Making critical connections: predictive analytics in government

Improve strategic and tactical decision-making

Highlights:

- Support data-driven decisions using IBM® SPSS® Modeler
- Reduce fraud, waste and abuse
- Allocate resources more effectively
- Improve planning and execution of services

Introduction

Today, it's particularly important that government agencies be able to detect patterns in large, complex datasets and make critical connections. Connections that link actions to actors, so that potential threats to the public good can be minimized or even eliminated. Making these connections requires accessing information of all types, often from disparate sources, to provide a foundation for strategic and tactical decision-making; and then providing insight to those who can make decisions and take action.

IBM SPSS predictive analytics can help your agency make critical connections. Predictive analytics technologies combine advanced analytical techniques with decision-support capabilities. Solutions incorporating predictive analytics enable various types of government organizations to explore data and gain insights that lead to informed decisions. For example:

- Law enforcement agencies look for patterns in criminal behavior and suspicious activity. This enables them to deploy personnel more effectively and to identify possible motives and suspects.
- Auditors of tax returns and Medicare/Medicaid claims compare information across cases to understand normal activity patterns. In this way, they can identify cases that deviate from the norm and, therefore, warrant further investigation.
- Disease management analysts study events that led to favorable outcomes across time and patient populations, in order to develop optimal treatment protocols.
- Public health authorities monitor syndromic information from various sources, looking for elevated levels of certain symptoms that signal a widespread disease outbreak. This accelerates the process of uncovering the cause of the outbreak.
- Network analysts protect the security of computer and communications systems by detecting "cyber threats." These include unauthorized access and the release of computer worms or viruses.

Summary:

Predictive analytics helps your agency make critical connections between information from multiple sources and provides a foundation for strategic and tactical decision-making. This white paper explains how predictive insights significantly improve the planning and performance of government programs, services and resources.

With IBM SPSS predictive analytics, data becomes insight and insight guides action, so that personnel in a variety of functions can anticipate developments and take the right steps at the right time. This has a positive effect not only on your agency's return on investment – the usual definition of ROI – but also on your return on information.

SPSS was one of the pioneers in the field of data analysis; it was first on the scene and continues to be one of the most popular and widely used software applications. As a new member of the IBM organization, SPSS brings its leading-edge analytic tools to a broader number of customers worldwide.

IBM SPSS offerings include industry-leading products in predictive analytics including finding and analyzing critical connections between your structured and unstructured data. IBM SPSS predictive analytics tools are based on industry standards and can easily integrate with your existing infrastructure to improve accuracy, decrease manpower and minimize loss. The combined effort brings you the utmost in flexibility in the kinds of data you mine and how you deploy results.

Improve efficiency, manage risk, and reduce costs

Here are some of the ways that government agencies successfully employ predictive analytics:

- **Reduce costs while improving resource allocation.** Facing an increasing backlog of collections, an agency develops a collection prioritization plan that leverages its limited resources and aligns operations with new strategic goals. By focusing its collection efforts, the agency achieves a higher success rate, resulting in additional annual revenue.
- **Reduce fraud, waste and abuse.** A Medicaid fraud detection office predicts which claims are likely to be fraudulent, so that auditors can concentrate on the right claims and recoup lost revenue more cost effectively.
- **More efficiently protect public safety and security.** Analysts at a U.S. metropolitan police department review and analyze crime data, identify trends and patterns, and develop predictive models that are then made available to operational personnel through an intranet. Command staff can evaluate real-time conditions and send police units where they are most likely to be needed.
- **Better manage risk.** Government agencies are alerted to anomalies in the reported number of cases of a particular illness. As a result, medical personnel in the affected area can be notified in a timely fashion.

- **Streamline processes.** Millions of pieces of data from microarray experiments, such as genetic factors underlying malignant brain tumors in children, are analyzed to discover the most effective therapies, thereby extending or saving lives.
- **Increase job effectiveness.** Recruiters are able to improve their efficiency at filling jobs by focusing on the few candidates among hundreds of leads that are most likely to respond favorably.

