

Navigating The Realm of Web Intelligence and Unleash the Power of Intelligent Insights

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Abstract- *In this world full of Technology Web Intelligence plays a disciplinary role in Artificial Intelligence [AI] and in Advanced Information Technology [IT]. Web Intelligence is the combination and implementation of both Artificial Intelligence [AI] and Information Technology [IT]. As Internet and Web based technologies are growing rapidly in this digital generation Web Intelligence remains the platform to explore the fundamental roles of Artificial Intelligence which is growing and exploring to the highest in the globe in the basis of creating a new era. In this chapter we can have a clear vision about Web Intelligence and all of its domains, its evolution, the difficulty while implementing it and about its elaborated future.*

Keywords- Web Intelligence, Artificial Intelligence, Information Technology, Wisdom in web, Information retrieval, Mining, Farming.

I. INTRODUCTION

Web Intelligence is a multidisciplinary field that mainly focuses on enhancing and developing the web-based applications and systems through the abilities of artificial intelligence, data mining, machine learning and other web-internet based techniques. It retrieves the user needed information from the data that are available in vast amount in web by analysing the user request. Web Intelligence plays a very crucial role in various web-based domains including web search, e-commerce, cybersecurity and in more fields as it requests to retrieve valuable information from the ever-expanding digital world wide web [1].

Web Intelligence refers to study and technological field that enhances the user experience by analysing the data and providing the data without duplicates to the user. It ensures data security while sharing or retrieving the data in the internet. Web Intelligence plays a pivotal role in moulding and shaping the way users interact with the internet and enabling applications like fraud detection, sentimental analysis, face detection, cyber security etc... extremely making web more informative and

responsible for user needs [2-5]. Web Intelligence was first introduced in the year 2000 [6-8]. In this generation of intelligence researchers and scientist tried to give the ability to acquire and apply knowledge where ever needed and some skills to machine which was later defined as artificial intelligence. The web intelligence is the most important part in artificial intelligence and in web-based applications. The development of futuristic devices and machines are fully dependent on the web technology. So this is considered as one of the most incredible achievement of human mind facing all kind of challenges and overcoming all the milestones to make the world more innovative. On continuation of the introduction we will be discussing about the literature review on web intelligence

Web Intelligence is also considered as a web-based tool which enhances reporting and analysing the data. It provides an interactive way of viewing the data and analysing the data from various resources available. It also helping in doing standard functions like adding data, removing data, saving the data and finally retrieving the data. Web intelligence is the area which is the part of scientific research and development that explores lots and lots of information with the help of artificial intelligence.

Fig. 1 shows the web intelligence.

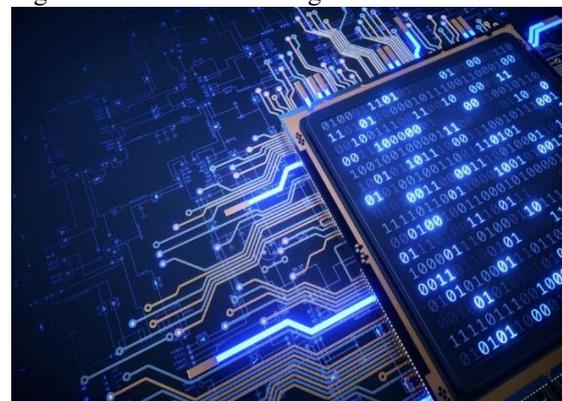


Fig. 1 Web Intelligence

II. LITERATURE REVIEW

Most of the researchers defined the need of Web Intelligence is just for web size and complexity. The web intelligence stands on four pillar legs such as the system can think and act like human, system can think immediately and react immediately, system can analyze the situation and react according to that and it reacts naturally with the emotions [9-12]. For increasing target marketing web intelligence has a most populated application called E-commerce which has the feature of tracking user browsing behaviour based on individual mouse click.

III. WEB INTELLIGENCE

Web Intelligence is a multifaced concept of field that briefly shows about the intersection of technology, data, internet and human interaction with digital world. This survey paper delves about the significance of web intelligence, about its key components, applications of it in real world and its impacts on society [13].

At its core, web intelligence means the ability to collect or retrieve more amount of data generated on the internet and modify them into a meaningful data which can used in many domains of web-based technology [14].

A. Core and key components

The core and key components of Web Intelligence mostly rely upon data extraction, data mining, cybersecurity, e-commerce and other internet-based domains.

- It plays an irreplaceable role in industries
- Web Intelligence helps in businesses by detecting regular data of customer needs, fraud transaction, ratings etc.
- In medical field it diagnoses the disease by analysing patient medical data available in the internet and tracks their health.
- In finance it predicts market trends on regular basis and manages the investment.
- In cybersecurity it helps to identify online threats by tracking network traffic and user behaviour.

