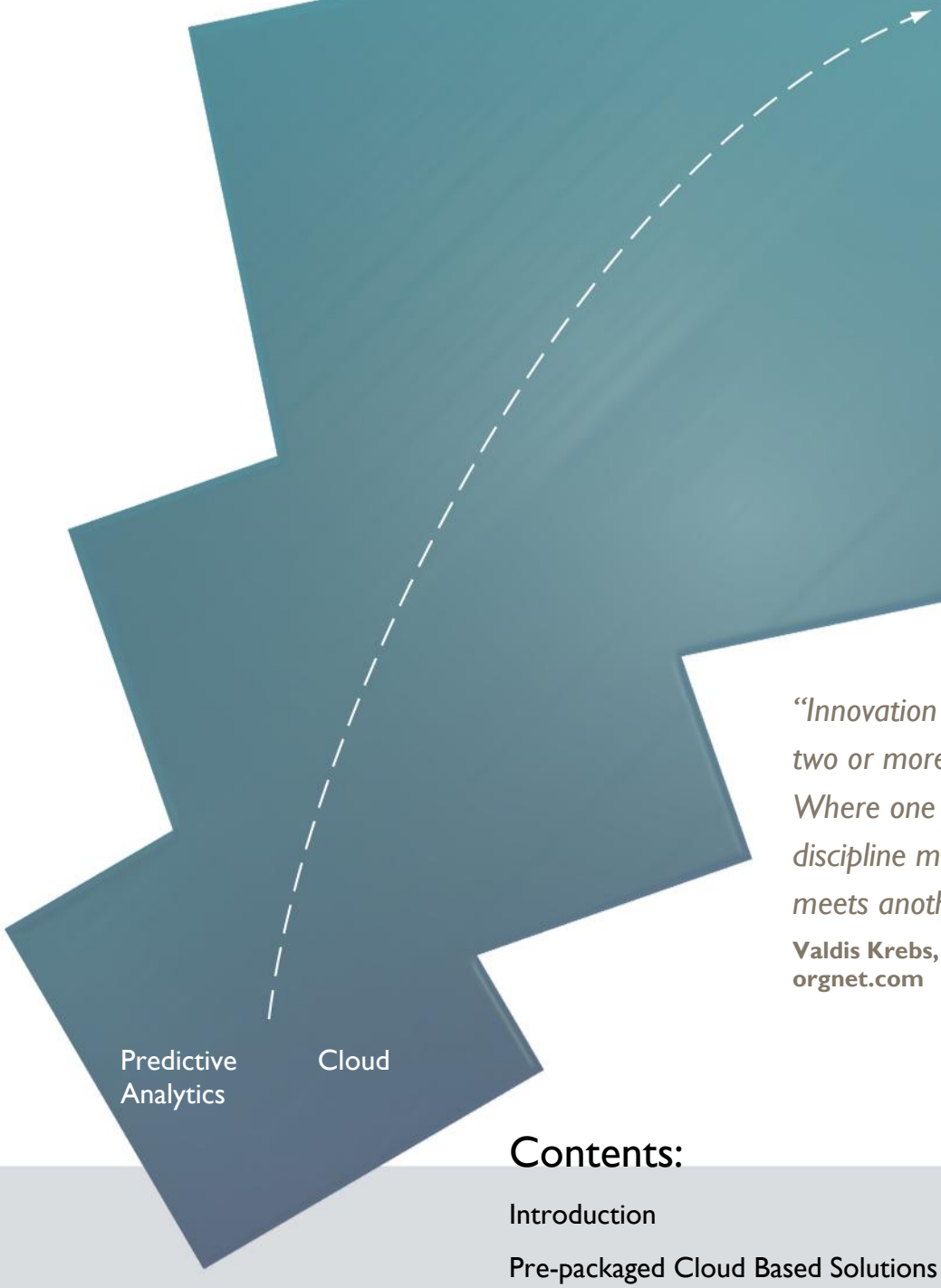
DECISION
MANAGEMENT
SOLUTIONS

Predictive Analytics in the Cloud

James Taylor
CEO, Decision Management Solutions

Two important technology trends intersect to create opportunity for organizations

Predictive Analytics in the Cloud



"Innovation happens at the intersection of two or more different, yet similar, groups. Where one technology meets another, one discipline meets another, one department meets another."

