Scientific Journal of Informatics
Vol. 6, No. 2, Nov 2019
p-ISSN 2407-7658 http://journal.unnes.ac.id/nju/index.php/sji e-ISSN 2460-0040

Intelligent Web Applications as Future Generation of Web Applications

Karzan Wakil[1,2], Dayang N.A. Jawawi[3]

[1]Research Center, Sulaimani Polytechnic University, Sulaimani 46001, Kurdistan Region, Iraq
[2]Department of Information Technology, National Institute of Technology, Sulaimani 46001, Kurdistan Region, Iraq
[3]Software Engineering Department, Faculty of Engineering, School of Computing, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia.

Email: karzanwakil@gmail.com, dayang@utm.my

Abstract

During the recent years World Wide Web very fast increased a fundamental part in our everyday life. In commerce, personal relationship, the effect of the universal network has wholly changed the way people interact with each other and with machines. The problem is after rising the Artificial Intelligence to presenting human feelings, everything changed including web applications. In this paper, we describe the intelligent web applications as present and future of web applications, moreover we highlight the special features and their roles in increasing intelligence of web applications as well as impact this application in the process development of the web systems. The result of this paper leds the developers to create smart and modern web applications.

Keywords: Web Application, Intelligent Application, Artificial Intelligence.

1. INTRODUCTION

Evolution of Web 1.0 into the Web 4.0 [1] and sometime new web is Web 5.0 [2] of the World Wide Web (WWW), has resulted in the introduction of several web applications [3]. Categorization and evolution of web applications' complexity have been reported in [4], whereas, scholars in [5] have grouped web application types based on the chronological order of their appearance. The current web generation, as described by [5], is intelligent web. These intelligent web are also described as a upcoming generation of semantic web [6]. In general, an upcoming complexity in the web technology is intelligent web applications since new drawbacks to the web is intelligence.

Web Intelligence comprises a multidisciplinary area that handles data and services exploitation over the Web, with the intention of creating novel services and data with the use of both AI (Artificial Intelligence) and ICT (Information and Communication Technologies) methods. Over the years, practitioners and researchers have applied diverse technologies and approaches and they have as well followed diverse objectives. Here are some of the conceptions pointed out for instance, the semantic Web, Web information repositories, Web content and structure mining, Web user behavior analysis and social network analysis. There

are also additional general notions, for instance, distributed systems, knowledge discovery from databases, machine learning, multi-agent systems and knowledge representation, which are some keys to understanding the intelligent web's essentials [7-9].

The AI-enabled webs and software advent is capable of revolutionizing the way users are interacting with online enterprises. In the near future, it is conceivable that, AI-Web is the first point of contact between the customer and the online enterprise in one hand, and complexity of data and big data in another hand that enables the use of AI on the webs. In this paper, we describe the intelligent web applications as present and future web applications, moreover we highlight the special features and their roles in increasing intelligence of web applications. The contributions are; AI features for developing web applications, and using AI features for solving web complexities.

The paper is organized as follows: Section 2 explains the background work on intelligent web applications. The Section 3 prepared research process for finding result. In the section 4 Analyzes and IA and web applications. Section 5 presents features and roles of IWAs. Section 6 parents some examples for IWAs. Section 7 consists of results and discussion. Section 8 presents some concluding remarks and points to future works.

Web Intelligence was first coined in the late 1999's. From that time, many new algorithms, methods and techniques were developed and used extracting both knowledge and wisdom from the data originating from the Web. A number of initiatives have been adopted by the world communities in the intelligent web applications [10]. In this section we explain most important works that focused on semantic web, intelligent web, and intelligent web applications, as well as features and roles during the development smart web systems from previous works.

