Research on the Developments of Business Intelligence and its Enlightenment based on Bibliometric Statistics and Knowledge Map Analysis

Zongfeng Zou¹, Jie Cheng¹, Kugan Huang¹ and Yonghan Gui¹,*
¹School of Management, Shanghai University, Shanghai, China

*Corresponding author e-mail: 121701659@qq.com

Abstract. In the information age, the ability of information processing and utilizing has become the key to establish the success or failure of enterprises. Faced with the rapid growth of corporate data, traditional data management methods are in vain and then business intelligence has emerged. At first of the study, 876 papers from SCI-expanded and SSCI during 1997-2017 are collected to form the database. And then the present work which assisted by CiteSpace performs a bibliometric analysis to evaluate the research publications on business intelligence based on the above database. The paper presents a scenario of the field from three aspects: annual publication amount, the trend in research, citation. Lastly, results show that Journal “Expert Systems with Applications” published the most papers relating to business intelligence during 1997-2017, which has great influence and authority by measuring many indexes and Article “Business intelligence and analytics: from big data to big impact” is the most cited paper of business intelligence during 1997-2017. Among the geographic locations of the researchers, Europe was proved to be the most productive area and America always has a leading position. Among research hotspots of business intelligence, “cloud computing” is the latest hotspot. Through above studies, it can be learned that faced with the era of big data, business intelligence and cloud computing will be integrated deeply and constantly. The result of the present investigation would help the business intelligence researchers to understand the overall situation prevailing in this specialized field.

1. Introduction
In the information age, the ability of information processing and utilizing has become the key to establish the success or failure of enterprises [1]. Faced with the rapid growth of corporate data, traditional data management methods are in vain and then business intelligence has emerged.

In 1996, Gartner Group proposed the concept of business intelligence and defined: "Business intelligence describes a series of concepts and methods, and assists business decisions by applying fact-based support systems. Business intelligence provides technologies and methods that enable companies to analyze data rapidly, including collecting, managing, and analyzing data, and then transforms the data into useful information, and finally distributes it throughout the company [2]."

Nowadays, the concept of business intelligence is not just the technology or tools of data analysis, but the overall application of the solution and even it can sublimate into a management idea [3], a rational thinking based on data science analysis.

This study assisted by a software called CiteSpace uses bibliometric analysis to carefully analyze over 800 papers from Science Citation Index Expanded (SCI-EXPANDED) and Social Sciences
Citation Index (SSCI) of “Web of Science” relating to business intelligence published in various journals from 1996 to 2017. Based on these papers, annual publication amount, the trends of geographic locations of authors, keywords clustered by CiteSpace and the papers which are most highly cited in this field are analyzed and described.

The rest of this paper is organized as follows. Data and methods used are presented in Section II. Section III analyzes annual publication amount of business intelligence in SCI-expanded and SSCI. Following that, Section IV analyzes the trend in research of business intelligence based on different criteria. Section V gives papers that are most highly cited in this field. Section VI provides an enlightenment of BI. Section VII includes a conclusion of the paper.

2. Data and methods

2.1. Data source
The bibliometric database of the present investigation is built on papers retrieved from SCI-Expanded and SSCI of “Web of Science”. SCI-Expanded and SSCI both are world-class, authoritative and famous citation index databases. The former is mainly oriented towards the basic research field of natural sciences, and the latter is widely used by the scholars in the humanities and social sciences.

The search strategy in Web of Science Core Collection is: TS= (“business intelligence”) and PY=(1996-2017) and DT=(Article OR Proceedings paper) and [excluding] DT=(Book chapter) and database=(SCI-Expanded and SSCI). Following the above search strategy, a total of 846 papers from 364 academic journals and 40 conferences were found, of which 704 bibliographic data are obtained from SCI, covering multiple disciplines including computer science, management, economics, and engineering.

2.2. Methods
Bibliometrics is a sub-discipline of library and information science that uses statistical methods to evaluate the status of a certain research field and predict its development trend by means of various quantitative characteristics of the literature. At present, many scholars have used bibliometric methods to study hotspots and developments in various fields [4].

