VOICE BASED ONTOLOGY FRAMEWORK TO GUIDE THE VISUALLY IMPAIRED IN WEB SERVICE

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Abstract

The upsurge of the web service and composite web service has made life more sophisticated and easier for the web users but the physically challenged persons are more affected while dealing with these types of online transactions in the web service. This paper proposes an optimal solution for the blinds to make use of the web service using a query based on voice commands and blends the fingerprint security during the payment cycle since when the blind user dictates the bank account details will be overheard by others using a new tool named VIFEW. Here in this paper, the voice is converted into text when the blind user request and the textual response from the web service will again be converted into voice enabling the visually impaired to do the complete transaction

Keywords: - Web service, Composite Web service, VIFEW, Query based voice commands, Visually impaired.

I. INTRODUCTION

The ontologies assume that the fundamental job is to characterize the semantic and connection between the user queries and fetch the desired results from the web archives. In this way, by adding paradigm ontology so as to decipher user queries and their significant archives in well being and security domain, we empower a user with utilizing a smaller number of terms to pick up useful data. The principle goal of this investigation is to improve the convenience and proficiency of semantic inquiry utilizing ontology so as to advance the user queries and gain user fulfillment in the resultant hunt with info and yield as voice. Semantic basically implies meaning. Which means empowers an increasingly viable utilization of essential data. The semantic web is a web of data represented and connected in manners to establish a structure that holds to characterized syntax and jargon builds.

The Semantic Web enables data to be shared and recovered crosswise over applications. The semantic web [1] foresees an interlinked system of machine processed information, made conceivable by the circulation of semantic data models called ontology. The Semantic depends on the Resource Description Framework (RDF) which is still in the early stage of development and lots of researches is carried out in this area to make it conceivable for all. One of the most significant issues in finding appropriate data utilizing existing ontologies for catching the user-required data from the Semantic Web. For instance, in the event that one needs to distribute their maintain online products sold in Semantic Web, they might want to discover a few ontologies speaking to things like "region", "website", and "product offered". Else, they should fabricate their ontologies without anyone else's input.

This paper mainly deals with the framework for the visually impaired and the search queries are optimized in such a way to enhance the productivity of the blinds. The queries are accepted in the form of user's voice and then that is converted into texts to fetch the results which in turn again converted back to voice enabling the blinds to understand what data the web has fetched for their query.

II.Related Works

Inspired by Google's page rank algorithm a perpetually evolving web system called Swoogle [2] is proposed with a clear intention to examine, analyze and index the web documents from various sources and uses a customized algorithm to rank the results fetched by the user queries.

The author D.H.Widyantoro [3] proposed a fuzzy-based system named PASS – Personalized Abstract Search Services to fetch the abstract contents present in the research papers published in the journals. The Fuzzy ontology works on phases and in the first phase the creation of full ontology is carried out and in the second phase, the pruning of the unwanted terms is carried out.

The author Kyumars Sheykh Esmaili [4] proposed a semantic search engine with a multi scope that worked on several areas and fetched the results in multi-dimension enabling the user with a wide perspective of data. The work is subdivided into several parts like,

1. Construction of the domain
2. Creation of the ontology automatically for the concerned domain.
3. Create documents automatically for the domains.
4. Customize the ontologies and display the results.

The web is the biggest source of information where the data can be explored and fetched from various remote places and serves the human with the needed information in time, but the visually impaired can't utilize the web viably because of availability and ease of use issues [5]. There are different existing web availability frameworks utilized by the visually impaired which incorporates the Speech synthesizers and Screen readers.

Screen synthesizers have been in presence for over 50 years. Screen synthesizers are the customized framework that acknowledges the content as information and changes the data content into human speech. That of Screen readers empower users to know and comprehend what is being shown on the screen a PC. For example, "the content appeared on PC screens legitimately changed into sound, where pictures and other objects are changed into their alternative text provided in the design of the web page ".