Valdis Krebs, Founder & Chief Scientist, orgnet.com

Contents:

Introduction	1
Pre-packaged Cloud Based Solutions	5
Predictive Analytics for SaaS	7
Predictive Analytics for On Premise	9
Modeling with the Data Cloud	11
Elastic Compute Power for Modeling	13

Predictive Analytics in the Cloud

An Introduction

"The challenge was to build a system that can sustain our consistent growth, scale when needed, predict performance trends, has high availability built in, and runs on the cloud."

Lenin Gali, Director of Business Intelligence at ShareThis

"Everything we need to make a loan decision is right at our fingertips. It has definitely simplified operations and made life easier."

Beverly Pile, Vice President of Consumer Underwriting, Prosperity Bank

Predictive analytics and cloud are hot topics in business today. Predictive analytics are increasingly the focus of many companies' efforts to improve business performance with analytics while cloud is fast becoming the default option for purchasing and deploying software. Public, private and hybrid clouds are all evolving rapidly and are here to stay. But what's happening at the intersection of these two technologies? How can predictive analytics in the cloud add value and what are the critical risks and issues involved?

This paper explores the five key opportunities for organizations to use predictive analytics in the cloud:

- Using the cloud to deliver predictive analytics-enabled "Decisions as a Service" solutions
- Embedding predictive analytics in Software as a Service (SaaS) and other cloud-deployed applications
- Using the cloud to deliver predictive analytics to non-cloud applications across the extended enterprise
- Building predictive analytics against data in the cloud
- Using cloud computing to deliver elastic compute power for building predictive analytic models

Before discussing the various options for predictive analytics in the cloud it is worth clarifying exactly what we mean by the various terms.

Introduction

Predictive Analytics

Predictive analytics is short hand for using historical data to build predictive analytic models. These models are mathematical formulae that use analysis of the past to calculate a value that represents a prediction about the future. It is sometimes said that "predictive analytics turn uncertainty about the future into a usable probability." Instead of simply being uncertain which offer is most attractive to our customers we can use a predictive analytic model to see which particular offer is most likely to be attractive to each specific customer; instead of being uncertain which claims are fraudulent we can use a predictive analytic model to predict how likely it is that a specific claim is fraudulent; instead of being uncertain how to treat our customers we can segment them into groups that are likely to respond similarly. Predictive analytics are often considered part of business intelligence or business analytics while data mining is often used as a synonym.

As we enter the era of "big data," increasing amounts of data, both structured and unstructured, is available for analysis. Information that used to be "hidden" in emails or text fields is increasingly available for analysis. The growth of social media has added a whole new class of information that can be used to build a richer picture of customers and prospects. Gaining actionable insights from this data is rapidly becoming a business imperative. The use of predictive analytics to make sense of and exploit new and existing data sources is tracking to become pervasive, expanding from industries where it is already well established into every aspect of business and operations.

Predictive analytic models can be grouped into several categories:

- Statistical—How likely is this fact to be statistically significant?
- Association—If someone needs this item what else might they need?
- Clustering—Group customers by the likelihood they will behave similarly.
- Binary Predictions—will this shipment be late?
- Number in range predictions—how likely is this claim to be fraud?
- Selection from choices predictions—which route should be used for this delivery?

A wide range of possible techniques exist to develop these predictive analytic models. These will not be discussed here but a list of suitable references is provided in the bibliography.

Predictive analytic models can be built with an organization's own data, with data from external third-party sources and from data pooled from multiple organizations. In general more data sources, and more data, improve the effectiveness of predictive analytic models provided this data reflects the organization's population of interest. Organizations that build predictive analytic models typically invest in an analytic infrastructure that allows them to clean, integrate and analyze data.

Predictive analytics add value to an organization by improving the quality of decision-making. Knowing the prediction is not enough—the prediction must be acted on to add value. How a predictive analytic model is deployed, how it is used to drive automated decisions or to support manual decisions, is critical. Building predictive analytic models and deploying them are separate steps in the process but both must be mastered to get value from predictive analytics. Approaches for deploying predictive analytic models include writing or generating code that performs the same calculation as the model; deploying the model to a business rules management system or BRMS; and deploying the model "in-database" so that it is executed by a database or data warehouse server as required.

Introduction

Cloud

The key element in cloud computing is that computing resources are delivered as a service or a utility rather than as a set of products that must be installed and configured. A network is used to access the service, typically the internet. For example, instead of installing software to manage emails on a server at my location I use a cloud based email service that can be accessed from anywhere using a browser. An analogy to the electrical grid is often used—companies don't buy and install their own power generation capability, they buy power as and when they need it. Cloud computing, especially public cloud computing, makes computing capabilities available on a similar basis.