In order to solve essential empirical matters that the software system developers face as they build applications founded on SWA (Semantic Web Services), Barros H. et al. (2011) presented a systematic way of enabling the development process of intelligent applications founded on SWS and introduced the way this approach deals with the matters that are conversed. Lastly, introductory experimental outcomes have revealed the efficiency in building intelligent systems with the use of the method [11]. Wang S. et al. recommended an intelligent structure to disseminate inputs of the consumer athwart diverse web applications after two years. Their structure assembles inputs of the consumer and examines the patterns of usage of the consumer. It also discovers the alterations of contexts of the user through extraction of contextual information of the consumer from diverse sources for instance, a calendar of the consumer. They carried out an introductory investigation on efficiency of their recommended clustering method. They accomplished a recall of 87 percent as well as an accuracy of 80 percent [12]. In addition, Ruta M. et al. (2018) presented a new method for a machine that is semantic enriched learning on assorted data streams within the Internet of Things

(IOT). Mapping of raw data to concept labels that are ontology-based offers a low-level semantic understanding of the statistical information distribution, whereas the concept components' conjunctive aggregation enables automatic building of an important and rich exemplification of events in the course of the phase of model training [13].

There is a long history concerning Intelligent web applications for instance, Velásquez J. D. et al. (2004) who recommended structure, offering an method of processing web data, storing the information extracted and getting it ready for the web mining techniques' application, aiming at discovering patterns that are meaningful concerning the visitor that browses their preferences and behavior. The approach was used effectively to a real-world web site, that the commercial bank owns [14]. Currently, Rimmer V. et al. (2018) discovered that an adversary could mechanize the process of feature engineering, and thus automatically deanonymize tor traffic by applying our novel method based on deep learning.

They assemble a dataset consisting of traces of network that exceed three million, which is the most prevalent dataset of web traffic ever applied for fingerprinting of website, and discover that the performance accomplished by their deep learning methods is similar to famous techniques, including a variety of research struggles that span over many years. For a closed world of 100 websites, the attained rate of accomplishment is more than 96 percent and for our biggest closed world of 900 classes, it is 94 percent. The most performant deep learning model in the evaluation is two percent more precise as compared to the state-of the-art attack [15].

There are a number of fields applied AI methods which include web systems, these fields applied intelligent web applications to be an intelligent service. The authors in [16] had investigated the current social media's shortcomings as well as the intelligent web's method that is going to be useful in improving social media as well as making it more intelligent. In another work [17], the authors utilization of Web Intelligence is talked over together with means whereby an extensive range of research, which for the long-term, assists this area. A novel network of an iCrawler (intelligent agent-based crawler) for deep web databases that are domain-specific in [18] has been recommended to deal with the restrictions of the present techniques. The iCrawler, determined by domain ontology and intelligent learning agents, as well as a series of effective and innovative policies, which include a link scoring policy and a two-step page classifier, could progress the current methods' performance. For systems of education, the authors in another work applied intelligent web. They introduced their contribution for performing adaptive and intelligent WBES (Web-based Education Systems) that consider the individual student learning necessities, through a complete architecture and structure for developing WBES. Three basic modules of the recommended WBES are also defined: a cognitive maps-based student model, an authoring tool and a semantic web-based evaluation. In addition, a stated SOA (Service Oriented Architecture) focused on deploying services that are durable, reusable, interoperable and accessible [19].

2. METHODS

In this section, we present a research methodology process for finding features and roles of IWA. In this case we propose a research process that contain in four steps. In the first step, we analyze AI techniques in the development web applications. in the second step we present features and roles of IWA. In the third step, we illustrate IWA in some examples for showing the IWA features. the last step consists of result and discussion. As shown in Figure 1.

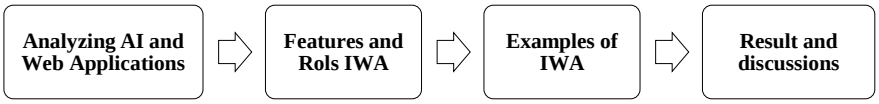

Fig.1: Research Methodology

For finding the result we need to extract web application features and AI techniques, also presenting the AI techniques how develop modern web applications for finding IWA features. After this step we will present the role of the new features in IWAs. Moreover, we will present some examples for approving role of IWA features in the different fields such as business or education systems. Finally, we will discuss the result and how to IWA become de facto of web applications in the near future.

2.1. Analyzing AI and Web Applications

In person-machine interactions, Machine Learning, which is an Artificial Intelligence's branch, provides another benefit. Without learning capabilities, applications will deal with a challenge in the same way time after time and make a similar mistake devoid of modification or optimization of the solution according to the previous experience.