CiteSpace is an information visualization software based on co-citation analysis theory and pathFinder algorithm, developed by Dr. Chen of Drexel University in the US, which is mainly used to measure and analyze scientific literature data [5, 6]. It can be used to detect and analyze the trend of the research frontier of a discipline, draw a knowledge map of a discipline or knowledge domain, intuitively demonstrate the knowledge characteristics of a domain, and identify research hotspots and frontiers [7].

Based on the above bibliometric database, this paper assisted by CiteSpace uses bibliometric analysis to analyze and describe developments of business intelligence from different aspects. The aims and objectives of the present research are to get a comprehensive overview of business intelligence research by analyzing existing scientific achievements, studying the trend of geographic locations of authors, and finding out keywords clustered by CiteSpace and the most cited papers.

3. Annual publication amount analysis
The amount of papers published is usually regarded as an important indicator to measure scientific research output, quality, and contribution [8]. In order to analyze the output characteristics and trends of business intelligence research, this section analyzes the annual publication amount in this database and distribution characteristics of major journals.

3.1. General analysis
The growth of scientific literature is also an objective social phenomenon. American scientific scientist and information scientist, D.J. Price, proposed the exponential growth law of scientific literature, namely the logic curve equation of Price, which is defined as follows:

\[ F(t) = ae^{bt} \]  
(1)
Where \( F(t) \) is the number of literature at the time \( t \), \( a \) is the amount of literature at the initial time \( (t = 0) \), \( e \) is the base of natural logarithm, \( b \) is the time constant, and \( K \) is the maximum value of literature growth.

The logic curve shows that in the initial stage of the growth of the scientific literature, it is in line with the law of exponential growth. However, this growth trend will weaken in a certain period. When the amount of literature increases to half of its maximum value, its growth rate will begin to decrease and eventually grow slowly, with \( K \) as the limit.

As shown in Fig.1, business intelligence has undergone an initial growth phase, and now entered a phase of linear growth. Since 1996 when Gartner Group proposed the concept of business intelligence, the number of papers published relating to business intelligence in SCI-expanded and SSCI grew slowly in the next 8 years besides 2000. There is a sudden growth in 2005. However, the growth rate of relevant papers fell back in the next two years. During 2008-2011, the increase in the number of papers slowed down. And the sudden growth of the number of relevant papers again took place in 2012. There is a steady increase during 2013-2017.

In order to facilitate our further study, the 876 published papers are classified into several groups by time: ‘1997-2003’, ‘2004-2010’ and ‘2011-2017’.

| Year | 1997-2003 | 2004-2010 | 2011-2017 |
|------|------------|------------|------------|
| Number of papers | 55 | 227 | 597 |
| Number of journals | 47 | 143 | 277 |

The number of papers and involved journals every seven years is experiencing an upward trend. Before 2004, only 55 relevant papers were published. However, when it came to ‘2011-2017’, the most recent period, 594 articles were published, occupying 68% in the database.

There is a steady growth over the past 21 years for business intelligence research as the annual number of publications increased from 47 in 1997 to 143 in 2010 and then from 143 in 2011 to 277 in 2017. To sum up, the growing trend obtained in Fig. 1 indicates that business intelligence research has gained increased attention over the past 21 years.

3.2. Publications of major journals during 1997-2017

![Figure 2. Publications of major journals during 1997-2017.](image-url)
Fig. 2 lists the journals publishing more than 10 papers in total. Among the involved journals, ‘Expert Systems with Applications’ published 36 papers in total, ranking the top. And most papers published in this journal were after 2011. If we focused on the recent period (2011-2017), “Decision Support Systems” was the most productive. In addition, in the above journals, we can easily find that 'Lecture Notes in Computer Science' is the only one that has not published a relative paper in the recent period (2011-2017), and in the first two phases, “Lecture Notes in Computer Science” always is the most productive.