While there are those who consider cloud computing to be a new phenomenon, the basic principles of a cloud based solution go back to the hosted application service providers of the 1990s and even to the shared environments provided by, for example, credit card processors since the 1980s. The recent explosion in interest has been driven by the replacement of custom interfaces and protocols with those based on Internet standards, by increasingly standardized hardware and software platforms suitable for developing cloud solutions, by the growth in virtualization software and by the widespread adoption of Service Oriented Architecture.

Three kinds of cloud computing are often discussed:

- Public cloud computing involves providing capabilities as a service over the Internet using shared infrastructure for all users—all users have access to the same compute capacity. Sometimes the applications available on public clouds are available to everyone, sometimes only to those who have signed up for a particular service.
- Private cloud computing involves using a private network so that only a particular company or organization can access the resources. This organization owns all the compute capacity being used.
- Hybrid clouds use a mix of the two approaches, often running the same software in both public and private settings and using the two sets of infrastructure for slightly different purposes. Public cloud infrastructure may be used to get started quickly before transitioning to private cloud functionality or some functions may be performed only on a private cloud—to keep data off the public networks for instance—while others are performed on both the private and public clouds.

Key elements of cloud solutions include:

- Multi-tenancy, where multiple clients or projects are sharing the same hardware and software infrastructure so that fluctuations in demand between them can be managed.
- Transaction or usage pricing so that those using the capacity are paying for what they actually use not simply for the right to use it.
- Location transparency and network access so that the solutions offer API-based or browser-based access available from any device that can access the network (public or private).
- Service level agreements that define reliability and performance.
- Reliability and availability through shared and sharable resources, failover from one piece of capacity to the next and high levels of overall redundancy.

Predictive Analytics in the Cloud

The characteristics of both cloud and predictive analytics solutions make the combination interesting. The combination of the power of predictive analytics to turn data into actionable insight and of cloud to deliver this insight broadly and cost effectively is potentially transformative. Five distinct opportunities for using predictive analytics and cloud together can be identified:

- Pre-packaged cloud based solutions.
  Solution offerings, delivered as cloud based or SaaS solutions, that provide decision-making based on predictive analytics as a core feature of the solution. For example cloud based applications offering next

best action, offer selection, fraud detection or instant credit decisions.

- Predictive analytics for SaaS.
  The use of predictive analytics solutions that are cloud based to inject predictive analytics into other software products that are cloud based or delivered as SaaS. For example embedding customer churn predictions in SaaS CRM solutions or delivering risk predictions into cloud based dashboards.
- Predictive analytics for on-premise.
  The use of predictive analytics solutions that are cloud based to inject predictive analytics into disparate internal systems and multi-channel environments. E.g. using cloud based deployment to link an internally developed cross-sell offer service (that uses propensity to buy models) to multiple customer-facing systems.
- Modeling with the data cloud.
  The use of cloud based predictive analytic solutions to respond to the increasing amount of relevant data available in the cloud rather than on-premise. For instance building predictive analytic models in the cloud based on customer purchase and behavior data stored in a SaaS CRM system as well as third party data available from a cloud based web service.
- Elastic compute power for modeling.
  The use of cloud technology to provide predictive analytics solutions that can scale elastically to meet demand. E.g. assigning extra resources dynamically when optimization or other demanding algorithms are being used to build sophisticated predictive analytic models against large datasets.

The characteristics of each of these opportunities, their value to organizations that adopt them and the way in which cloud and predictive analytic approaches intersect in each case are the topic of the remainder of this paper.

Pre-packaged cloud based solutions

Decisions as a Service

"Clario's cloud technology has given us a marketing tool that optimizes our contact decisions and improves our planning process. Additionally, their talented staff and deep industry expertise has helped us improve our sales forecasting."

VP of Planning, Multi Channel Retailer

"With SAS, we've been able to identify the category of merchandise that had a high affinity based on past transactions and present an offer that's relevant to that category of merchandise."

Charlie White, Vice President, Customer Relationship Marketing, Chico's

Three main characteristics define pre-packaged cloud based solutions. First, and most important, these are solutions and not infrastructure. They make or enable specific decisions that can be described in business terms. The solution is not a predictive analytic solution so much as a decision-making solution. These solutions use predictive analytic models to make these decisions more accurate and effective. The predictive analytic models are embedded within a solution framework so that what the customer gets are better decisions not simply predictions.

