

Enhance the Competitive Intelligence Capabilities in Company using Web Mining Technique

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Abstract

In this globalization era, the company should have a strategy to keep having the edge on the competitors. The way is enhancing the competitive intelligence of that company because CI is a part of strategy management of company that focuses on external business environment. In business world, the company must focus on not only CI but also Decision Support System because it is an important piece of management system of a company. By technology development, nowadays a company can find information about competitors or others on the web, so this paper provides an overview how web can be used for competitive intelligence. The collected information is not always the useful information. The company must also select the appropriate source to determine the best result for making decision. One of the related literature proposes a framework of Decision Support System by web mining technique. This paper also provides an enhancement of that framework in order to enhance the competitive intelligence. Keywords: Business Intelligence, Competitive Intelligence, Web Mining, Decision Support System

1 Introduction

In this globalization era, the company needs to have a strategy to compete with others. To be the best company is not a simple thing, because there are many great competitors. The company has to consider the importance of enforcing achievements of the goals that defined by their business strategies through business intelligence concepts.

Business Intelligence (BI) can be defined by two different points of view. The first, BI is the human intelligence ability that concerns in business activities. The second is about intelligence as how information is valued and relevant to others. It means that business intelligence is the inside of applications and technologies for collecting information to make better business decisions. It is really important for company to have wide knowledge about factors such as customers, internal operations, business partners, competitors, and economic environment to make a good business decisions.

If BI is the global concept, there are many specific approaches of BI for handling the high competition in this world. Competitive Intelligence (CI) is one approach of BI that focuses on monitoring the external business environment of organization in order to identify relevant information for decision making process. The collected is about what competitors do. Refer to the information the company can provide better decisions. In a business environ-

ment, Decision Support System (DSS) has implemented in enterprise to decide some activities or targets. DSS is a part of Artificial Intelligence that is a computer-based information system including knowledge-based systems. DSS can be enhanced by using CI approach to boost better result in business.

In the past, the sources of competitive intelligence information mainly consisted of printout information such as company reports and databases. However, Almost all has changed in the recent decade. The information and resources can be easily founded on the web because of information technologies development.

The intent of this paper is to provide an overview of how the Web can be used for competitive intelligence, because the web has a large repository of information that could be relevant to a company's decision making, and it is necessary to examine and to analyze the content, structure and usage of web resources using techniques of web mining.

Advance of technologies for internet growing was spectacular and full of information and source which are now accessible on the web. The source that is needed for company such as source for general information, source for learning about the competitors, source for learning about industry trends, source for learning about company's customers and source that can help evaluate a market or an opportunity.

The next challenge is how to find the appropri-

ate sources of web that provide many information because source of web can be used for competitive intelligence in company's decision making, and after get the appropriate source, how to communicate knowledge to the web. And that is all the way to enhance Competitive Intelligence.

2 Literatur Review

2. LITERATURE REVIEW The formal information gathered from external sources, that can be from internet, media, etc. The informal data and information collected analyzed, collected and filtered by managers that represent flexible and efficient informal Competitive Intelligence. But in other case, an informal CI is not enough to support some strategic and tactic process of decision making. To support the process of decision making, companies gathering data from various and different sources and then store the sources in data warehouse that represent a collection of data to support the process of decision making. Consider that factual information consist in data number, indicators, numbers, and about competitors, costumers, suppliers that regarding in past actions, so intelligence represents a collection of cleaned, filtered and analyzed the sources or information to support managers in process of decision making.

In the paper of Ionut Anica-Popa and Gabriel Cucui [1] propose a framework of a decision support system based on web mining techniques to enhance capabilities of organization's Competitive Intelligence. The important thing is to examine and to analyze the content, usage and structure of web resources, that in order to extract relevant information from the web. Web mining techniques based on architecture consist of three tiers : decision tier, logic tier and data tier. With CI it is represented by information which describe how competitive is an organization, then it is being able to predict moves of business environment actors. Sung Sik Park, Yang Sok Kim, Byeong Ho Kang [4] propose the management information monitoring of newly uploaded information in target web sites, by check predefined web pages and prompt users when there are changes in pages on web sites, then it detecting the changes automatically. Then, that information can be used as knowledge resources. Bonnie Hohhof [3] propose sto change information into intelligence information, that after get the information from web then process it into the intelligence information. The intelligence information is the provide from continuous systematic Competitive Information Systems (CIS). CIS that multifaceted services that contribute to organizational decision making by providing information services by collecting and analyzing data in web from pri-

mary sources. Robert J. Boncella [2] on the paper of Communications of the Association for Information System propose the technique in implementing a CI project with information gathering and information analysis by using personalized or focused Web Spiders. Information analysis based on web mining that can be categorized into three classes (Web Content Mining, Web Structure Mining, and Web Usage Mining).

Structure Mining, and Web Usage Mining). The comparison for each propose, from the paper of Ionut Anica-Popa and Gabriel Cucui is processing data (information from web) into a new information and knowledge using web mining technique based on architecture consist of three tiers : decision tier, logic tier and data tier. From the paper of Sung Sik Park, Yang Sok Kim, Byeong Ho Kang is focuses in monitoring the information, detected when the data on the web is changes, so that changes observed with fast and immediately with web monitoring. In the paper of Bonnie Hohhof is after get the information, then make it and change the information into the intelligence information by using Competitive Information System that providing information services by collecting and analyzing data in web. From the paper from Robert J. Boncella focuses in get information with Web Spiders as a technique in implementing CI with gathering and analysis information from the web and base on web mining technique that categorized into three classes.

