# Editorial Article

Almost one decade before when Tim Berners Lee coined the idea of semantic web, it looked like a distant dream. Now we are already experiencing the initial waves of semantic web in the form of more intelligent context based searches. However human nature is insatiable which drives us towards exploring potential avenues of betterment. This fact is leading WWW towards transformation from Semantic Web to Wisdom Web. This article highlights the technologies contributing most towards the next generation of WWW and also suggests future direction for Web Personalization.

Wisdom Web: The WWW Generation Next

Since its inception in early 1990s world wide web has undergone three generations and is ready to proceed towards its fourth generation which is the knowledge oriented web or Wisdom Web. The insatiable thirst for exploration has led the WWW from information oriented web to knowledge oriented one. Initially Tim Berner Lee gave the idea of WWW for exchange of information placed on different systems with the help of hyperlinks which later took the shape of WWW and became the global repository of information. The journey of WWW can be summarized as: Information Web → Social Web → Semantic Web→ Wisdom Web. Figure 1 given below shows this paradigm shift with respect to time.
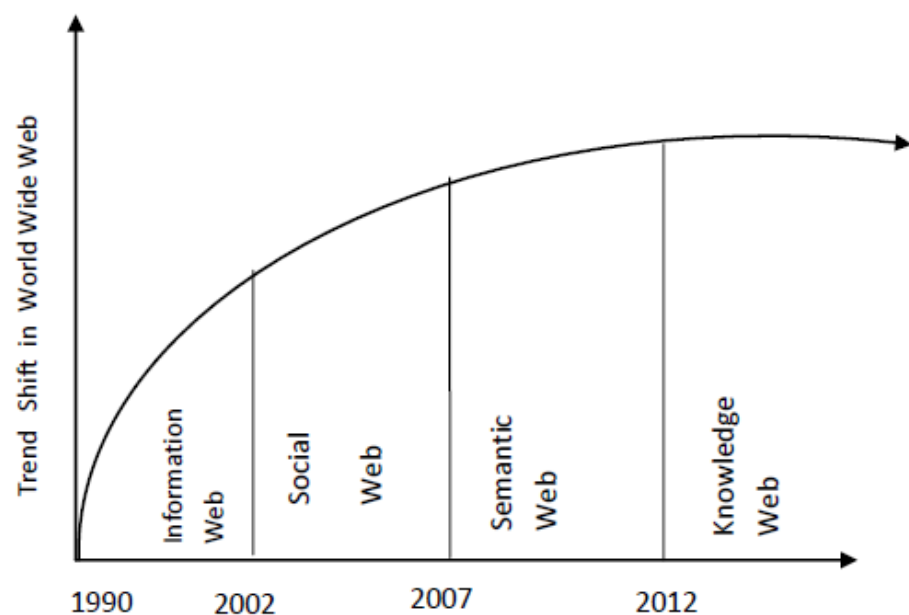
Figure 1 Paradigm Shift w.r.t. Time

Transformation of Information Web to Semantic Web in the present era is contributed by many technologies and rigorous research efforts in different dimensions. Although there are numerous technologies

contributing towards the appearance and functionality of the web, this work limits attention on the following prominent fields:

- **Semantic Web**
- **Agent Technology**
- **Intelligent Focused Crawlers**
- **Web Mining specifically Content and Usage mining**

Semantic Web aims towards making the machines understand meaning of the information displayed on the web pages or other sources, so that machines may contribute in returning context based information to the users, who are nowadays suffering from information overload problem. Thus SW focuses on changing the way web pages are developed (shifting from HTML to XML) , making use of Resource Description Framework (RDF) in web content development so that computers may understand and identify different entities and their attributes.

However, since computer is a machine and can't be intelligent, this intelligence of returning context based information to users is provided by *Agent Technology*. Agents are software components which can work on behalf of its user. Possessed with autonomy, learning ability, goal directedness, mobility, reactivity and pro activity and many other appealing attributes, they have proved promising solution for SW implementation. They are widely employed in e-commerce based applications, providing personal assistance to users and many web based applications. Tim Berner Lee coined the idea of SW keeping agent technology in mind. In his visionary article 'The Semantic Web' (2001), he emphasized that agents will be the instruments in future semantic web. His prediction has been proved since SW applications and services are relying heavily on agent technology, actually acting as its backbone.

Search *engines* are major player in Semantic Web, since nowadays users look forward to SE for any kind of information retrieval. Context based information retrieval seems impossible without search engines in scene. Search engines are supported by crawlers in back end which are software components collecting information from the web and placing it in indexes for future retrieval. These crawlers are also making use of intelligent mobile agents which collect information from the web autonomously, index them, and refresh the pages periodically, at the same time reducing network traffic. Earlier crawlers being simple software components were not able to move, they just sat on a server and send http requests for the desired information on the network and received responses. Thus every request was associated with increased traffic on the web, which might not be useful or was partially useful. Now mobile agent based crawlers don't send http requests, they replicate and transmit themselves over the network to various servers. Perform local search for the desired information and send only useful information back to the source, thereby reducing traffic. Along with simple search

engines like Google, yahoo, altavista etc. focused SE are also available and widely been used for research purposes. These focused search engines specialized in one kind of information for example information available as portable document files (pdf). They employ focused web crawlers, focusing only on one kind of data such as research data only, Google Scholar is an example of this category.

