



A STUDY ON WEB INTELLIGENCE AND ITS APPLICATIONS IN THE NEW INFORMATION AGE

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Abstract: *Today the world is changing at a very rapid pace, many new areas of studies are being evolved in order make human living easy on this planet, one of the latest area of study that has been at present at a cutting edge is the study of web intelligence and big data. This paper gives information regarding Web Intelligence (WI) which has been renowned as a new trend in the field of Computer Science for immense scientific and methodical research which results in progress to discover some of the impacts and roles of Information Technology (IT) and Artificial Intelligence (AI). In this context this paper also discusses, data mining helps search engines on the web to find some superior quality Web pages and improve Web click stream investigation. For the Web to reach its full and complete limits, however, we must improve its services, to make it more intelligible, and enhance its usability across the parts of world. As researchers and scientists go on to develop a wide range of advanced data mining techniques, we believe that this technology will play a gradually more important and a extremely significant role in meeting the challenges of budding the intelligent Web services to all.*

Keywords: *Web, web intelligence, data mining, artificial intelligence, information technology, mobile devices*

I. Introduction

Web Intelligence is the area of research, experiment and study of the application of information technology and artificial intelligence on the web in order to create the higher level of commodities, frameworks and services which are mainly dependent on the internet. The term “web intelligence” was initially coined in a paper which was written and presented by Ning Zhong, Y.Y.Ohsuga and Jiming Liu Yao in the Computer Software and Applications Conference in the year 2000. Web intelligence is a field of study that describes some of the roles and important impacts of some concepts of Information Technology as well as in the field of artificial intelligence on the next generation of web-related products, systems, and its activities. As a new direction for scientific or technical research and its development, the web intelligence can prove to be an extremely beneficial tool for the field of artificial intelligence in many areas, some of which may include e-learning, e-commerce, e-governance and so on. Web intelligence is considered as one of the one of the important field of study for the development of the wisdom web (including the semantic web). Data mining holds the solution to the discovery and classification of the authoritative links, traversal prototype, and semantic web structures that will bring intelligence and path to our Web interactions. Hence data mining plays a very significant role in developing the web intelligence.

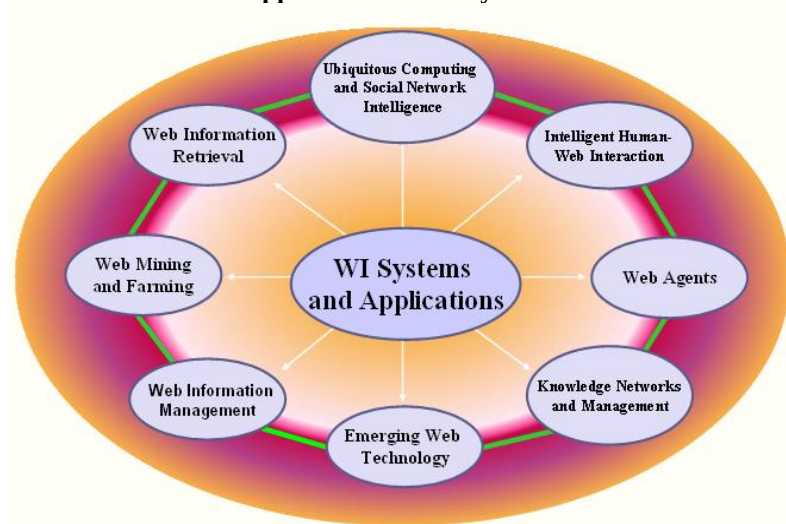
II. What is Web Intelligence

Generally speaking, Web Intelligence can be considered as new trend in scientific or technical research oriented study and is an emerging area that gives immense scope for discover the realistic impact and the essential roles of artificial intelligence (AI), some of which may include knowledge representation, planning, knowledge discovery and data mining, and social network intelligence, as well as some of the advanced information technology (IT) applications, such as wireless networks; latest devices; social networks; and data and knowledge grids; and the next generation of Web-empowered products. On one hand, Web Intelligence applications results from existing disciplines to a totally new domain or era in technology. On the other hand, WI introduces new problems and challenges to the existing and established disciplines in the field of technology. WI may be considered as an enhancement or an extension of Artificial Intelligence and IT. The WI technologies surely transform the way in which the information is collected, stored, processed, presented, shared, and used through various methods.