III. Proposed Framework

The security is the major threat to the visually impaired user utilizing the services of the web services and to overcome this snag the proposed framework named “Visually Impaired Framework to Enhance Work (VIFEW)” is designed and developed. The first stage in this framework is to register the blind user with his bio-metric details like fingerprint and every time the blind user needs to access the web, the fingerprint reader will authenticate the user and the user will have to read out the queries which will be converted into text by a VTT Voice to Text engine. The retrieved information again will be converted into Voice by a TTV text to voice the engine. Whenever the blind user needs to do a monetary transaction, the fingerprint is used to authenticate and authorize the user and it provides the best security to the visually impaired users. The proposed framework is showcased in Fig. 1

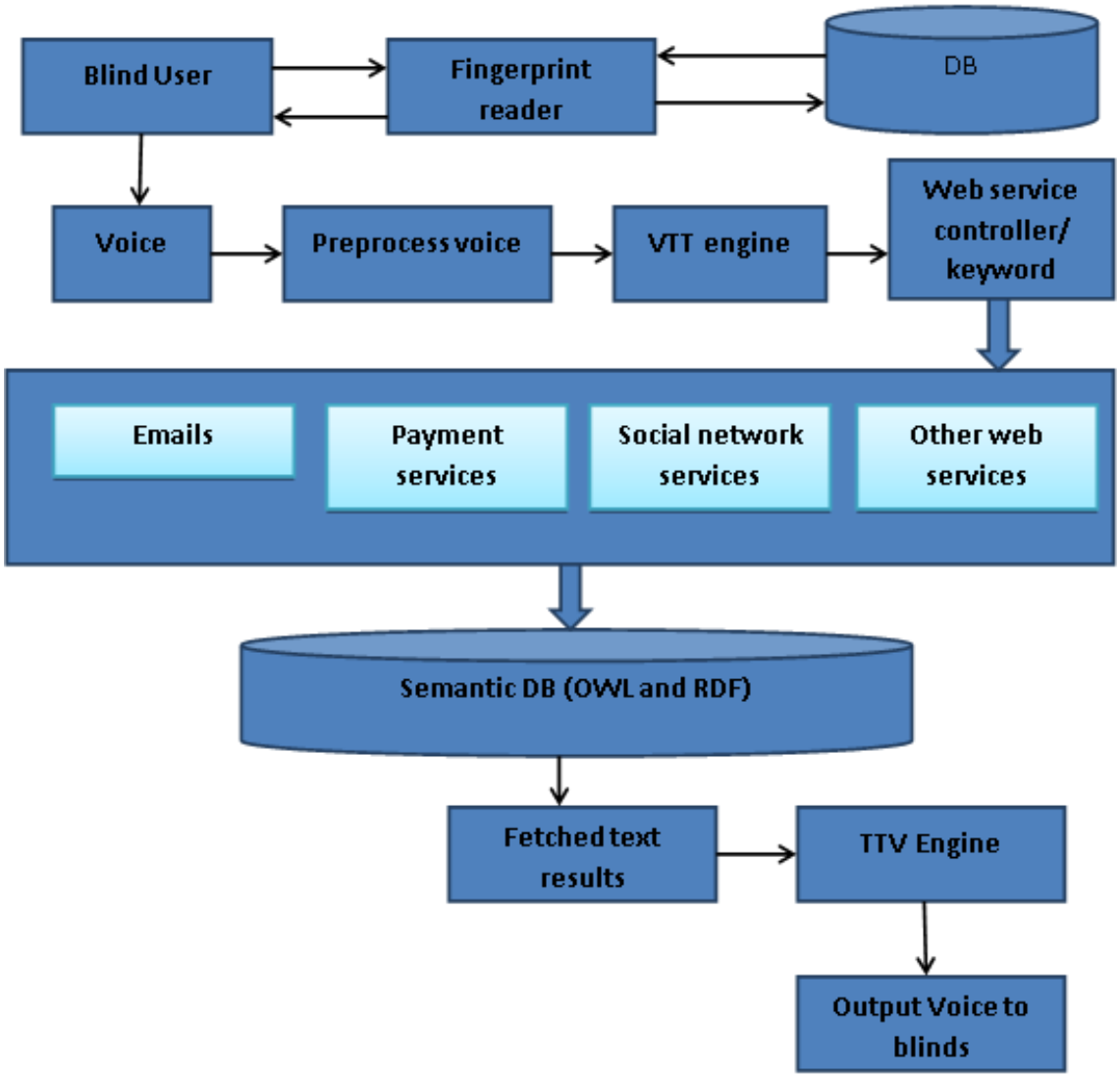

Fig. 1. Proposed VIFEW tool

The fingerprint reader is used to authenticate the user and it provides greater security when the blinds deal with either debit or credit card transactions since the user will have to read out the card number, pin number etc, but in this proposed framework the