COMPLEX MATHEMATICAL TOOLS BASED LOGICAL APPROACH FOR TODAY'S BUSINESS PLANNING

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Present global scenario is most complex. Due to advent of Information Technology its infiltration in every sector developing a challenging approaches for solving such complex situation. In this context the term business intelligence has come up. Business intelligence uses technologies, processes, and applications to analyze mostly internal, structured data and competitive intelligence gathers, analyzes and disseminates information with a topical focus on company competitors are business processes. Broadly, business intelligence can include the subset of competitive intelligence. Business intelligence and business analytics are sometimes used interchangeably, but there are alternate definitions. Business analytics solutions typically use data, statistical and quantitative analysis and fact-based data to measure past performance to guide an organization's business planning. Here author has elaborated the idea of Business analytics a complex mathematical tools based logical approach to business planning and issues comprise with the concept in short to highlight the importance of Business Analytics and its impact in continuously developing society. A list of software programs for vertical industries and words and phrases about software development, use and management has been cited.

Introduction

Rapid scientific technological advancements are reshaping the world. Developments in information and communication technology have revolutionized every activity, be it scientific or business and commerce or individual and personal. Consequences of which in today's globally competitive market, knowledge constantly makes itself obsolete with the result that today's advanced knowledge is tomorrow's ignorance. Therefore one has to be on the learning curve and continuously move up. Keeping touch with existing intelligence based global scenario in lieu of traditional analysis new term like Business intelligent, Analytics, Business analytics etc. have come up.

Analytics is the discovery and communication of meaningful patterns in data. Especially valuable in areas rich with recorded information, analytics relies on the simultaneous application of statistics, computer programming and operations research to quantify performance. Analytics often favors data visualization to communicate insight.

Firms may commonly apply analytics to business data, to describe, predict, and improve business performance. Specifically, arenas within analytics include predictive analytics, enterprise decision management, retail analytics, store assortment and stock-keeping unit optimization, marketing optimization and marketing mix modeling, web analytics, sales force sizing and optimization, price and promotion modeling, predictive science, credit risk analysis, and fraud analytics. Since analytics can require extensive computation, the algorithms and software used for analytics harness the most current methods in computer science, statistics, and mathematics.[1]

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Business Analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning.[2] Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods.

Business analytics makes extensive use of statistical analysis, including explanatory and predictive modeling,[3] and fact-based management to drive decision making. Business analytics is therefore closely related to management science. Analytics may be used as input for human decisions or may drive fully automated decisions. In other words, querying, reporting, Online Analytical Processing (OLAP - a powerful technology for data discovery, including capabilities for limitless report viewing, complex analytical calculations, and predictive "what if" scenario planning) and alert tools can answer questions such as what happened, how many, how often, where the problem is, and what actions are needed. Business analytics can answer questions like why is this happening, what if these trends continue, what will happen next, what is the best that can happen.[4]

Analytics have been used in business since the management exercises were put into place by Frederick Winslow Taylor in the late 19th century. Henry Ford measured the time of each component in his newly established assembly line. But analytics began to command more attention in the late 1960s when computers were used in decision support systems. Since then, analytics have changed and formed with the development of enterprise resource planning (ERP) systems, data warehouses, and a large number of other software tools and processes.[4]

In later years with the introduction to computers the business analytics have exploded. This change has brought analytics to a whole new level and has made the possibilities endless.

Analytics is a multi-dimensional discipline. There is extensive use of mathematics and statistics, the use of descriptive techniques and predictive models to gain valuable knowledge from data to data analysis. The insights from data are used to in business settings e.g. text analytics vs. the more generic text mining to emphasize this broader perspective. There is an increasing use of the term *advanced analytics*, typically used to describe the technical aspects of analytics, especially predictive recommend action or to guide decision making rooted in business context. Thus, analytics is not so much concerned with individual analyses or analysis steps, but with the entire methodology. There is a pronounced tendency to use the term *analytics* modeling, machine learning techniques, and neural networks. As in todays industry bigger and bigger focus on automation is seen where the Digital Analytics is all need go towards the cloud platform.

Analytics comprises with Marketing optimization, Portfolio analysis, Risk analytics, Digital analytics, App analytics, Big Bang of App Analytics.

Marketing Optimization

Marketing evolves from a creative process into a highly data-driven process. Analytics is used by Marketing organizations to determine the outcomes of campaigns or efforts and to guide decisions for investment and consumer targeting. Demographic studies, customer segmentation, conjoint analysis and other techniques allow marketers to use large amounts of consumer purchase, survey and panel data to understand and communicate marketing strategy. Web analytics allows marketers to collect session-level information about interactions on a website using an operation called sessionization. Those interactions provide the web analytics information systems with the information to track the referrer, search keywords, IP address, and activities of the visitor. With this information, a marketer can improve the marketing campaigns, site creative content, and information architecture.