Table 2. Number of papers and journals from 1997-2017.

| Journal                                    | h5-index | h5-median | IF     | 5-Year IF | CiteScore | SNIP | SJR  |
|--------------------------------------------|----------|-----------|--------|-----------|-----------|------|------|
| Expert Systems with Applications           | 92       | 122       | 3.928  | 3.526     | 4.70      | 2.492| 1.433|
| Decision Support Systems                   | 70       | 97        | 3.222  | 4.290     | 4.67      | 2.497| 1.806|
| Lecture Notes in Computer Science          | --       | --        | --     | --        | 0.67      | 0.552| 0.315|
| Information Systems Management             | 16       | 23        | 1.298  | 2.000     | 1.34      | 1.137| 0.426|
| International Journal of Information Systems Management | 53 | 86 | 3.872 | 4.713 | 5.68 | 2.828 | 1.252 |
| Journal of Computer Information Systems    | 24       | 35        | 0.675  | 1.232     | 1.87      | 1.179| 0.738|
| Industrial Management Data Systems         | 34       | 48        | 2.205  | 2.343     | --        | --   | --   |
| Knowledge-Based Systems                    | 68       | 90        | 4.529  | 4.627     | 5.35      | 2.660| 1.877|
| Information Systems Frontiers              | 29       | 45        | 2.521  | 2.205     | 2.39      | 1.230| 0.540|
| International Journal of Data Warehousing and Mining | -- | -- | 0.727 | 0.909 | 1.45 | 0.935 | 0.468 |

Google Scholar Metrics help researchers to assess the visibility and influence of recent articles in scholarly publications, using two metrics: h5-index and h5-media [9]. The h-index of a publication is the largest number h such that at least h articles in that publication were cited at least h times each. The h-median of a publication is the median of the citation counts in its h-core. The h-core of a publication is a set of top cited articles from the publication. These indexes of above journals are from Google Scholar.

Impact Factor (IF) measures the average number of citations received in a particular year by papers published in the journal during the two preceding years. These indexes “IF” and “5-Year IF” of above journals are from Web of Science [10].

CiteScore 2016 counts the citations received in 2016 to documents published in 2013, 2014 or 2015, and divides this by the number of documents published in 2013, 2014 and 2015. SCImago Journal Rank (SJR) is a new type of journal evaluation index proposed by Félix de Moya and others of the SCImago research group in Spain in 2007 based on Scopus and the view that “not all citations are equal” [11]. SJR uses a similar algorithm as Google page rank; it provides a quantitative and a qualitative measure of the journal’s impact. SNIP measures contextual citation impact by weighting citations based on the total number of citations in a subject field. These indexes “CiteScore”, “SJR” and “SNIP” of above journals both are from Scopus [12].

It can be seen that the latest impact factors of these journals are between 0.5 and 4.6. The most recent impact factor which we can search out from Web of Science for "Lecture Notes in Computer Science" was 0.402 in 2005. And the latest relating papers published by “Lecture Notes in Computer Science” are in 2016. So the quality of relating papers is still guaranteed. And the latest relating papers are published by “Lecture Notes in Computer Science” in 2016 so the quality of relating papers in this field is still guaranteed. Comprehensively combining the indicators in Table 2 with the data in Fig. 2, it is not difficult to see that the journals “International Journal of Information Management” and “Knowledge-Based Systems” take great perform in the most recent period (2010-2017). And “Expert Systems with Applications” and “Decision Support Systems” are always leading journals in this filed.
4. Trend in research of business intelligence

4.1. Trend in Geographic Location of Authors
To understand the change of research geographical areas, locations of authors are investigated. In this study, we follow these standards: the location of this author will be counted multiple times equal to his publications if one researcher published more than one paper in a year. For the papers of multiple authors, all of the authors’ locations will count.