3 Methodology

Competitive Intelligence (CI) takes almost whole parts in strategic management of a company. It has to be enhanced, so the company can increase the capability to compete well. In this section, a framework Ionut Anica-Popa and Gabriel Cucui [1] will be enhanced in order to determine specific problem in logic tier. Get idea from [1] a framework for that problem based on architecture is implemented that consist of three tiers (Figure 1): decision tier, logic tier and data tier.

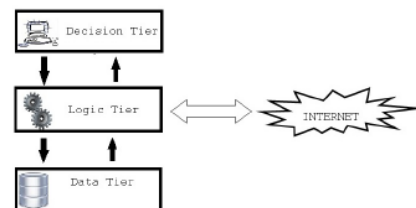


Figure 1: Framework for DSS based on web mining techniques [1]

1. First, Decision Tier which is the highest level of the framework, accepts the request from user.

2. Next, Logic tier makes decision of the request.
3. Then, Decision Tier changes the decision into a simple format, so the user can understand to use them.
4. After that, Logic Tier collects data, information and knowledge from web using web mining technique and gives them to data tier.
5. Finally, Data tier keeps and finds information from all company's databases, and sends to the logic tier for processing.

According to (Figure 2), there is a same characteristic with (Figure 1). This is a DSS framework. It has an Inference Engine as logic tier, Database and Knowledge Base as the lowest tier. Inference Engine implements how to combine database and knowledge base, then makes decision based on rule. So, Knowledge tier is also important for enhancing the competitive intelligence. A framework from [1] must be enhanced, because there is not knowledge tier.

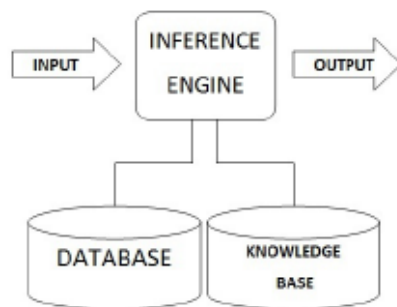


Figure 2: DSS framework

This section presents a combination between [1]'s framework and DSS framework.

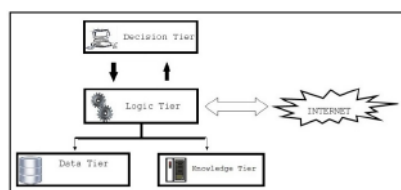


Figure 3: A Framework for Enhancing Competitive Intelligence

1. First, Decision Tier makes the list of all information that is needed to find.
2. Next, Logic tier sends query and query rewriting to the web. Query rewriting (using views) consists in reformulating a query according to views that are already available from the database, in order to optimize the execution plan of the query. Query rewriting techniques

have been widely explored in the database field. Logic tier has to find how to communicate database and knowledge base on the web. A knowledge base is special kind of database for knowledge management, providing the means for the computerized collection, organization, and retrieval of knowledge. Also a collection of data representing related experiences, their results are related to their problems and solutions. For searching data on the web is a common thing, but implementing knowledge base is a difficult thing to do. In order to get relevant information, it is very important to use web mining technique. Web mining is classified into three concepts : web content mining, web structure mining, and web usage mining. Web content mining represents technique to collect all information used for compete others. Web structure mining represents the company can generate the information in similarity between two or more web pages. The collected information is not always the useful information. The company must also select the appropriate source to determine the best result for making decision. Web usage mining represents how to search data and knowledge efficiently for company behavior and select the useful information.

3. Finally, if the company knows how to implement that, Logic tier can easily classify whether database or knowledge base.

Here is a case example about how competitive intelligence must be enhanced. A case is about big book store. The book store has a large database with dynamic data movement. As the Web is constantly changing, data collected from search engines in different time periods will also change. This provides us with an opportunity to collect different data sets to validate results and to determine if the market changes over time are reflected in the Web hyperlink data. The company has to update data frequently. On the other hand, the company has to find information up to date whether about the competitors or about the offered products. The company has to know what thing that customers look for, such as the type and best quality product. So the company is able to find the solution of what customers want and offers it to be sold. The company has to find the number of competitors and how much the demand for determining solution of that problem. The company also have to know how many web sites that has offered the solution for customers and whether it fulfills customers needs. For example, the company searches information by keyword: book store in Jakarta or however the keyword which associates with the problem, If the company finds a bad testimonial from

customer, it means the company gets a good market to be proceeded.

The points that we can keep are ensuring the market demand. The company has to know the competition level and all information about the product that is offered by the competitors. The company must also monitor the competitor's web sites, from there the company get information to attract customers for always coming to this book store, not to competitor's book store. All of the information must be selected, so the company just gets the appropriate information.

4 Conclusion

The enhancement of Competitive Intelligence is a good way to help company in this high competition era. Actually, a most part of competitive intelligence is about information. More ability for get the information and then selecting useful information, and more ability for enhancing that competitive intelligence. On the web, It can be generated efficiently by web mining technique. But, how to communicate knowledge base to the web is still being main problem. Because a web accept a job as the instruction, it can not use the logic as perfect as human.

References

- [1] I. Anica-Popa and G. Cucui. A framework for enhancing competitive intelligence capabilities using decision support system based on web mining techniques. *International Journal of Computers, Communications & Control*, IV(4):326–334, 2009.
- [2] R. J. BONCELLA. Competitive intelligence and the web. *Communications of the Association for Information Systems*, 12:327–340, 2003.
- [3] B. Hohhof. Developing information systems for competitive intelligence support. *Library Trends*, 43(2), 1994.
- [4] B. H. K. Sung Sik Park, Yang Sok Kim. Web information management system: Personalization and generalization. *International Conference WWW/Internet*, 2003.