A text mining interface reduces text mining time for both business analysts and statisticians and makes it easy to drill down into textual documents to gain deeper insight.

Derive new insights about your customers and organization with powerful predictive analytics

SAS provides a superior data mining toolset that includes modern analytical algorithms such as decision trees, neural networks, time series mining,

regression and heuristics for quantitative analysts addressing ad hoc issues as well as enterprise architects who need to deploy model scoring logic into decision-support systems potentially using a grid-supported, client/server architecture.

Spot trends and predict new opportunities by adding text to the mix

Analysis of information contained in customer letters and call center notes can uncover actual motivating factors that result in customer dissatisfaction regarding services or product desires. SAS Text Miner provides a full range of predictive modeling tools that can unearth opportunities for discovering the what and the why, all within the integrated SAS environment.

Surface business information and easily share results through the unique model repository

Numerous integrated assessment features enable you to compare results of different SAS Enterprise Miner™ modeling techniques in both statistical and business terms within a single, easy-to-interpret framework. SAS Enterprise Miner projects support the collaborative sharing of modeling results among quantitative analysts. Models also can be imported into the SAS Model Manager repository for sharing with scoring officers and independent model validation testers.

Get faster results with automated model scoring

Scoring is the process of applying a model to new data and is the resulting action of many data mining endeavors. SAS Enterprise Miner guides you through the entire data mining process and produces complete scoring code for all stages of model development. The scoring code can be deployed across your enterprise with SAS, on the Web or directly in relational databases. The result is faster implementation of your data mining results.

Reduce the time to create, manage and deploy models into production

Model deployment is the final and most important phase in which the ROI from the entire data mining process is realized. Errors and time delays in the deployment of models have a significant impact on the ROI of predictive analytics, which is why a standard process for moving models from development to the production environment is very important. SAS Model Manager guides users through a repeatable process for registering, testing and validat-

ing models. Models can be monitored during their deployment to capture model performance decay as early as possible and to trigger a model replacement process. The proper management of champion and challenger models enables a quick replacement of champion models in production, as well as informed decisions on when to recalibrate models stored in the repository.

Leverage all your computing power for faster, more accurate analyses

SAS delivers enterprise-class grid computing capabilities that enable SAS applications to automatically leverage grid computing to run faster and take optimal advantage of computing resources. Production models exported from SAS Model Manager can be deployed via the SAS Data Integration Server high-performance scoring engine. The scoring process can be scheduled and executed in grid using SAS Grid Manager.

“SAS Enterprise Miner and SAS Text Miner are worth their weight in gold. They’ve paid for themselves many times over by highlighting cost and quality issues, leading to valuable improvements at Louisville hospitals and worldwide.”

Dr. Patricia Cerrito

University of Louisville

The SAS® Difference

- **Data access, management and cleansing are seamlessly integrated with SAS data mining solutions.** This makes it easier to prepare data for analysis.
- **Scalability.** With multithreaded algorithms and support for grid computing, SAS reduces execution time and uses hardware resources most efficiently.
- **The most powerful predictive analytics available.** Smart defaults allow business users to produce models quickly, while advanced statisticians have the option to tweak details and embed their own algorithms into their model flows.
- **Zero-footprint client and collaborative access to data mining projects.** The Java client interface enables fast and maintenance-free distribution of the SAS data mining solution throughout large organizations. Data mining projects can be shared between analysts across different units and regions.
- **Robust variable selection and data modification tools.** Enriched data leads to better modeling and more reliable results.



Implement with ease and predict with confidence

Support and training

SAS customers receive a full suite of technical support services at no extra charge. In addition, our online Customer Support Center provides 24/7 access to a wealth of resources. Knowledge sharing is available through seminars, Webcasts and an expansive selection of training courses.

Consulting

Also to support your analytical needs, SAS offers a variety of consulting services, including discovery workshops, installation and configuration services, data and text mining modeling services and ongoing customer care. Expert consultants are available to share their vast knowledge and experience. For more information, visit www.sas.com/consult/usconsult/analyticalconsulting.

Getting started guide

Getting Started with SAS® Enterprise Miner™ 5.3 introduces you to SAS Enterprise Miner and shows how to perform basic data mining tasks. You will learn how to use the GUI tools to create and manage process flow diagrams and projects and to export mining results for reporting and integration with other SAS software. A PDF version is free for customers, or the book can be purchased. For more information, visit <http://support.sas.com/documentation/onlinedoc/miner>.

Integrated SAS® Enterprise Intelligence Platform

Like all SAS software, SAS' powerful data mining solutions are based on the SAS Enterprise Intelligence Platform, which provides an integrated framework for creating and sharing enterprise intelligence—all managed from a single point of control. The platform provides integrated components for data integration, intelligent storage, analytics and business intelligence. A shared metadata foundation across all SAS products and solutions ensures consistency of data, so everyone in your organization receives the same version of the truth.