Web Intelligence in Industries

Web intelligence in industries plays a vital role in collecting regular data of import and export details that are available on cloud.

Web Intelligence in businesses

It helps businesses in collecting data about consumer needs, market trends and helps to gather information

about competitors and ensures in building an effective market strategy.

Web Intelligence in healthcare

As now a days everything became digital medical field has gained more advantages due to this through which medical records, patient details, scientific research papers are available online which makes doctors more-easier to track the health of an individual patient [15].

Web Intelligence in e-commerce

In e-commerce it provides all the facilities given by the government to the people and provides online shopping methods which are very popular and growing technology now a days. E-commerce is the well growing field in web intelligence.

Web Intelligence in social media

In social media web intelligence uses to identifies user needs according to their search and provides according to it. It connects the people with the digital world by acting as an interface.

Web Intelligence in finance

In finance sector web intelligence is used for detecting fraud transaction, stock market analysis and risk assessment by collecting and analysing data from social media and data available online.

Web Intelligence in cybersecurity

Web Intelligence helps in identifying the threats to the people and gives alert to the official who take serious on to it [16].

Web Intelligence in education

In education it provides personalized learning techniques and learning platforms to make study easier and make the concept understandable to every student [17].

B. CHALLENGES FACED DUE TO WEB INTELLIGENCE

- As lot of data are available in online it is difficult to filter the data and get the relevant one which leads to information overloading.
- Due to this technology fake news and information can also spread in social media and other sources of internet which leads to chaos among the people.
- This technology can cause leakage of privacy information to the unauthorized and illegal user through dark net.

- Web data can affect the reliability of the data because it can be inconsistent, inaccurate and incomplete.
- Web cannot process and analyse large volumes of data which needs a complex robust infrastructure.
- Ethical dilemmas are most unsolvable problem in web intelligence it causes unknowing of how to collect a data, how to use and potential consequences.
- When dealing with web data compliance with data protection laws and regulation such as GDPR can be challenging.
- Hacking attempts, data breaches, posing security risk are those activities that can attract cyberattacks [18].

In this next topic we are going to see about the real-world web intelligence which clearly shows us the WI in real world

IV. REAL WORLD IN WEB INTELLIGENCE

Web Intelligence in real world is a routine of collecting, gathering, extracting information that are available in the web like social media, news websites and other medias which project the real-world issues then and there to the people. It helps the people to know about all the trends that are happening throughout the world and make people engaged in this web world. Web intelligence always provides an individual according to their needs and make itself as a user friendly one. It makes people to know about e-commerce, educational facilities, finance, cybersecurity, industries, businesses, medical field and so on. It helps multinational companies and entrepreneur to make decisions according to their competitors through the data that are available in the web. In this next topic we are going to discuss about the importance of Web Intelligence in real world.

A. Features of web intelligence

The web should have the automatic capability of dividing its process to the agents as well as to their sub agents. And those intermediate agents should connect and communicate through a proper Agent Communication Language with other agents to make their communication more simple. The agent population involved in this web intelligence may get change on a regular basis as some agents may get deactivated and some agents may come into existence. The web intelligence agents should have the feature to use Problem Solver Markup Language and other various languages to update about their roles, setting features and relationship with various agents. And lets see the features of WI in fig 2.

- Web intelligence should have the ability of understanding and processing the natural language.
- It must have the feature of understanding and judging the core meaning of the concept.
- It must check the source of knowledge created dynamically for the concept and must show the relationship that it has with the concept.
- And at-last the web intelligence can personalize the user communications and interactions.

On continuation of this topic we will discuss about the importance of web intelligence which is shown in Fig. 2.

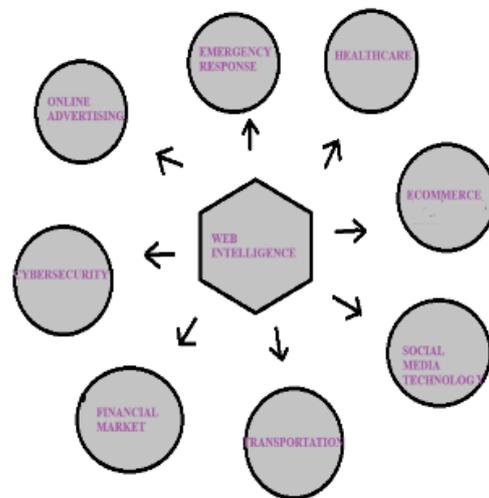


Fig 2. Real World Web Intelligence

V. IMPORTANCE OF WEB INTELLIGENCE IN REAL WORLD

- Web Intelligence makes search engines like Google, Chrome, ChatGPT etc to make users get relevant web pages when they search.
- It tracks trends and competitors to make informed decisions.
- It helps people to know about the government policies and other online purchasing facilities.
- It monitors and detects potential threats and issues on web pages and internet to protect form cyberattacks.
- It engages people with social media like twitter, Facebook, Instagram etc to know about trends and real time issues that are happening in the real world.
- It detects fake records like fraud transaction, account takeovers and fake reviews in online.
- It helps to track an individual health, helps to track diseases and find the resources that are needed for a patient to get recover.