For example a multi-channel cross-sell solution decides which product to offer as a cross sell to customers in different channels. This is based on predictive analytic models that predict how likely it is that the customer in question will buy each product and on rules and policies regarding how and when the products are sold.

The predictive analytic models involved are provided to the end customer—they are not required to build their own models. These models may be built automatically by software embedded in the solution or be built by the solution provider directly. Typically these models are built using the end customer's own data. Some of these models may be built using data pooled from many organizations and multiple users of the solution may therefore use the same predictive analytic models.

For instance applications for credit card fraud detection may use scores developed from credit card transactions

across all card issuers to predict how likely a particular transaction is to be fraudulent.

Value

Because offerings in this category are focused on solving a specific business problem they are straightforward to budget for and to justify. Business people can identify that the solution will help address a known business problem and can use this to justify purchase. In addition, because the offerings are packaged solutions, they offer a rapid time to value with little need for configuration, integration or modeling before value is realized. The value of predictive analytic models is also directly realized by providing a solution that acts on the predictions being made.

Because these are packaged solutions there is little or no need for the business buyers or users to understand either predictive analytics or the cloud. Typically, everything is packaged up into a solution with simple interfaces for both installation and usage. Users can get value from the solution without having specific skills in predictive analytics or even in the solution area itself.

These solutions are often purchased because they address a business need and the fact that they are both cloud based and embed predictive analytics matters only to the extent that these drive the desired behavior and cost profile for the end user. This simplicity and ease of use has a cost, of course, in that these solutions are typically hard to expand beyond their specific purpose.

The intersection

Because decisions have a simple interface—some information is provided and a decision is returned—they are easy to embed in services. It is straightforward to hide the complexity of analytic decision-making behind a simple API. This characteristic of decision-making solutions makes them a good candidate for cloud based delivery.

A mobile phone operator in Europe with over 2M subscribers, the company offers both prepaid and postpaid packages. It prides itself on delivering services based on honesty, transparency, simplicity and optimization of internal resources. Traditionally focused on connecting with mobile subscribers via SMS text, it also interacted with customers in the call center, on their website and in their 800 retail stores. Their historical campaign response rate averaged around 1.5% and speed to market was a challenge with campaigns taking too long to deploy.

Using Toovio's cloud-based Interaction Manager the company ran a set of pilot campaigns. Using adaptive predictive models, marketing rules engine, batch decisioning, and outbound campaign tools it took only three days to set up, including generating files for the company's SMS campaign system. Six campaigns targeted prepaid subscribers with "top - up" offers and one targeted postpaid subscribers with higher tariff plans. Average response rates increased to 9.65%—a 643% increase. Two campaigns broke their records reaching almost 16% and 21%. In addition they were able to create, test, and launch campaigns within hours. The company got immediate value without customization, lengthy training, or a steep learning curve.

In addition, the use of the cloud allows data for the analytics to be pulled together by the solution provider so that it can be analyzed effectively. The cloud allows the solution provider to "push" new models to all users rapidly and gives them access to pooled data from many customers if this is part of the solution's value.

Solutions that embed predictive analytics in cloud-based decision-making services are powerful but how can an organization deploy its own models to cloud-based applications it already uses?

Predictive Analytics for SaaS

Cloud based analytics for SaaS operational systems

"Predixion Insight has allowed us to develop and refine customer segments in a very short space of time – previous attempts at this exercise have been very time consuming and difficult to communicate in terms of converting the outputs in meaningful well-articulated insights about our customers."

Edmund Tam, Customer Insight Manager, Kiwibank

"Clario offers us the opportunity to quickly integrate best practices for marketing analytics and strategic planning through their 'Core' cloud applications to support our internal marketing resources without having to commit to large investments in infrastructure projects or tying up our internal IT department."

Dave Mathews, President, CEO Healthy Directions

Companies are increasingly investing in SaaS offerings for their operational systems. SaaS solutions for Customer Relationship Management, Human Resources, Marketing and more are well established. Business Intelligence, social and collaboration platforms as well as hosted versions of applications from the major enterprise platform vendors are also available. Like many enterprise applications, many SaaS applications don't apply predictive analytics. A cloud based predictive analytics solution may be the most effective way to embed more advanced analytics into these operational systems.

The defining characteristic of this category is that it uses the cloud to deliver predictions to SaaS or cloud based applications. The SaaS applications already support or automate some decision-making and the predictive analytics are being delivered to improve the accuracy of these decisions. Predictive scores or characteristics are generated using predictive analytic models and embedded in the SaaS application using the cloud. For example a credit risk score could be delivered to a SaaS CRM solution and then used by a customer routing script to route customers with low credit scores to an agent who specializes in helping those with poor credit.