bio-metric is used to solve that problem of reading the secret loud. Once the blind user is authenticated, the user will have to read out the details which are initially pre-processed to eliminate the noise and the distortions present in the voice data.

The pre-processing is the most significant procedure that must be completed in any significant work to guarantee the smooth working of the principle forms. Here the pre-processing is done to change over the info voice into lucidity and clamour free from the foundation. This procedure includes different procedures like introductory sifting, foundation commotion separating, and endpoint revelation.

The initial filtering is used to remove the noise present in the voice and as the vowels are pronounced at a low frequency it is quite difficult to convert the voice exactly into text spoken by the blind user. Hence the initial filtering is used to remove the noise and make sure that the exact texts are converted from the spoken voice. The overall process is shown in Fig. 2.

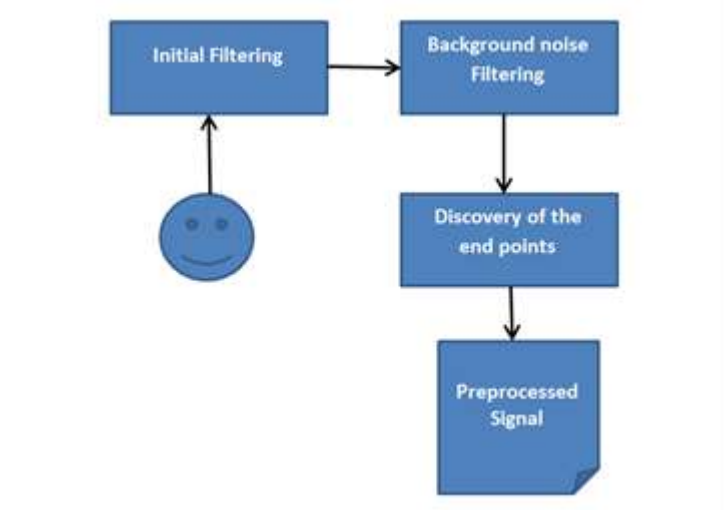

Fig. 2. Preprocessing of the voice signals

The voice decoder process is shown in Fig 3 and the steps for removal of background noise from the users' voice data is shown in Fig 4.