Context based information retrieval is achieved by SEs supported with semantic web contents and intelligent agents working in the back end. Now user expectation is shifting towards personalized web contents i.e. interest based information retrieval. With the explosion of information on the web, it is difficult for the user to select relevant and useful information. Neither the user has the time or the patience for exploring long result pages returned by the SE to find most relevant information. Internet has taken the form of global market where anyone can buy anything from anywhere. Customers are having lots of websites to choose product and services from. Business organizations are facing tough competition in attracting customers and retaining them. End user wants to avoid information overload problem and business organizations want to retain their customers by providing them customized services. This phenomenon has given rise to web mining techniques. Web Mining (WM) refers to applying tools and techniques of data mining on web contents so as to gain useful knowledge about trends and patterns of user behavior. WM has been classified into web content mining, web usage mining and web structure mining out of which content and usage mining are directly contributing towards web personalization or interest based information retrieval. WM has been paid much attention by research community recently and is expected to contribute greatly towards future knowledge oriented web.

Figure 2 given below illustrates the process of emergence of wisdom web. Also this figure highlights the role of search engines, intelligent agents, agent based crawlers, application of web mining techniques on web server logs and emergence of knowledge through this process which is further used in making useful recommendations for the users. We currently experience and work with this kind of web, although it is still far from personalized web, since the techniques applied in mining web data and results produced are general and are not meant for a specific individual, thus the results may or may not be fruitful. Transformation of WWW to Wisdom Web requires change in the way of web access and therefore requires new architecture for Search engines. Unlike the free information access from the search engines, there should be account based access for searches so that the user exploring the information may be recorded and provided with updates and new information on his/her interest domains. This change in search engine architecture may lead to efficient web personalization, can help in providing knowledge, based recommendation to an individual and thus can contribute towards Wisdom Web.
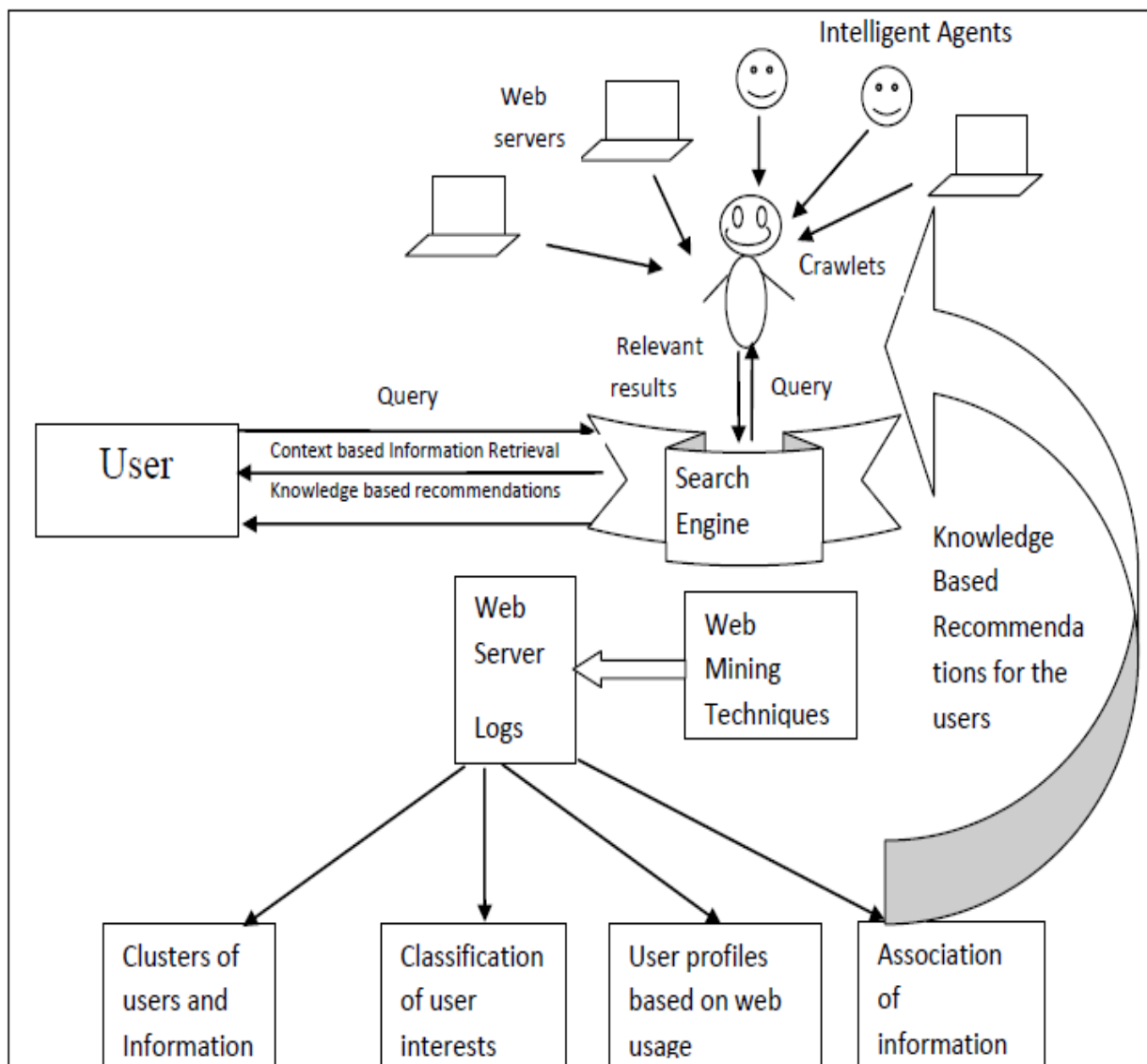
Figure 2 High Level View of Emerging Wisdom Web

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Dr. Singh has Ph.D. (Computer Science), M.Phil. (Computer Science), MCA, M.Sc.(Computer Science) and B.Sc. (Computer Science & App.) degrees to her credit. She owes the credit of 23 published research papers in various International Journals of repute, with one of her paper awarded as the Best Paper in an IEEE Conference. Her research domain includes Semantic web, Agent Technology, Web Mining and Intrusion Detection Systems.