The predictive analytic models in question could be developed by the customer, the solution provider or a third party. They could also be based on pooled data as discussed above. The models could be built

automatically using software or be built using an existing analytic infrastructure. Regardless, the focus is on making those predictions available to SaaS or cloud based environments.

Similarly the solutions could be specific to a particular kind of predictive analytic model or a particular domain, or they could offer a more general purpose capability. A general purpose capability for instance might allow any model to be deployed into a reporting environment using a standard such as the Predictive Model Markup Language (PMML) while a more focused solution might use the Force.com environment to integrate predictive analytic models with Salesforce.com.

Value

The value of this category derives from the lack of analytic sophistication in most SaaS and cloud based applications, especially when it comes to predictive analytics. While many SaaS offerings are described as being "analytic" this usually mean only that they provide integrated reporting and dashboards. Some are not strong even at these most basic analytic tasks. The absence of support for data mining and predictive analytics in these solutions creates a need for offerings that can push predictive analytics into these applications to improve decision-making.

The predictions can improve decision-making in one of two ways. They could be pushed into an automated decision where they are combined with business rules or scripting in the target application. This allows the SaaS application to make more sophisticated decisions. They could also be added to a dashboard or reporting environment designed to support a person making a specific decision, helping them make a better one.

The intersection

In many situations, predictive analytics are a much more powerful way to use data than reporting or dashboards.

Chico's, based in Fort Myers, FL, operates more than 1,000 boutiques throughout the US, US Virgin Islands and Puerto Rico under the Chico's, White House | Black Market and Soma brands. The company also markets to consumers through catalog and online channels. Chico's segments its catalog mailings and differentiates promotion efforts for maximum impact using SAS OnDemand: Marketing Automation. This cloud-based predictive analytics solution allows Chico's to send customers with a propensity to buy items as soon as they are released a full-size, full-price catalog and mailings highlighting new merchandise. Discount shoppers get slimmer liquidation catalogs and sale fliers. Online customers receive e-mails geared to their buying habits.

Being able to use historical data to make predictions about the future turns a largely passive data asset into one that can be used to actively improve business results. This is especially true because SaaS applications are often concerned with day to day operations. The power of predictive analytics to improve the way operational decisions are made is well established so embedding predictive analytics into these operational SaaS applications is very valuable.

SaaS applications need cloud based delivery of predictive analytics if they are to use these kinds of analytic models. SaaS applications can't easily access predictive analytic models deployed on premise (the traditional way organizations deploy their models). It is also not necessarily possible or desirable to deploy predictive analytic models as scores in the SaaS application database while newer in-database deployment technologies may not work with a hosted database. As a result scores must be made available as a cloud based service call for maximum utility.

Cloud-based deployment of predictive analytics can improve the accuracy of SaaS systems. It can also help make analytics more pervasive in on-premise applications.

Predictive Analytics for On Premise

Cloud based analytics for on-premise operational systems

"The Cloud based 'Software as a Service' model saves the cost of traditionally expensive Data Mining software and makes the administration of your source data and Data Mining Models a snap."

Michael Martin, Business Information Arts, Inc.

"We have a real-time marketing program running live across two channels in under five weeks, with additional channels being planned for next quarter. This is something I never thought would be possible for a bank of our size, but now we can compete with larger banks by delivering a superior level of sophistication across every customer interaction with Toovio's solution."

CIO at US Regional Bank

Operational systems are where companies are seeing the greatest payback on their predictive analytic investments. The ability to package up predictive analytics in cloud based services to enhance an organization's existing systems can lower barriers to predictive analytics deployment. Many predictive analytic models are built by organizations and then not deployed, not put into production. These undeployed models represent lost opportunity for organizations. The pervasiveness of cloud-based solutions and the ease with which applications can be connected to the cloud mean that a cloud-based predictive analytic deployment approach may significantly increase the effective use of predictive analytic models.

The characteristics of cloud based services to deliver predictive analytics to on-premise solutions are very similar to those embedding predictive analytics in SaaS systems. The difference is that the models are being deployed not to SaaS or cloud based solutions but to internal legacy applications or to applications managed by an organization's partners at their own locations. In this category the models are more likely to be the organization's own predictive analytic models though they could also be built in the cloud (see "Elastic compute power for modeling" below). For example, the predicted target price for a product might need to be distributed to multiple channel partners who each have their own systems.