- It helps to find peoples issues that they are facing on their day-to-day life and submit this report to the higher officials.
- online resources like websites etc and study through online.
- In travel it makes us to know about the place through its ratings and pictures that are collected from satellite and helps us in booking tickets, registering before our arrival.
- It forecasts the weather conditions, climate change, energy

On continuation of this topic we are going to elaborate our thoughts on web intelligence through its evolution and architecture.

VI. EVOLUTION OF WEB AND ITS ARCHITECTURE

A. Evolution of web.

Web was introduced in the year 1990, the repository of knowledge was considered as World Wide Web. Google ,which is one of the search engine had been used for the purpose of searching web, through that they could search and analyse only minimal portion of web which is called as “Surface web”. But the “Deep web” which contains large amount of data had not been used by anybody. Later some startup companies used quantum linguistics in the process of searching Deep web. All this made a new network-based structure called “client server” model. The next major application called social networking was came into existence when the distributed or shared networks were introduced to allow social interaction and communication a new combination of web called Web-2 came into existence. Fig 3 shows the web architecture.

In return to the original or actual web called Web-1, the searching was done through constraints and key words which is not suitable for all the cases and resulted in inappropriate information. Therefore it was mandatory and necessary to construct a semantic web which is called as Web-3. This web-3 was constructed on basis of Ontologies. These ontologies tell us about the essential component of semantic web and describe the concept in machine readable form. Ontological languages like OWL which stands for Ontology Web Language and many other languages and tools helps in the implementation of the Web-3.

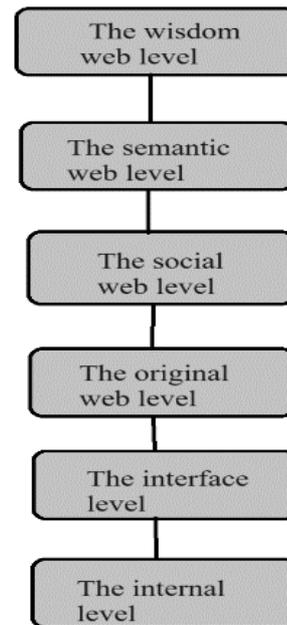


Fig.3 Web Architecture

B. Level of internet This is the architecture which has been evolved from 1969 and was rapidly growing towards the New Internet Generation. The frequent obstacles of the Internet are to support the ability to move free or mobility in large-scale, effective and efficient information or distribution of contents and privacy. There are many analysis across the globe to provide effective solution for the above barriers. Most of these projects have been created as a basic design concept, predicted to be developed and substantiate the basic technological functions and provide all time effective network.

C. Level of interface As the web function has an interface level for developing human interaction with the internet, it obligates the following features like robust cross language processing, personalization in interactive-media representation and potentiality in multi-modal data processing. Web inserted cameras in the phone can arise a question or a doubt in the form of an depiction captured by the camera that have been enabled in the phone.

D. Level of original web It is also called as Web-1 and it is the crucial level. The most significant application is searching the web pages and websites which satisfies the given or declared keywords. This can be done by using a amount of search engines like Google. Those engines can yield the list of the web pages which satisfy the code of identification given, but it is categorized in the order of showing the importance of each page. Here the pages are hyperlinked to each other. Google, the most familiar

search engine uses a page ranking algorithm to rank the pages.

E. Level of social web The social web is considered as combination of social relations which connects lots and lots of people through the wide web available all around the world. The social web encounters how webpages and software are created and updated in order of supporting the faster social communication with people. The main objective of the social web is to make simple interpersonal communication and interaction for the users.

F. Level of web-3: This Web-3 is also called as semantic web. This was started by Berners-Lee, who describes the semantic web as one of the earliest works of his days on the World wide web. During those time he was very much involved in developing the sophisticated applications for creating, editing and viewing connected data. On continuation of this topic we are going to discuss about tools used in web intelligence.