Table 3. The number of papers by geographic locations.

|                  | 1997-2003 | 2004-2010 | 2011-2017 |
|------------------|-----------|-----------|-----------|
| Number of countries (regions) | 13        | 42        | 65        |
| Number of papers  | 55        | 227       | 597       |
| Europe            | 10        | 90        | 322       |
| North America     | 32        | 96        | 208       |
| Asia              | 10        | 64        | 209       |
| Oceania           | 0         | 12        | 38        |
| South America     | 0         | 5         | 20        |
| Africa            | 0         | 4         | 13        |

Table 3 shows the number of papers by geographic locations over time. The number of papers increases steadily as scholars from more countries or regions joined business intelligence research. In the above database, the earliest paper regard to business intelligence is the one published by Pawar, BS, and Sharda, R in the USA, namely “Obtaining business intelligence on the Internet”. Although recorded publications during 1997-2003 are limited, it is still obvious to find North American scholars dominated at that time.

In the second period (2004-2010), the number of papers published by European scholars is almost equal to that of North American scholars, and Asian scholars ranked third. In the recent period (2011-2017), Asian and European scholars are quite productive. The number of papers published by Asian scholars exceeds that of North American scholars, and the number of papers published by European scholars even is about 1.55 times that of North American scholars. We can find out that In Europe, the volume of published papers by every individual country or region scholars is not outstanding. However, from the overall perspective, Europe scholars are the most productive.

There are two major countries in this area, China and America. Since business intelligence emerged, America has always been the leader in this research field, which maintained its high productivity over 20 years. For China, since the first paper written by Chinese scholars in this field was published in 2002, China gradually became a leading country with regard to the research outcomes. However, compared to the United States, there is still a big gap. For example, in the latest period (2011-2017), Chinese scholars published 112 papers, and American scholars published 171 papers, and American scholars published 171 papers, about 3.49 times that of the third, Spain.

Furthermore, the small number of researchers in Africa, South America and Oceania explains the relevantly slow development of this research in these regions.

4.2. Trend in research hotspots of business intelligence
In this section, we will use CiteSpace to visualize the above data to explore the trend in research hotspots of business intelligence. First, the time slicing is set to “1” year and the node types are determined as “key word”. And then in order to highlight the key information, we select the 10% of the highest cited frequency in each time slicing. Thresholds of that which are the frequency of occurrence, co-occurrence frequency, and co-occurrence rate for the three periods before, during, and after are set to (1, 3, 5), (3, 3, 20), (3, 3, 20), respectively. Finally, the pruning mode selects “Minimum Spanning Tree” (MST).
After the clustering calculation, the module value (Q value) is 0.4961 > 0.3, which means that the divided community structure is significant. And an average contour value (S value) is 0.5477 > 0.5, which means that this clustering is reasonable [6]. The resulting keywords by clustering are shown in Figure 3.

Table 4 shows top terms of business intelligence research sort by time descending.

| No. | Mean Year | Top Terms                               |
|-----|-----------|-----------------------------------------|
| #2  | 2013      | cloud computing                         |
| #1  | 2012      | social media                            |
| #0,#3 | 2011     | enterprise system, empirical study       |
| #5,#7 | 2007     | clickstream data, corporate decision     |
| #4  | 2005      | fuzzy approach                          |
| #6  | 2003      | process intelligence                    |
| #8  | 1999      | intelligence                            |

At the initial of the research, the concept of intelligence was the focus. At this stage, scholars emphasized the importance of information for making strategic decisions and built general business intelligence models [13]. However, in some industries, common business intelligence models offered only a partial solution. And some scholars found that Organizations exercising process intelligence were flexibly adaptive [14]. Then around 2005, the fuzzy approach became a new favorite for some scholars. For example, they enhanced the concept of summarization using fuzzy technology to help Data warehousing, which was the critical component and tool for business intelligence, extend the aggregation process and provide insightful information intelligently [15]. And as the rise of e-commerce, some scholars focused on using clickstream data to learn or predict online-purchasing behavior for corporate decision making. The result indicated that clickstream behavior was important when determining the tendency to buy [16].