Predictive Analytics for On Premise

Value

Many organizations have a disparate set of legacy applications into which they wish to deploy predictive analytic models. As organizations use an increasingly diverse set of partners and integrate these partners more tightly into their operations, the need to push predictive analytics to these other organizations also grows. Widespread deployment of predictive analytic models using a cloud based approach allows consistency of decision-making across channels, partners and legacy applications.

A cloud based approach is likely to be an effective solution in part because of the difficulty of embedding models in multiple applications and because a single database or a single environment may not be accessible to all the solutions that need the predictions in question. Multiple systems built using multiple technologies might not all be able to execute code generated for a predictive analytic model where they will likely all be able to access a cloud-based service. Similarly all these systems are unlikely to share a single database so in-database or in-warehouse deployment of a predictive analytic model will not be an option.

Pilot Flying J, which operates 550 interstate travel centers and travel plazas in North America is one of the top 10 privately held companies in the United States. Pilot Flying J has purchased and deployed Predixion Insight™, Predixion Software's cloud-based collaborative predictive analytics solution. Pilot Flying J is using Predixion Insight to develop powerful market basket association models that help the company accurately forecast sales for its restaurants and convenience stores by hour, enabling the company to highly optimize inventory and staffing levels. This helps minimize food waste and reduces overall costs from its restaurant operations. Predixion Insight also helps Pilot Flying J identify possible product placement non-compliance in its stores by kicking out outliers on a regularly scheduled basis for further examination—anomalies are communicated to store managers to confirm and rectify the issue.

A fitness company that sells directly to consumers through a catalog, other direct mail, the internet, TV and retail channel, this company has several brands. Clario's cloud-based analytics solution was used to build buyer and inquiry models to target catalogs for one of the brands. This brand's catalog goes out three times per year and because of the high price point of a typical fitness equipment purchase, identifying the right customers to target is critical. Attributes were created from a variety of internal and cloud-based sources such as customer, order, item, inquiry activity and demographic data. These attributes drove predictive response models for current buyers and catalog inquirers based on historical mailing and purchase information. The final predictive analytic models rank order customers and inquirers according to expected sales. Model scores are updated prior to each campaign using Clario Core. For one campaign the buyer model had a 25% higher response rate and 44% higher ROI compared to prior campaigns. The inquirer model had an ROI increase of 174%.

The intersection

Predictive analytic models are particularly valuable in improving day to day operations. These front-line operations have both the most partners and require the most diverse set of enterprise software applications. The need to push predictive analytic models to every point of contact to drive consistently excellent decisions benefits tremendously from a cloud based approach.

The cloud is a great tool for driving analytic behavior into disparate systems. But as more of an organization's data moves to the cloud, the potential for modeling in the cloud grows.

Modeling with the data cloud

Predictive modeling with cloud-based data

"By using adaptive predictive models we were able to achieve a 643% increase in our SMS interaction responses with customized products and timely offers relevant to each wireless customer. Being a cloud based service, we were able to implement the Toovio solution in less than one week with minimal effort and very little complexity."

Director of Mobile Campaigns, European Mobile Operator

"We are nimble in redeploying our analytics team to new and potentially more profitable ventures very quickly."

Stephen Buck, Vice President of Analytic Services, McKesson Pharmaceutical Division

As companies use more and more SaaS applications, a greater percentage of the data they have use and manage is already in the cloud. For example web analytic data, credit bureau data and social media data as well as CRM and sales transaction data. This creates issues as well as opportunity.

An increasing number of the data sources that an organization needs to use to build predictive analytic models are thus available in the cloud. Where previously organizations had on-premise solutions that contained all their customer, sales transaction, human resources, marketing and web data, now this data is often stored in SaaS and cloud based solutions. In addition social media and other unstructured data are often available only through the cloud. The increasingly widespread adoption of "Big Data" technology is driven in part by a need to access and analyze the large volumes of new data available in the cloud.

This category of solution pulls all the data available in SaaS applications as well as third party web services into a cloud based data management and modeling environment. It pushes predictive analytic modeling to the data, given that the data is already in the cloud. For instance a company may bring all its internal data sources as well as the standard third party data it uses for enrichment into a cloud based environment so that its whole analytic team can access it, and build models against it, from anywhere.

Modeling with the data cloud

Value

The value of this approach is that it saves on data transmission at the end points. Instead of data having to be pulled down into a modeling environment it remains in the cloud and is accessed and modeled there. This means that data is being moved cloud to cloud not cloud to end point, improving response and load times.