VII. DEEP WEB

Although surface and other levels of web may contain billions of static information within Hyper Text Markup Language pages, In the year of 2008 when Google had to pass a milestone which is based on data. They came across those hardships by updating trillion of address to the web pages through surface web but there was a hidden web behind this surface web which is used as the main source to ignore those problem is Deep web. This Deep web is almost five hundred(500) times larger and greater than surface web.

This Deep web include information based on financial field, history about shopping criteria, schedules of flight take-off and landing, researches in medical field and all kinds of information stored in database which are not available to search engines. Each Deep web uses some search engines as intermediate which is used for each data sources. In order of deep searching properly we should have semantic contents available for search.

This Deep web is mostly used web which is used for deep searching the data which cannot be retrieved by other search engines. On this continuation of this topic we are going to see about various tools used in web intelligence.

VIII. TOOLS USED IN WEB INTELLIGENCE

Web intelligence has various tools and technology to process, analyse, retrieve data from web. Some commonly used tools and technologies are web crawlers, data scraping libraries, web APIs, data

storage, data transformation, natural language processing, machine learning frameworks, web analytical tools, visualization tools, search engines, web intelligence platforms.

These technologies are used to gather and retrieve more data that are available in vast amount in online without data duplication, frameworks, data overriding etc. some of most commonly used tools are listed as above. These tools really work as a backbone to web intelligence. In this next topic we are going to discuss about the most popular algorithm called bat algorithm. So lets see the tools in the bellow mentioned in Table1.

Table 1. Tools in web intelligence

TABEA U	SISENCE	LOOKER	ZOHO CORPORA TION
ANALYT ICS	MICROSOFT POWER BI	IBM COGNO ANALYTIC S	DUNDAS DATA ANALYTIC S
QLIK	ORACLE BUISNESS INTELLIGE NCE	YELLOWIN BUISNESS INTELLIGE NCE	INFORMAT ION BUILDERS
BUISNE SS OBJECT	BIRIT PROJECT	PENTAHO	CLIC DATA
ALTERY X	HUB SPOT	SAS INSTITUTE	GOOGLE DATA STUDIO
QLIK SENSE	DCMO	MICRO STRATERG Y	DATAPINE

IX. BAT ALGORITHM

Bat algorithm is the metaheuristic-algorithm which is based on Swarm and it was developed in the year 2010 by Xin-She Yang. Bat algorithm is known for its searching or foraging behaviour through which it searches its prey. This Bat algorithm is working based on the emission of various pulse and microbats loudness with echolocation behaviour. This bat algorithm uses artificial bats for searching agents. The echolocation behaviour is classified based on the following steps:

- Here the bat contains velocity v_i at the best position x_i with frequency or wavelength and loudness A_i at i^{th} step.
- Once it gets its best prey it will frequently change its frequency or wavelength, loudness and pulse emission rate r .
- In this searching is done through a random search also called as local random walk.

- In this algorithm selecting the best prey is done until the stop is met and then the selection gets completed.

STEPS IN BAT ALGORITHM

Step1: Begin the algorithm.

Step2: Declare the best position, velocity and the parameters.

Step3: Evaluate the individual and save the best position.

Step4: Update the velocity and position.

Step5: r and $I \geq r_i$

Step6: Update temporary position and evaluate its fitness.

Step7: r and $2 \leq A_i$ & $f(x_i(t)) < f(p(t))$.

Step8: Updation of loudness, emission and best position.

Step9: Stop criteria is met.

Step10: Output of the best position.

Step11: End of the algorithm.

X WEB INTELLIGENCE IN PRESENT AND FUTURE

Web Intelligence provides power to search engines like google, chrome to make user to get their required search data. It also recommends more platforms like Netflix, Disney plus to people to engage with the world. NLP technology provides chatbots, virtual assistants, face detection, making human-computer more interactive with the mankind. Big Data Analytics is also one of the most well developing platforms in web intelligence. E-commerce is the next successful that is developing in the current era exploring about government policies to the people, about retailers, inventory management and customer targeting. Cybersecurity is the field in which web intelligence plays a crucial role in detecting the faces for security purpose, tracking the data of the people that is available online. Social media is a platform that builds support for the web intelligence by introducing trends to the people and make them know about the issues that are happening all around the globe. In future web intelligence would bring a vast change by introducing AI and Machine learning, semantic web, edge computing, ethical consideration, argument reality, virtual reality, blockchain integration and quantum computing.

XI. CONCLUSION

The result of this research paper concludes that this world can't survive without a web for example web-cycle of humans, creatures etc. so this web is going to decide our future. It makes our future as a digitalized one and makes us to adapt to it. The development of AI and Machine learning makes the web intelligence more powerful. The introduction of web intelligence may cause some issues at the beginning but once it gets into the digital world it makes unbelievable changes that are more useful to the upcoming generation.

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