Furthermore, scholars continue to explore the links between business intelligence and enterprise systems. For example, research has found that business intelligence systems must be deeply incorporated into modern enterprise systems to fully understand how information throughout an organization and to make sense of that information [17]. At the same time, scholars have also been committed to the use of empirical study in business intelligence. For example, some scholars examined the effect of user satisfaction on system usage and individual performance with business intelligence systems, which was an empirical study of Taiwan's electronics industry [18]. Due to the popularity of the Internet, social media plays a more important role in our lives. Scholars can employ text mining on a popular social medium used by vehicle enthusiasts: online discussion forums to discovery Vehicle defect [19]. This is also part of business intelligence. Nowadays, the era of big data has come. The traditional business intelligence running on the centralized platform of UNIX minicomputers can no longer meet the timeliness of information requirements in business [20]. Cloud computing has become a hot topic for current researchers, which also is an inevitable trend.
5. Citation analysis

In this section, the overall citation status of data mining has been analyzed in table 6. It is not difficult to find that in the second period (2004-2010), although the amount of publication is much lower than that of the recent period, h-index and average cited frequency are significantly higher than others.

Furthermore, the average citation of the top 10 highly cited papers is 222.1, which is much higher than that of all papers. These 10 papers are about big data analytics, predictive analytics, business intelligence software, decision support systems, data mining, group support systems, Maturity model, enterprise systems, process mining, data warehouse. A number of 3 papers were published in “Decision Support Systems” which also published most of the papers in the field during the past seven years.

Table 5. The citation status of business intelligence.

| Publication Amount | Number of Papers Cited | Total Cited Frequency | h-index | Average Cited Frequency |
|--------------------|------------------------|-----------------------|---------|------------------------|
| 876                | 665                    | 10273                 | 46      | 11.73                  |

Table 6. Highly cited literature in the field of business intelligence (1997-2017).

| No. | Title                                                                 | Authors                                      | Source                                      | Total Citation | Publication Year |
|-----|-----------------------------------------------------------------------|----------------------------------------------|---------------------------------------------|----------------|------------------|
| 1   | Business intelligence and analytics: from big data to big impact       | Chen, Hsinchun; Chiang, Roger H. L.; Storey, Veda C. | MIS quarterly                              | 795            | 2012             |
| 2   | Beyond the hype: Big data concepts, methods, and analytics             | Gandomi, Amir; Haider, Murtaza               | International Journal of Information Management | 268            | 2015             |
| 3   | Antecedents of information and system quality: An empirical examination within the context of data warehousing | Nelson, RR; Todd, PA; Wixom, BH | Journal of Management Information Systems | 244            | 2005             |
| 4   | A critical analysis of decision support systems research               | Arnott, D; Pervan, G                         | Journal of Information Technology           | 192            | 2005             |
| 5   | The application of data mining techniques in financial fraud detection: A classification framework and an academic review of literature     | Ngai, E. W. T.; Hu, Yong; Wong, Y. H.; Chen, Yijun; Sun, Xin | Decision Support Systems | 172            | 2011             |
| 6   | Eight key issues for the decision support systems discipline          | Amott, David; Pervan, Graham                 | Decision Support Systems                     | 122            | 2008             |
| 7   | Developing Maturity Models for IT Management - A Procedure Model and its Application | Becker, Joerg; Knackstedt, Ralf; Poeppelbuss, Jens | Business & Information Systems Engineering | 119            | 2009             |
| 8   | Business Intelligence for Enterprise Systems: A Survey                | Duan, Lian; Xu, Li Da                        | IEEE Transactions on Industrial Informatics | 113            | 2012             |
| 9   | Time prediction based on process mining                               | Van der Aalst, W. M. P.; Schonenberg, M. H.; Song, M. | Information Systems | 97             | 2011             |
| 10  | Integrated decision support systems: A data warehousing perspective   | March, Salvatore T.; Hevner, Alan R.         | Decision Support Systems                     | 97             | 2007             |
Article “Business intelligence and analytics: from big data to big impact”, was published in 2012, with a total citation of 795 and it is the most cited paper during 1997-2017 of business intelligence. “Beyond the hype: Big data concepts, methods, and analytics”, with a total citation of 268, ranks the second. “Antecedents of information and system quality: An empirical examination within the context of data warehousing”, with a total citation of 244, ranks the third. We can easily find out ‘big data analytics’ is a big hot spot undoubtedly in this research field.