The challenges of Internet computing research and development in the next decade will be completely WI centric, focusing on how we can intelligently make the best use of the widely available Web connectivity and web services. Really great potential exists for WI to make useful contributions to various e-business (including e-commerce and e-finance), e-learning, e-government, e-community, and so on. Many specific applications and

systems have been proposed and studied. In particular, the e-business action that involves the end user is undergoing a major revolution.

III. Applications of WI Systems



As stated earlier web intelligence is an emerging technology today. The various applications of the Web Intelligence systems are shown in fig.1.

Some of the best examples where web intelligence systems are used are:

- i) *Business Intelligence*
- ii) *E-Commerce*
- iii) *E-Finance*
- iv) *E-Government*
- v) *E-Learning*
- vi) *E-Science*
- vii) *Intelligent Web Information Systems*
- viii) *Price Dynamics and Pricing Algorithms*
- ix) *Web-Based Direct Marketing and CRM*
- x) *Web-Based EDI*

Again as described in fig.1 each of the applications are further used in various fields of computing. Day by day the Web is changing the way it collects, develop, and use the appropriate information or data. Also, it redefines the meanings and process of the business, commerce, finance, publishing, marketing, education, development, research, as well as some other important aspects of our routine daily life. Even though these individual Web-based information systems are continuously being brought into effective action everywhere, some sophisticated issues and techniques for emerging and for benefiting from Web intelligence still remain to be studied systematically.

IV. Levels of Web intelligence

Now that we have seen the some of the trending applications of the web intelligence, let us see the various levels of the web intelligence technologies. To develop a Wisdom Web and to benefit from the information infrastructure that the Web has empowered, we have witnessed the fast development as well as applications of many WI techniques and technologies. Now let us see the four most important levels of the web intelligence:



The above figure shows the 4 important levels of WI. Their description is stated below:

Internet level-The communication, security and infrastructure protocols:

This is the first important level in web intelligence. In the present day the Web is regarded as a system that is completely a computerised network. WI techniques for this type of the level includes the Web data perfecting systems that are built upon patterns like the Web surfing patterns to resolve the issue of Web suspension. The intelligence of the Web perfecting comes from an adaptive learning process which is actually based on the observation and characterization of user and their surfing behaviour.

Interface level-The multimedia presentation Standards:

This is the second important level in the web intelligence. The Web is regarded as the biggest interface for the human-Internet interaction. WI techniques for this type of the level are used to develop intelligent Web interfaces where in the capabilities of adaptive cross-language processing, personalized, multimodal data processing and multimedia representation are required.

Knowledge level-The information processing and the management tools:

This is the next level after the interface level in the web intelligence. The Web is today regarded as a distributed data base/ a knowledge base. There is an urgent need to develop the languages like the semantic mark up languages which will be used to represent the semantic contents of the Web that are available in the machine-understandable formats for the agent-based autonomic computing, which includes the searching, classification, filtering, managing, aggregation,, mining, and discovery of the information on the Web based platforms.

Application level-The present day computing and social intelligence environments:

The Web today is regarded as a basis for establishing social networks that contain communities of people, organizations and other social entities who may be connected by social relationships like friendship, co-workers, or just by information exchange with common interests. These are virtual communities or the Web-supported social networks or. The study of WI concerns the several important issues regarding the social network intelligence. Furthermore, the multimedia contents on the Web are accessible not only from the stationary platforms, but are also increasing day by day from the mobile platforms. The present day computing and the accessibility of the web services from various wireless devices needs adaptive personalization for which the WI techniques are used to construct models of user interests by inferring implicitly from user behaviour and their actions.

Particularly, the social intelligence approach presents numerous opportunities and challenges for the research and development of WI, as well as a Web-supported social network that needs to be supported by all levels of WI as mentioned above.