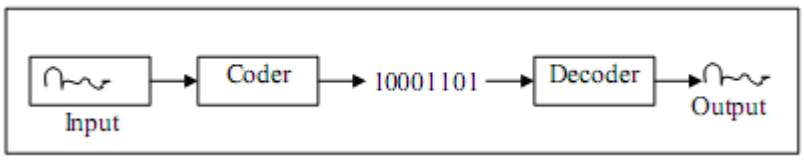

Fig. 3. Voice Decoder

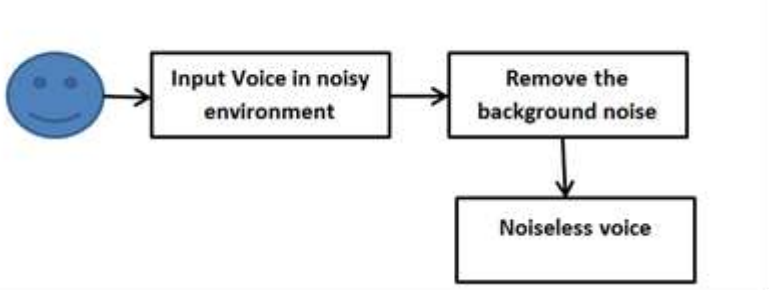

Fig. 4. Removal of the background noise from the user voice data

The most common method to remove the noise is endpoint detection which is done with the aid of zero crossings of the signal as shown in the following equation (1).

$$ZCR=\frac{1}{2}\sum_{n=1}^{N}|sgn[s(n+1)]-sgn[s(n)]| \quad \text{----- (1)}$$

The input voice is further processed to obtain the clear speech and then fed into the Voice to Text engine which converts the human speech into text and fed the text into the web service controller that guides the user content in the form of text into the appropriate domains shown in figure 1. The voice recognition used here is based on the hidden Markov Model and the extracted words are compared with the other approaches to prove that the HMM is superior in its recognition levels. The other techniques compared here in this paper are fuzzy, ANN and dynamic time wrapping methods. Let us consider a sentence what the blind user speaks as shown in the following Fig. 5.

INPUT VOICE: need to book an airline ticket to reach Singapore from my native Chennai on 21-09-2019 and I need a budget hotel for stay and need a cheap and affordable price for the airline as well as the hotel accommodation and I need some cab services there in Singapore during my stay.

Fig. 5. Sample sentence spoken by a blind user

Table 1 shows the recognition comparison for input voice

Table 1 Recognition comparison for an input voice

APPROACH	#CORRECT	#INCORRECT	ACCURACY
ANN	78 %	3 %	73.8%
DTW	81 %	9%	74%
Fuzzy	76 %	7 &	70 %
HMM	91 %	1%	89.6%

From table 1, it is quite clear that the HMM is performed exceedingly well and outclassed the other methods and this HMM is utilized in the proposed VIFEW tool. The keyword generator algorithm used in the proposed framework is shown in Fig. 6.

Procedure KeywordGenerator (TextData D)

Inputs : Recognized voice Textdata D
Outputs : Keyword kW

1. Load recognized Data D
2. ∀ word F ∈ Data D do begin
3. While [F ≠ EOF] do
4. Remove white spaces, symbols
5. Apply stop word template and remove stop words
6. Use Split function and form tokens
7. Store tokens
8. Check important tokens →result
9. End while
10. Move result tokens to kW
11. End For
12. Return kW

End Procedure

Fig. 6. Pseudocode of keyword generator

The procedure shown in Fig.6 is used to extract the keywords spoken by the blind users after pruning away the stop words, unwanted words and some unwanted technical words. The keyword extracted is used to fetch the results as well as where the web service controller should land and search for the user details will be exactly performed.

The data is retrieved from the web service and then the textual data which are extracted are again converted into speech to enable the blinds to conceive the required information. The main advantage of the proposed framework is that even the images or pictures present in the web pages are made known to the blinds with the aid of image comparison technique or alternative test methods used in the images embedded in the web pages. The second most important advantage is the secured online payment or transaction made with the aid of biometric security and proves to be the best when it comes to security.

IV. CONCLUTION

The proposed VIFEW tool has proved that the visually impaired and blinds were able to interact and use the internet like normal people and more importantly they are imbued with one of the most secure technologies (bio-metric). This paper analyzed the main problems associated with the semantic web services and most importantly the blinds that suffer the utmost and face many challenges related to security and browsing and came up with a novel solution provided in the form of VIFEW. The keyword generator guides the web service controller to pinpoint the exact domain or the service or the product the blind user is requesting and saves time and speeds up the entire process considerably.

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