Lastly, it is easily seen that in the basic framework of business intelligence, scholars are more concerned with data warehousing and data mining, which are the critical components and tools for business intelligence, instead of online analytical processing. Decision support system and business intelligence are inseparable because the ultimate goal of business intelligence is to help managers make decisions, which means their function is roughly the same.

6. Enlightenment
6.1. Business intelligence and cloud computing will be integrated deeply and constantly
On the one hand, from a theoretical point of view, the requirement of BI system to improve its performance continuously makes its deep combination with cloud computing to be a necessity. Traditional BI system runs on the centralized platform of Unix minicomputers, which brings the closeness of BI system. This relatively closed state and the demand for business timeliness are obviously contradictory. In addition, due to the closed nature of the system, some problems exit in the operation of traditional BI system, such as the poor scalability, the relatively weak processing capability and so on, which cause that traditional BI system can no longer meet the requirements for massive data processing, and the cost is relatively high. The emergence of cloud computing helped enterprisers to see the dawn of BI development. The combination of cloud computing and BI broke through the bottleneck of traditional BI system, which met the needs of enterprises for BI.

On the other hand, from a practical point of view, the world's best-in-class companies, no matter which industry they belong to, whose success is inseparable from the dual assistance of business intelligence and cloud computing. These successful companies mostly have their own cloud computing centers. For instance, Amazon, the largest online e-commerce company in the United States, has its own Amazon Web Services (AWS) and Google, the world's largest search engine company, owns Google cloud platform, and one of the largest online e-commerce companies in China, Alibaba has own alibaba cloud computing center. Taking Alibaba as an example, whose most famous and widest application, Taobao, its core block "Guess what you like" is a typical application of BI. At present, the recommendation mechanism of “Guess what you Like” has formed more than 10,000 elaborate consumption scenarios, and it is effectively combined with over 1 billion mass commodity library in Taobao, which can meet accurately the diversified demand of consumers at different stages.

In the future, business intelligence will continue to integrate with cloud computing deeply. Large enterprises will take more focus on building their own cloud computing centers, and SMEs will provide a better service or product for users through the professional cloud computing relying on large enterprises.

7. Conclusions
Research of business intelligence attracted increasing interests over the past 20 years, and it has a steady growth with increasing publications. The present work which assisted by CiteSpace conducted a bibliometric analysis of research on business intelligence between 1997 and 2017 and would help researchers to understand the whole picture of the field. According to the study, we learn about that a total of 846 papers were published in the two famous databases, SCI-expanded and SSCI of Web of Science.

Annual publication amount analysis shows that in the logic curve equation of Price, business intelligence has undergone an initial growth phase, now entered a phase of linear growth and Journal “Expert Systems with Applications” published the most papers relating to business intelligence during 1997-2017, which has great influence and authority by measuring many indexes, such as h-index, IF, SNIP and so on. Further, the following research findings are also obtained. Among the geographic locations of the researchers, Europe was proved to be the most productive area and America always has a leading position. In addition, China gradually became a leading country with regard to the
research outcomes. Among research hotspots of business intelligence, “cloud computing” is the latest hotspot. Citation analysis shows that Article “Business intelligence and analytics: from big data to big impact” is the most cited paper of business intelligence during 1997-2017.

In the future, reviews or other types of literature not lack of information could be included to get the whole picture of business intelligence, so the whole picture provided for business intelligence researchers will be more comprehensive.