By pushing the integration and cleaning of data into the cloud, it gets closer to cloud based source data and becomes a more readily sharable asset. This allows analytic modeling teams to build models and do analysis on integrated data from multiple cloud sources without having to pull it all down on to a local machine.

It also makes it possible to build models against shared or pooled data without having to deal with downloading it to multiple locations. If multiple companies are using the same SaaS application then it is possible to create a pool of anonymous data that all can access to develop predictive analytic models. For instance, credit card issuers working with a cloud-based processor can develop fraud models using pooled data by analyzing the pooled data in a private cloud. This requires that modeling move to the data, in the cloud.

The intersection

Cloud based solutions offer elastic storage and cloud to cloud data access. This makes it easier to pull together all the data needed for modeling and takes advantage of the flexibility of the cloud based provisioning of new data space. In addition it allows access to a massively enriched set of data for modeling as more of the data used to enrich an organization's own data is available in the cloud. As companies move increasingly to the use of SaaS solutions more of their core data will also be available only in the cloud, further increasing the value of this approach.

Prosperity Bank, a fast-growing $1.1B community bank based in Northern Florida, offers a complete line of commercial and consumer banking products. Prosperity wanted to improve the consistency and profitability of loan decisions across its 18 local banking offices. Prosperity adopted Fiserv's easyLENDER on-premise loan processing system and FICO's cloud-based LiquidCredit decision engine. Loan officers enter all the data into easyLender which then reaches out to LiquidCredit for a recommended decision. LiquidCredit uses advanced predictive analytics to determine the riskiness of the application using both the loan data and cloud-based data sources such as consumer credit bureaus. The combination let's Prosperity make rapid decisions, approving some loans in just minutes, and frees up staff to spend more time generating new business. Prosperity also gets consistency and regulatory compliance without having to funnel applications through a single central office.

One final area of opportunity exists—taking advantage of the elastic compute power of the cloud to build predictive analytic models more efficiently.

Elastic Compute Power for Modeling

Efficient modeling using the elasticity of the cloud

"Aster Data nCluster Cloud Edition helps our business needs by providing cutting-edge SQL-MapReduce analytics. We're happy with the combination of Aster Data and Amazon Web Services along with the low cost of ownership."

Tim Schigel, CEO, ShareThis

"Predixion Insight enables us to create our models quickly and obtain tangible results. We were on a tight schedule and didn't have time for extensive ramp up."

Tim Morgan, Managing Director, Sullexis

When companies are building predictive analytic models the amount of compute power needed varies widely during the process so an elastic solution seems inherently appealing. Building predictive analytic models in the cloud offers potentially infinite scaling.

Such a solution is designed to improve the creation and updating of predictive analytic models. The ability of clouds (private or public) to deliver elastic compute power is used for modeling activities that demand a lot of compute power. These solutions make it easy to add and provision new hardware as needed for modeling activities rather than requiring a pre-defined amount of hardware to be purchased, provisioned and configured. For instance when large datasets must be analyzed or when complex simulations are required to produce predictive analytic models, the team will need a lot more processing power then when they are analyzing results or investigating the data.

Elastic Compute Modeling

Value

Building, updating and validating models can require a lot of compute power especially for things like Monte Carlo simulations and optimization. Taking advantage of new sources of data, especially when these sources involve very large amounts of data also requires a great deal of compute power or the data will have to be sampled to make it more manageable. This problem is especially acute if an organization is also taking advantage of new cloud data sources. Taken together these aspects of predictive analytic modeling can lead to big spikes in compute power and a cloud based solution accommodates these intermittent spikes effectively.

Modelers are also a key and constrained resource in most organizations. Using elastic compute resources can get them their results more quickly without having to invest in all the compute power they might need at a particular moment. The ability of elastic compute power to deliver rapid results without dedicated hardware keeps costs manageable while still supporting the kind of rapid iteration that is so important for good models.

It is also true that in most organizations the existing operational hardware and data warehouse infrastructure is being run at or near capacity. This can make it difficult for analytic modeling teams to try new techniques that require more compute power or to investigate new datasets—their existing infrastructure becomes a limiting factor on their ability to develop better models.

Of course budgets are not completely elastic so there needs to be a mechanism to manage the use of resources. In particular ways to predict future usage—predictive analytics about predictive analytics—would be useful.