Support informed decision-making

IBM SPSS predictive analytics solutions apply sophisticated statistical, data mining and machine-learning techniques to historical information in order to uncover hidden patterns and trends. In contrast to rules-based analysis and detection methods, predictive analytics can identify relatively unusual behaviors, even those with subtle differences that other methods miss.

Ideally, predictive analytics solutions enable human knowledge, first-hand experience and intuition to guide the application of analytical techniques. The most effective predictive analytics solutions can analyze not only tabular data but also textual data.

Finally, predictive analytics techniques explore and learn from all dimensions of data. This means that as hackers, criminals or terrorists try new tactics, resulting in new "signals," the software is able to identify them quickly and reliably.

Connect data to insight to action

To increase the understanding of how predictive analytics works, here is a description of the three-step process by which predictive analytics connects data to action.

Connect all of the data

The first step is to connect and consider all relevant, available data. For example, much information is considered "unstructured" because it is not currently stored in structured databases. Unstructured data is typically textual data, such as notes fields, emails, reports and open-ended survey responses. One of the strengths of predictive analytics is its ability to "structure" text so that predictive techniques can be used to detect previously unsuspected patterns.

Connect data to insight

Next, identify and describe normal behavior or instances in the data. By knowing what is normal or typical, unusual activity and deviations from the norm can be more readily identified and highlighted. Predictive analytics applies powerful techniques to data using three general approaches:

- **Prediction** explores all possible relationships and patterns in the historical data, determining which combination of behaviors, attitudes, and characteristics are most likely to result in a specific outcome
- **Association** identifies events that occur together and, given a series of events, determines what action is likely to occur next
- **Clustering** finds naturally occurring groups in data that exhibit similar characteristics

Each of these techniques creates a model that explains the results across the data population.

Connect insight to action

Insight gained from predictive analytics is valuable only if it is accessible and understandable by the people who can use it to plan and carry out appropriate actions. IBM SPSS solutions offer graphing capabilities that enable research teams to present findings visually, so that decision-makers can quickly grasp their significance. A variety of deployment options make it possible to deliver results quickly and cost effectively, often in real time.

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Why IBM SPSS technology?

Our predictive analytics solutions integrate with your organization's existing technology infrastructure through an open architecture that can be "plugged into" existing systems and, therefore, achieve results faster. Our solutions are designed to work with virtually any type of database or flat file, on any platform. They can even be embedded in operational systems. Our decades of experience in analytic technologies results in products that streamline sophisticated, complex processes.

Using IBM SPSS predictive analytics solutions is a superior way to gain information from data. With these solutions, government organizations can:

- Identify patterns even in massive amounts of data
- Leverage multiple data sources, including unstructured textual data
- Present information graphically, making it easier to understand and act upon
- Share information across geographic and jurisdictional boundaries
- Ensure the right people receive the information they need, when they need it

IBM understands how critically important predictive analytics can be to government organizations. We are dedicated to helping you obtain the greatest value from these advanced technologies – and the greatest return on your information.

About IBM Business Analytics

IBM Business Analytics software delivers complete, consistent and accurate information that decision-makers trust to improve business performance. A comprehensive portfolio of business intelligence, predictive analytics, financial performance and strategy management, and analytic applications provides clear, immediate and actionable insights into current performance and the ability to predict future outcomes. Combined with rich industry solutions, proven practices and professional services, organizations of every size can drive the highest productivity, confidently automate decisions and deliver better results.

As part of this portfolio, IBM SPSS Predictive Analytics software helps organizations predict future events and proactively act upon that insight to drive better business outcomes. Commercial, government and academic customers worldwide rely on IBM SPSS technology as a competitive advantage in attracting, retaining and growing customers, while reducing fraud and mitigating risk. By incorporating IBM SPSS software into their daily operations, organizations become predictive enterprises – able to direct and automate decisions to meet business goals and achieve measurable competitive advantage. For further information or to reach a representative visit www.ibm.com/spss.

Business Analytics software

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