Machine Learning refers to an enabling technology, which enables web applications to get used to with time via observation and learning from habits of the users, their preferences and idiosyncrasies. Owing to the applications just being smarter, user experience improves.

With the competitive benefits mentioned above, the rationale behind AI-enabled websites not being deployed all over as presently is that, notwithstanding its lengthy history, AI remains a developing technology, taking into consideration mainstream (IT) Information Technology. The devices applied by AI, for instance, genetic algorithms, Bayesian classifiers, neural networks and Markov chains, are nothing but gibberish to mainstream web developers. For most companies, building AI into a web application from scratch is expensive.

Commercializing AI's potential did not succeed in escaping the top global web technology players' attention. Facebook, Google of that ilk have introduced an AI

toolkit that allows the plugging of ready-made natural language understanding and machine learning characteristics into web applications.

Google and Facebook own free services such Dialog flow (formerly api.ai) and wit.ai in that order. On the other hand, we have commercial paid services, which include IBM Watson, Amazon Lex and Microsoft LUIS.

In enterprise web applications, the AI toolkits that the global industry leaders provide have eased the AI adoption. Hiring of AI PhDs with the intention of empowering ones websites with natural language understanding abilities is no longer necessary. Mainstream web developers could rather incorporate AI into chatbots on one's platforms of present web and mobile technology. It is therefore not necessary for designers to be retrained to code in esoteric AI programming languages to manipulate the technology. They rather work with tools and APIs that they had previously being acquainted with, for example, Ruby, Python, JavaScript, Net, Node.js, CSS, C++. Java, HTML.

Deploying AI with the use of the above toolkits has a number of challenges. Notwithstanding best effort of the toolkits to hide the artificial intelligence's complexities, developers still need to learn a novel concepts and lingo for instance, actions, agents, entities, and intents. However, it is reassuring, to learn that online documentation is readily accessible for bringing developers up to haste with the toolkits. It is much achievable to learn to customize and incorporate the technology. A challenge that is more formidable for incorporating the toolkits is that the software necessitates more customization with the intention of comprehending certain notions in one's specific application domain. These toolkits are intended to be starting points that are general-purpose for comprehending daily language constructs and might not be explicit enough to deconstruct the domain-specific notions or the emblematic tasks that your web visitors may aspire to be undertaken. Human trainers must therefore avail the software with a conception hierarchy that is explicit to one's application. Furthermore, for one to develop the precision of sentence parsing for their specific application domain, trainers ought to unequivocally offer sentence instances of the distinctive requests that an individual application are meant to tackle.

This element of training is tedious very time-consuming, though it is necessary since it reduces the chance of errors in comprehending requests of consumers. To bump-start the AI toolkits adoption and for the initial training hurdles to be overcome, toolkit vendors have begun offering pre-built domain models targeting particular tasks and industries. A point in case is Dialog flow, which provides pre-built agents targeting industries like restaurants, hotels, airlines, coffee shops, and common tasks for instance, web search, product support and map navigation. Microsoft LUIS features pre-built domains for fitness tracking, taxis, movie theatres, restaurant reservation, and many others. The tendency of availing prepackaged domains is absolutely going to abridge the time of deploying AI functionalities in web applications [20].

Fig.2 are essential for characterizing an application as an intelligent web application and referred to them throughout the book as the triangle of intelligence. It is prudent to these components and build a model of their interaction that best fits your needs [21].

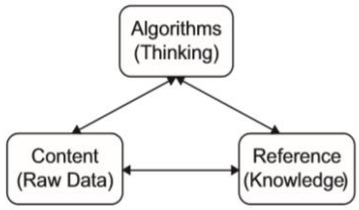

Fig.2: The triangle of intelligence the three essential ingredients of intelligent applications [21]

2.2. Features and Roles IWA

The analysis and expectation that intelligent application development will progressively undergo revolution is owing to the accessibility of the large-scale semantic web, which originates from next-generation SWA. In section 4, IWA has been explained and presented. IWA's future is predicted to operate on human brain intensely, but at present, the effort is concentrated on thinking and mining. IWA consists of web mining, semantic web, web personalization, and Intelligent agents. IWA's intelligent agent is an important feature, through which data is mined, as illustrated in Fig.3.