Analysis techniques frequently used in marketing include marketing mix modeling, pricing and promotion analyses, sales force optimization, customer analytics e.g.: segmentation. Web analytics and optimization of web sites and online campaigns now frequently work hand in hand with the more traditional marketing analysis techniques. A focus on digital media has slightly changed the vocabulary so that marketing mix modeling is commonly referred to as attribution modeling in the digital or marketing mix modeling context.

These tools and techniques support both strategic marketing decisions and more tactical campaign support in terms of targeting the best potential customer with the optimal message in the most cost effective medium at the ideal time.

Portfolio Analysis : Portfolio analysis is a common application of business analytics. A bank or lending agency has a collection of accounts of varying value and risk. The accounts may differ by the social status (wealthy, middle-class, poor, etc.) of the holder, the geographical location, its net value, and many other factors. The lender must balance the return on the loan with the risk of default for each loan. The question is then how to evaluate the

portfolio as a whole. Portfolio analysis is important for the interest of such bank or lending agency.

The least risk loan may be to the very wealthy, but there are a very limited number of wealthy people. On the other hand there are many poor that can be lent to, but at greater risk. Some balance must be struck that maximizes return and minimizes risk. The analytics solution may combine time series analysis with many other issues in order to make decisions on when to lend money to these different borrower segments, or decisions on the interest rate charged to members of a portfolio segment to cover any losses among members in that segment.

Risk Analytics : When Goal of business analysis is to suggest Measures for waste Reduction and completion of projects in time and improve project efficiency risk factor can be ignored. The main risk for the people is discrimination like Price discrimination [5] or Statistical discrimination.[6]

There is also the risk that a developer could profit from the ideas or work done by the users like this example: The users could, for example, write new ideas in a note taking app, and those ideas could then be sent as a custom event, and the developers could use those ideas to profit from them. This can happen because the ownership of content is usually unclear in the law.[7] If the users' identity is not protected, there are of course more risks, for example, the risk that private information about the users is put on the internet. In the extreme, there is the risk that the world could become like George Orwell's 1984 [8] especially now that the governments are giving themselves more powers to access citizens' information.[9]

Predictive models in industries, particularly bank or lending agency have been widely developed to bring certainty across the risk scores for individual customers. Credit scores are built to predict individual's delinquency behaviour and also scores are widely used to evaluate the credit worthiness of each applicant and rated while processing loan application. Furthermore, risk analyses are carried out in the scientific world and the insurance industry.

Digital Analytics : Digital analytics is the analysis of qualitative and quantitative data from business and the competition to drive a continual improvement of the online experience that customers and potential customers have which translates to desired outcomes (both online and offline). With the right skills, processes and technologies, one can uncover the vital information about how he engages with his customers, effectiveness of his engagements and give him the data on which to take action to improve the outcome i.e. business results.

Digital analytics is a set of business and technical activities that define, create, collect, verify or transform digital data into reporting, research, analyses, recommendations, optimizations, predictions, and automations.[10]

Application Analytics : Application Analytics or in short App analytics is the process of collecting information about the way an App is used. App analytics is used by developers to improve their apps, to know how the users use the apps.

There are standard Applied analytics softwares. Developers can also create their own framework.

The information collected with App Analytics can be classified in these two types:

1. Standard Metrics: like Session Length.[11]

2. Custom events: Using custom events, Apps can transmit any type of information.[12] Custom events are the ones that present the greater risk for the user's privacy because anything can be transmitted, for example, the user's e-mail. Paradoxically, Custom events are also the ones that offer more benefits for honest developers because of their flexibility.

The main two Analytics frameworks are designed to protect user's identity through anonymising the data obtained from the users, but that doesn't mean that it's impossible for developers to find a way to determine the user's identity (for example through custom events).

The Big Bang of App Analytics

This term refers to the phenomenon that App Analytics has suddenly become mainstream in a short period of time. David Cearley, vice president & Gartner Fellow has said that "Every app now needs to be an analytic app. ... Analytics will become deeply, but invisibly embedded everywhere." [13]

Precisely this situation is what could cause more worry to people because not all doubts about the protection of users' privacy have been resolved but most people are unaware of this phenomenon.

Customer Dynamics

Customer dynamics is an emerging theory on customer-business relationships that describes the ongoing interchange of information and transactions between

customers and organizations. These exchanges occur over a wide range of communication channels, such as phone, email, Web and text, including those outside of organizational control like social media. Similar to the scientific disciplines of family and social dynamics, Customer Dynamics looks at the relationships between organizations and customers from an interpersonal viewpoint. It goes beyond the transactional nature of the interaction to look at emotions, intent, and desires. It views interactions as a chain of events rather than single point occurrences. As Business analytics refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning Business analytics used to focus on developing new insights and understanding of business performance it should look after Customer dynamics, a subset of organizational dynamics,[14] which describes how people function together to accomplish a task. The level of operational success is said to be determined by the behavioral nature of organizations - individuals' roles, interpersonal relations, and group dynamics, and how they all react when brought together.

