



## Business Intelligence: A Rapidly Growing Option through Web Mining

Ward Catherine\*

Department of Computer Engineering, University of Busitema, Busitema, Uganda  
 \*Corresponding Author: Ward Catherine, Department of Computer Engineering, University of Busitema, Busitema, Uganda. E-mail: catherinehaus@gmail.com

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### Description

The World Wide Web is a popular and interactive medium to distribute information in this scenario. The web is huge, diverse, ever changing, widely disseminated global information service center. We are familiar with terms like e-commerce, e-governance, e-market, e-finance, e-learning, e-banking etc. for an organization it is new challenge to maintain direct contact with customers because of the rapid growth in e-commerce, publishing and electronic service delivery. To deal with this there is need of intelligent marketing strategies and CRM (customer relationship management) i.e. the effective way of integrating enterprise applications in real time. Web mining is the vast field that helps to understand various concepts of different fields. Web usage mining techniques are attempted to reason about different materialized issues of Business Intelligence which include marketing expertise as domain knowledge and are specifically designed for electronic commerce purposes. To this end, the chapter provides an introduction to the field of Web mining and examines existing as well as potential Web mining applications applicable for different business function, like marketing, human resources, and fiscal administration. Suggestions for improving information technology infrastructure are made, which can help businesses interested in Web mining hit the ground running.

The Internet has changed the rules for today's businesses, which now increasingly face the challenge of improving and sustaining performance throughout the enterprise. The growth of the World Wide Web and enabling technologies has made data collection, data exchange and information exchange easier and has resulted in speeding up of most major business functions. Delays in retail, manufacturing, shipping, and customer service processes are no longer accepted as necessary evils, and firms improving upon these critical functions have an edge in their battle of margins. Technology has been brought to bear on myriad business processes and affected massive change in the form of automation, tracking, and communications, but many of the most profound changes are yet to come. Leaps in computational power have enabled businesses to collect and process large amounts of data. The availability of data and the necessary computational resources, together with the potential of data mining, has shown great promise in having a transformational effect on the way businesses perform their work. Well-known successes of companies such as Amazon.com have provided evidence to that end. By leveraging large repositories of data collected by corporations, data

mining techniques and methods offer unprecedented opportunities in understanding business processes and in predicting future behavior. With the Web serving as the realm of many of today's businesses, firms can improve their ability to know when and what customers want by understanding customer behavior, find bottlenecks in internal processes, and better anticipate industry trends. Web usage mining is a part of Business Intelligence rather than the technical aspect. It is used for detecting business strategies through the efficient use of web applications. It is also crucial for customer relationship management (CRM) as it can ensure customer satisfaction as far as the interaction between the customer and organization is concerned. Examples are given in different business aspects, such as product recommendations, fraud detection, process mining, inventory management, and how the use of Web mining will enable growth revenue, minimize costs, and enhance strategic vision.

### Web Mining Techniques

Web mining is a research is converging area from several research communities such as Database, Information Retrieval, Machine Learning and Natural Language Processing. It is related to the Data Mining but not equivalent to it. Besides a large amount of content information stored on web pages, web pages also contain a rich and dynamic collection of hyperlink information. In addition, web page access and usage information are also recorded in web logs. Web mining is the use of data mining techniques to automatically discover and extract useful information from web documents and pages. This extracted information enables an individual to promote business understanding marketing dynamics; current trends opted by companies for better growth results etc. Automatically selecting and pre-processing specific information from retrieved web resources. This step is transformation process retrieved in IR process from original data. These transformations covers removing stop words, finding phrases in the training corpus, transforming the representation to relational or first order logic form etc. Automatically discovers general patterns at individual website as well as across multiple sites. Data mining techniques and machine learning are often used for generalization.

Validation and interpretation of mined patterns. In information and knowledge discovery process, people play very important role. This is important for validation and interpretation in last step. Web mining tasks are mainly divided into three classes, namely web content mining, web structure mining and web usage mining. Web content mining aims to discover useful information from web content or documents. Basically, web content contains textual data, image, audio, video, metadata and hyperlinks. Most of the web content data are unstructured or semi-structured data. The goals of web content mining include assisting or improving information finding filtering information based on user profiles, modeling data on the Web, and integrating web data for more sophisticated queries. Text mining and multimedia data mining techniques can be used for mining the content in web pages. Web structure mining discovers the link structure model based on the topology of hyperlinks on the Web. The link structure model can be used for categorizing web pages and computing the similarity measures or relationships between web pages. It is also useful for discovering authoritative web pages, the structure of web pages itself, and the nature of the hierarchy of hyperlinks in the website of a particular domain. Web usage mining also known as web log mining, aims to discover interesting and frequent user access

patterns from web browsing data that are stored in web server logs, proxy server logs or browser logs. In this research, we focus on investigating web usage mining techniques to provide enhanced web services. Web Content Mining is the process of extracting useful information from the contents of web documents. Content data corresponds to collection of facts a Web page was designed to convey to user. It may consist of text, audio, video, images, or structured records such as lists and tables.

### **Analyzing of Behavioral Patterns**

Web usage mining is the application of data mining techniques to discover usage pattern from Web data, in order to understand and better serve the needs of Web-based applications. Usage data captures the identity or origin of Web users along with their browsing behavior at a web site. Capturing, Modeling and analyzing of behavioral patterns of users is the goal of this web mining category. Web usage mining consists of three phases, namely pre-processing, pattern discovery, and pattern analysis. A high level Web usage mining Process is presented in proposes that the web mining process can be divided into two main parts. The first part includes the domain dependent processes of transforming the Web data into suitable

transaction form. This includes pre-processing, transaction identification, and data integration components. The second part includes some data mining and pattern matching techniques such as association rule and sequential patterns. Web Usage Mining techniques can be used to anticipate the user behavior in real time by comparing the current navigation pattern with typical patterns which were extracted from past Web log. Recommendation systems could be developed to recommend interesting links to products which could be interesting to users. One of the major issues in web log mining is to group all the users' page requests so to clearly identify the paths that users followed during navigation through the web site. The most common approach is to use cookies to track down the sequence of users' page requests or by using some heuristic methods. Session reconstruction is also difficult from proxy server log file data and sometimes not all users' navigation paths can be identified. The usage data collected at different sources represent the navigation patterns of different segments of the overall web traffic, ranging from single user, single site browsing Behavior to multi-user, multi-site access patterns. Web server log does not accurately contain sufficient information for inferring the behavior at the client side as they relate to the pages served by the web server.