ShareThis is the sharing network that makes it simple to share any online content quickly. ShareThis allows users to share content through email, IM, social media, SMS and other services without leaving the current page. Publishers can deploy the ShareThis button to drive traffic, stimulate viral activity, and track the sharing of online content. ShareThis mines over 1.5TB of data per month to provide value-added services to publishers to report on trends in topics, traffic, and shared content. Using a cloud-based Aster Data solution from Teradata, ShareThis can quickly discover the patterns and trends that signal shifts in sharing topics and influence, and provide value-added insights to publishers and users who want to know what's hot and what's not.

The intersection

Elastic compute power for modeling takes advantage of the elasticity of cloud solutions to make predictive analytic activities more efficient. Not all the steps in the analysis, design, testing and deployment of predictive analytic models require the same amount of compute power. Using the elastic nature of cloud computing resources to ensure that those building predictive analytic models have the capacity they need when they need it makes for faster time to build predictive analytic models without a massive investment in hardware. Faster time to build models means more iterations and more effective analytic teams

Bibliography

Ayres, Ian. *Super Crunchers: Why thinking-by-numbers is the new way to be smart*. New York, NY: Bantam Books, 2007.

Berry, Michael, and Gordon Linoff. *Data Mining Techniques: For Marketing Sales, and Customer Relationship Management* 3rd Edition. Indianapolis, IN: Wiley Publishing, Inc., 2011.

Davenport, Tom, and Jeanne Harris. *Competing on Analytics: The New Science of Winning*. Harvard Business School Press, 2007.

Davenport, Tom, Jeanne Harris, and Robert Morison. *Analytics at Work: Smarter Decisions, Better Results*. Boston MA: Harvard Business Press, 2010.

Fung, Kaiser. *Numbers rule your world: The hidden influence of probability and statistics on everything you do*. New York, NY: McGraw Hill, 2010.

Hugos, Michael and Derek Hulitzky. *Business in the Cloud: What Every Business Needs to Know About Cloud Computing:* Wiley, 2010

Hurwitz, Judith, Robin Bloor, Marcia Kaufman and Fern Halper. *Cloud Computing For Dummies:* For Dummies 2009

Linthicum, David. *Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide:* Addison-Wesley, 2009

Mulholland, Andy, John Pyke and Peter Fingar. *Enterprise Cloud Computing: A Strategy Guide for Business and Technology Leaders*: Meghan-Kiffer, 2010

Nisbet, Robert, John Elder, and Gary Miner. *Handbook of Statistical Analysis and Data Mining Applications*. Burlington, MA: Elsevier, 2009.

Tan, Pang-Nin, Michael Steinbach, and Vipin Kumar. *Introduction to Data Mining.* Boston, MA: Pearson Education, Inc., 2006.

Taylor, James. *Decision Management Systems: A Practical Guide to using Business Rules and Predictive Analytics*. New York, NY: IBM Press, 2012;

Taylor, James, and Neil Raden. *Smart (Enough) Systems: How to deliver competitive advantage by automating hidden decisions.* New York, NY: Prentice Hall, 2007.

We would like to acknowledge our research sponsors

About Decision Management Solutions

Decision Management Solutions is the leading professional services firm specializing in decision management, a proven approach for rapid and cost effective deployment of predictive analytic models in operational systems. Decision Management Solutions is helping companies make the business case for analytics, enabling them to reduce fraud, continually manage and assess risk and maximize customer value with increased flexibility and speed.

James Taylor is the CEO and Principal Consultant of Decision Management Solutions. James is the leading expert in using Decision Management systems like business rules and predictive analytics to help companies improve decision making and develop smarter and more agile processes and systems. James has over 20 years developing software and solutions for clients and has led Decision Management efforts for leading companies in insurance, banking, health management and telecommunications.

In addition to consulting, James delivers webinars, workshops and training. He is a regular keynote speaker at conferences such as ComputerWorld BI & Analytics Perspectives, Business Rules Forum, Predictive Analytics World and IBM's Business Analytics Forum. James is the author of the upcoming book "Decision Management Systems: A Practical Guide to Business Rules and Predictive Analytics" (IBMPress) and was lead author of "Smart (Enough) Systems: How to Deliver Competitive Advantage by Automating Hidden Decisions" (Prentice Hall, 2007) with Neil Raden. He has contributed chapters to multiple books including "Applying Real-World BPM in an SAP Environment," "The Decision Model," "The Business Rules Revolution: Doing Business The Right Way" and "Business Intelligence Implementation: Issues and Perspectives." James is a faculty member of the International Institute for Analytics.

More information is available at **http://www.decisionmanagementsolutions.com**.
To engage us or request information, email us at
info@decisionmanagementsolutions.com.