Customer dynamics is a specific dimension of customer experience management and customer relationship management. It is distinct from these disciplines in its focus on the actual interactions that occur between the customer and the organization, and its consideration of implications for both the customer and the business. Customer dynamics addresses how the growing volume and diversity of interactions impacts the customer-business relationship in the areas of operational efficiency, customer experience, and revenue generation. The theory suggests that businesses can create significant competitive differentiation by understanding the customer's true intent and meeting that in a way that also supports the business's intents[17].

Customer dynamics is dependent parameter and is closely related with Customer experience (CX). Customer experience is the sum of all experiences a customer has with a supplier of goods and/or services, over the duration of their relationship with that supplier. This can include awareness, discovery, attraction, interaction, purchase, use, cultivation and advocacy. It can also be used to mean an individual experience over one transaction; the distinction is usually clear in context.

However, reviewing the ontology of customer experience, there is a disparity between this 'experience as everything' definition and its original intent i.e., experience as in a personal and memorable experience that critically creates a distinct economic offer different from the goods sold and services delivered[15]. As the economics of customer experience hang on the 'distinct economic offer' definition, one conclusion some commentators have made is that the 'experience as everything' definition is in fact a reworking of 'service excellence'.

Emerged Concept of Business Analytics

Business analytics (BA) is the practice of iterative, methodical exploration of an organization's data with emphasis on statistical analysis. Business analytics is used by companies committed to data-driven decision making to gain insights that inform business decisions and can be used to automate and optimize business processes. Data-driven companies treat their data as a corporate asset and leverage it for competitive advantage. Successful business analytics depends on data quality, skilled analysts who understand the technologies and the business and an organizational commitment to data-driven decision making.

Business analytics uses include: a. Exploring data to find new patterns and relationships (data mining), b. Explaining why a certain result occurred (statistical analysis, quantitative analysis), c. Experimenting to test previous decisions (A/B testing, multivariate testing), d. Forecasting future results (predictive modeling, predictive analytics).

Once the business goal of the analysis is determined, an analysis methodology is selected and data is acquired to support the analysis. Data acquisition often involves extraction from one or more business systems, cleansing, and integration into a single repository such as a data warehouse or data mart. The analysis is typically performed against a smaller sample set of data. Analytic tools range from spread sheets with statistical functions to complex data mining and predictive modeling applications. As patterns and relationships in the data are uncovered, new questions are asked and the analytic process iterates until the business goal is met. Deployment of predictive models involves scoring data records (typically in a database) and using the scores to optimize real-time decisions within applications and business processes. Business analytics also supports tactical decision making in response to unforeseen events, and in many cases the decision making is automated to support real-time responses.

Though the terms business intelligence and business analytics are often used interchangeably, there are some key differences[16]:

Considering the growing popularity of business analytics, business intelligence application vendors are including some BA functionality in their products. More recently, data warehouse appliance vendors have started to

BI vs BA	Business Intelligence	Business Analytics
Answers the questions:	What happened? When? Who? How many?	Why did it happen? Will it happen again? What will happen if we change x? What else does the data tell us that never thought to ask?
Includes:	Reporting (KPIs, metrics) Automated Monitoring/ Alerting (thresholds) Dashboards Scorecards OLAP (Cubes, Slice & Dice, Drilling) Ad hoc query	Statistical/Quantitative Analysis Data Mining Predictive Modeling Multivariate Testing

embed Business Analytics functionality within the appliance. Major enterprise system vendors are also embedding analytics, and the trend towards putting more analytics into memory is expected to shorten the time between a business event and decision/response.

Conclusion

From the discussion it is clear that Business analytics refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning and focuses on developing new insights and understanding of business performance based on data and statistical methods. Extensive use of statistical analysis, including explanatory and predictive modeling and fact-based management motivates Business Analytists to develop softwares for deriving fully automated decisions. Online Analytical Processing (OLAP), powerful technology for data discovery, including capabilities for limitless report viewing, complex analytical calculations, and predictive "what if" scenario planning, and alert tools can answer questions such as what happened, how many, how often, where the problem is, and what actions are needed. Business analytics can answer questions like why is this happening, what if these trends continue, what will happen next, what is the best that can happen using kinds of mathematical tools, softwares and strong logical analysis. So Business Analytics is now a frontier area of Basiness Pnanning Based on Complex Mathematical Tools with Realistic Logical Approach. Complex situations are forcing Business Planners for developing new tools continuously to handle kinds of real life situation. Author had pointed some important aspects of Business Analytics in his earlier article

named 'Business Analytics : Frontier Area of Forecasting Based on Complex Mathematical Tools with Realistic Logical Approach' and intend to discuss some other aspects of the subject citing case studies and recently developed mathematical tools viz. Fuzzy logic[18], Wavelet[19,20], Fractal Analysis[21,22] etc.[23,24] Here it is worthwhile to note that the author is confident to develop most logical analysis as well as appropriate software(s) using those mathematical tools[25]. ❐

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