V. Data mining and web intelligence

The Web— is an immense and dynamic collection of pages and data that includes countless number of hyperlinks and huge volumes of access to the data and usage information Thus is regarded as a rich and extraordinary data mining source. Further the web also poses immense challenges which is thereby leading to great amount of research and is contributing a lot to the new discoveries.

Hence to find any data on the web we need to do a very high and a massive search. Though the search time today for various search engines may be less but by implementing more web mining techniques we can reduce the search time even more.

The need for advanced web mining is:

Web page complication far exceeds the complication of any conventional text document collection:

Even though the Web behaves as a vast digital library, containing loads of information, most of the times the pages themselves lack a identical structure and contain far more authoring style and information variations than any other set of books Moreover, the tremendous numbers of digital documents in this digital library have not been maintained in a certain indexed order, thereby makes searching the data it contains extremely difficult.

The Web constitutes as a highly useful dynamic source of information:

Not only does the Web continue to grow rapidly day by day, but the information contained in it also requires a constant update accordingly. News, stock markets, corporate sites and service centre modify their Web pages regularly. Thus only by updating the content present one can benefit from the wide ocean of information.

The Web serves as a broad range of user communities:

The Internet is rapidly expanding the user community connections through numerous workstations. These users have noticeably different backgrounds, interests, and usage purposes in contrast to one another. Most of them

even lack good knowledge of the structure of the huge network of information while some of them are totally unaware of a particular search's intense cost, often may get lost within the immense world of web information, and can scrape at the many access hops and lengthy waits are necessary to get back search results again.

Only a little portion of the Web's pages contain truly significant or useful information:

A given user generally focuses on only a small and their required portion of the Web, treating the rest as an uninteresting or useless data which serves only to inundate the desired search results. Thus for a user the data he requires is only relevant among the huge data contained on the web.

Thus data mining plays a very significant role on the web. Google and other search engines showed the Web's great promise to become the ultimate information system.

VI. Example of Data mining for web intelligence

Many promising data mining techniques can help us to achieve effective Web intelligence. Customization of a service to a particular individual requires keeping a record of that person's Web traversal history and to build a profile accordingly, then by providing quick, tailored Web services based on that information of his record.

To date, some of the Web-based e-commerce service systems, such as amazon.com and makemytrip.com, register every user's past traversal and purchase history and create customer profiles from that set of data. Based on a user's profile and preferences, these e-commerce sites select appropriate packages, sales promotions, and recommendations, thereby providing better service than the other sites that does not store this information. Using data mining or web mining techniques to find a user's buying or traversal records we can further enhance the quality of these services. Although a tailored Web service based on a user's traversal history may help in recommending appropriate services, a system usually do not have the capability to collect enough information about a particular individual. Either the travelling history has too less past information about that particular person, or the possible ranges of recommendations are too many to set up a previous record for any of the individuals.

In the above case, combined filtering is helpful because it does not completely rely on a particular individual's past experience and his records but on the combined recommendations of the people who share a very similar pattern of records similar to the individual being examined. Thus, if people who have similar preferences to those of a given individual who was willing to buy dress A, then that particular person is likely to buy dress B and C as well. The site would then recommend B and C to that individual.

This method generates quality recommendations by evaluating combined effort rather than just basing on the recommendations of only one person's past experience and records. Indeed, combined filtering (also known as collective filtering) has been used as an effective data mining method for Web intelligence.

VII. Conclusion

WI has however been acknowledged as one of the most significant as well as the fastest-growing IT research fields in the era of the World Wide Web, grid computing, , knowledge Web, intelligent agent technology, and everywhere social computing.

WI technologies will always maintain to produce the latest tools and the infrastructure components that are necessary for creating intelligent venture portals and serve users worldwide wisely.

Data mining for Web intelligence will be an essential research area in Web technology, one that makes it possible for us to fully use the vast amount of information present on the Web.

However, to achieve perfect web mining we must overcome several research challenges before we can make the Web a friendlier, wealthier, and more intelligent source that we all can share and explore.

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