SAS® Enterprise Miner™

SAS Enterprise Miner offers a powerful, complete data mining solution with unparalleled model development and deployment options, and extensive integration opportunities into your data warehouse and business decision-making processes. It combines a rich suite of integrated data mining tools with ease of use, empowering users to explore and exploit corporate data for strategic business advantage. It streamlines the data mining process, enabling business analysts and data miners to create highly accurate predictive and descriptive models based on analysis of vast amounts of data from across the enterprise.

SAS Enterprise Miner includes an extensive suite of data mining capabilities, including decision trees, neural networks, regression and clustering capabilities, heuristics and the latest

statistical algorithms for finding patterns and predicting outcomes. With an automated and intelligent method for tuning predictive models, SAS Enterprise Miner selects the best model among many different types and complexities. It focuses on building the least complex model with the most predictive power. An added advantage is the software's ability to incorporate proprietary business scoring engines or in-house developed score code under one umbrella platform, enabling organizations to better track and manage all analytical models.

For those wishing to analyze unstructured data or automate their credit scoring processes, SAS offers two complimentary products that can be added on as nodes inside the SAS Enterprise Miner system: SAS Text Miner and Credit Scoring for SAS Enterprise Miner.

SAS® Text Miner

Integrating text-based information with structured data enriches your predictive modeling capabilities and provides new stores of insightful information for driving your business and research initiatives forward. Text mining supports a wide variety of applications, such as categorizing huge collections of call center data, Web text and blog analysis, finding patterns in customer feedback or employee surveys, detecting emerging product issues, analyzing competitive intelligence reports or patent databases, and classifying reports and company information by topic or business issue.

SAS Text Miner enables users to easily discover and extract knowledge from text documents. This makes possible the exploitation of time-critical information, such as warranty defect reports, resulting in faster corrective actions and potentially large savings. It also eliminates the need for manual processing of reports and customer feedback, resulting in additional savings as well as improving the quality of existing data mining models.

Credit Scoring for SAS® Enterprise Miner™

Banks, financial institutions and insurance companies develop and track credit scores based on rigorous data mining investigations. Credit Scoring for SAS Enterprise Miner enables banks and financial services organizations to internally develop, validate, implement and report on points-based credit scorecards faster, cheaper and more flexibly than credit outsourcing alternatives. It provides in-house model development, integrated model monitoring and flexible model deployment.

Desktop for Windows versions now available

SAS empowers small independent consultants as well as big business customers with a data mining workbench that runs entirely within the confines of a Windows PC. SAS Enterprise Miner for Desktop has the same interactive interface as the client/server version and is available as a standalone product for those running in Windows workstation environments.

SAS Enterprise Miner for Desktop users can also enhance their capabilities with the optional add-on of SAS Text Miner for Desktop and/or the desktop Credit Scoring for SAS Enterprise Miner node.

SAS® Scoring Accelerator for Teradata

For customers working with a Teradata database, we offer SAS Scoring Accelerator for Teradata. This product works in conjunction with SAS Enterprise Miner, translating and registering SAS Enterprise Miner models, which can now be deployed as Teradata-specific functions for execution of in-database scoring. Benefits include higher performance run times, faster analytical development, less data movement and reduced network overhead.

SAS® Model Manager

SAS Model Manager is designed for the selection, maintenance and continuous enhancement of predictive and descriptive models for operational decision making. It helps to organize and track the tasks of model creation and development, model verification, comparative model performance benchmarking, and model deployment in a production environment. It supports the process of tracking models through each stage of the analytical model life cycle by creating and managing rich metadata on each model. In addition to project management and version control, it provides model comparison and profile reports

and model-monitoring performance views. A thin Java client enables easy sharing of information and tasks across departments and ensures fast and fully documented movements of analytical models through the life cycle.

Other SAS® analytic products

SAS provides a robust suite of advanced analytic products, many of which have been used for decades to perform complex numerical calculations. Large government laboratories, leading research institutions and competitive business organizations in a wide variety of industries across the globe have chosen SAS for the breadth and depth of our statistical offerings. With the addition of SAS Model Manager, predictive models created with SAS code-based software can be centrally managed to efficiently deploy insights and leverage accumulated years of experience.

“SAS gives us a clearer view of the millions of customers who come to our Web sites every day... Now, faster than ever we can pass great deals to our customers, and the net ROI to us is huge.”

Dan Lynn

Director of Strategy and Customer Insights, Expedia

About SAS

SAS is the leader in business analytics software and services, and the largest independent vendor in the business intelligence market. With innovative business applications supported by an enterprise intelligence platform, SAS helps 44,000 organizations improve performance and deliver value by making better decisions faster. Since 1976 SAS has been giving customers around the world THE POWER TO KNOW®. www.sas.com



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