References
[1] Y. H. LU, J. S. ZHANG, “Thinking on Establishing Integrated Business Intelligence System,” Economic Globalization, no. 12, pp. 17-18, 2002.
[2] Don Jones, R. Sun, “How to Define Business Intelligence,” [EB/OL]. TechTarget Database, 2010-04-01, https://searchdatabase.techtarget. com.cn/7-18683/.
[3] H. Zhou, “Research on Business Intelligence in China,” Modern Management Science, no. 4, pp. 44-45+112, 2007.
[4] X. R. Li, X. X. Zhang, Z. Y. Li, Berlin, Q. Zhang, J. X. Zhang, W. Qiao, S. Y. Wang, “Bibliometric Analysis of Business Models.” System Engineering Theory and Practice, vol.36, no. 2, pp. 273-287, 2016.
[5] J. H. Hou, Z. G. Hu, “Review and Prospect of CiteSpace Software Application Research,” Modern Intelligence, no. 04, pp. 99-103, 2013.
[6] Y. Chen, C. M. Chen, Z. Y. Liu, Z. G. Hu, X. W. Wang, “Methodological functions of CiteSpace knowledge maps,” Scientific study, vol.33, no.02, pp. 242-253, 2015.
[7] J. Xu, W. P. Wang, “Study on the Development and Current Situation of Artificial Intelligence Education in China——Based on CiteSpace's Visualization Analysis of Chinese documents from 1976 to 2017,” Information Technology, vol. 43, no. 06, pp. 1-6, 2017.
[8] X. X. Ren, X. Qiao, L. P. He, Z. Y. Huang, S. Y. Wang, “Research and Analysis of Banking Business Model Based on Bibliometric Model,” System Engineering Theory and Practice, vol. 36, no. 05, pp. 1169-1179, 2016.
[9] “Google Scholar Metrics”, Google Scholar, 2018. [Online]. Available: https://scholar.google.com/scholar/metrics.html. [Accessed: May-2018].
[10] Web of Science. [Online]. Available: http://www.isiknowledge.com/. [Accessed: May-2018].
[11] X. B. Zou, X. J. Chen, “A Comparative Study of the New Citation Index Evaluation Indexes SNIP and IF, h Index and SJR,” Library and Information Service, vol. 56, no. 10, pp. 14-16+13, 2012.
[12] “Journal Metrics”, Scopus, 2018. [Online]. Available: https://journalmetrics.scopus.com. [Accessed: May-2018].
[13] Kim, W., “On business intelligence systems,” Tsukuba, Japan, 2nd International Conference on Worldwide Computing and Its Applications (WWCA 98), MAR 04-05., 1998.
[14] Holt, PJ; Light, J, “Process intelligence: Using Internet technology to improve effective drug trial throughput,” Drug information journal, vol. 35, no. 3, pp. 767-779, 2001.
[15] Krishna, PR; De, SK, “A fuzzy approach to build an intelligent data warehouse,” Journal of intelligent & fuzzy systems, vol. 11, no. 1-2, pp. 23-32, 2001.
[16] Van den Poel, D; Buckinx, W, “Predicting online-purchasing behaviour,” European journal of operational research, vol. 166, no. 2, pp. 557-575, 2005.
[17] Koh, S. C. L.; Gunasekaran, A.; Goodman, T, “Drivers, barriers and critical success factors for ERPII,” Journal of strategic information systems, vol. 20, no. 4, pp. 385-402, 2011.
[18] Hou, Chung-Kuang, “Examining the effect of user satisfaction on system usage and individual performance with business intelligence systems: An empirical study of Taiwan's electronics industry,” International journal of information management, vol. 32, no. 6, pp. 560-573, 2012.
[19] Abrahams, Alan S.; Jiao, Jian; Wang, G. Alan; Fan, Weiguo, “Vehicle defect discovery from social media,” Decision support systems, vol. 54, no. 1, pp. 87-97, 2012.
[20] X. Y. Mu, N. Miao, M. Chen, F. Wei, “The influence of Business intelligence on the core competitiveness of enterprises in the cloud computing environment,” Intelligence magazine, vol. 29, no. 6, pp. 50-53+43, 2010.