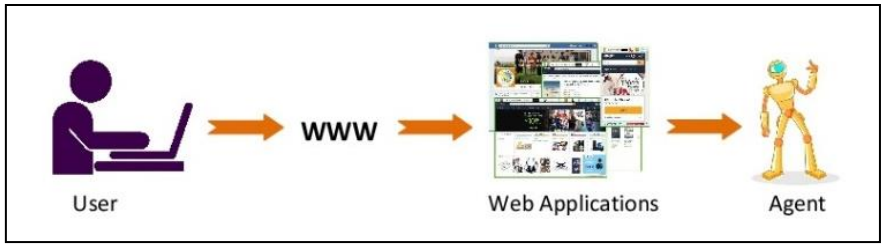

Fig.3 User Access Web Applications as IWA

features of modern web applications listed and collected, after analyzing we got the features same result of another our previous work [22]. Finally, the features of IWAs are: Web Personalization, Web Mining, Semantic Web, Intelligent Agents.

2.3. Examples of Intelligent Web Applications

Today, the new web applications focused on the Artificial Intelligence for responding front-end users, these websites proposed for intelligent image recognition, recommender systems, and so on. In the following illustrated by real-world examples of AI Web applications presented [23]:

1) Recommendation Engines of Amazon and Netflix
2) Web-based artificial intelligence Chatbots
3) Google and Microsoft using Image recognition
4) Web-based code helpers using AI

In the following we explain two of them that are Recommendation Engines of Amazon and Netflix and Web-based artificial intelligence Chatbots:

A. Recommendation Engines of Amazon and Netflix

Content arrangement based on user's context one of the popular actions that used by AI features. Amazon website used item-based collaborative filtering for classification the products. Amazon recommend the products for users based on goods-based recommendation (users are recommended for those similar to what they liked in the past) and buddy-based recommendation (users are recommended things which their Facebook friends like). The second example is Netflix website, the recommendation system regards to an algorithm that proposed for visual impressions, for this reason currently most of the users use this website.

B. Web-based artificial intelligence Chatbots

Another website that uses the AI techniques is Chatbots. They use AI techniques such as natural language considerate and pattern recognition to store and distinguish between the context of the information provided and elicit a suitable response for future replies. One of the most popular website bases on Chatbots is live chat bots where the conversation with a visitor on a website is automated using a Chatbot.

3. RESULT AND DISCUSSIONS

Whereas the exact definition of WI (Web Intelligence), might not be easy, one can easily argue for the necessity and need of generating such a study subfield in computer science. Due to the fast growth of the Web, we anticipate an interest that is growing fast in WI. Generally, the definition of WI is that it is a field exploiting AI and advanced IT on the Internet and Web. In the new setting of the Web, it could be seen as a marriage of information technology and AI. Through examination of the historical development and the scope of AI, we discuss a number of Web Intelligence features in the same way. There is no doubt in our mind that results from IT and AI that is going to affect the WI development. In this section we clarify the main results of our investigation during analysis IWAs that are:

1) AI has a big role in the development modern web applications.
2) Most important websites use AI techniques.
3) IWA is a future of web application.
4) The main features of IWAs are Web Personalization, Web Mining, Semantic Web, Intelligent Agents.
5) IWA features in the future control all smart web systems.

Above result presents that the AI techniques mostly help the websites for improve and creating smart services, also these properties more important for performance

web applications in different domain such as economics, education and marketing. These result shows that the features of IWAs helps this type of web applications become to de facto of web applications in the future.

4. CONCLUSION AND FUTURE WORK

In this paper, we describe the IWAs as present and future of web applications, moreover we highlight the special features and their roles in increasing intelligence of web applications as well as impact this application in the process development web systems. In the result we highlighted main features of IWAs that are Web Personalization, Web Mining, Semantic Web, Intelligent Agents. Moreover, IWA will be future generations of web applications. we recommend for researchers more analyze IWAs and implement in the process development web applications for improve web systems, also we recommend these features apply in to web engineering methods.

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