International Journal of Cloud Computing and Database Management

E-ISSN: 2707-5915
P-ISSN: 2707-5907
Impact Factor (RJIF): 5.4
IJCCDM 2025; 6(2): 34-42
Journal's Website
Received: 01-07-2025
Accepted: 04-08-2025

Ritu Mishra
Department of Computer Science & Engineering, R.D. Engineering College, Ghaziabad, Uttar Pradesh India

Ravindra Chauhan
Department of Computer Science & Engineering, R.D. Engineering College, Ghaziabad, Uttar Pradesh India

Corresponding Author:
Ritu Mishra
Department of Computer Science & Engineering, R.D. Engineering College, Ghaziabad, Uttar Pradesh India

Web service for visually impaired blind users using a novel mechanism

Ritu Mishra and Ravindra Chauhan

DOI: https://www.doi.org/10.33545/27075907.2025.v6.i2a.101

Abstract
All existing web service providers are getting inputs in the form of text from the users and provide the needed information. Providers of web service are not having options for satisfying visually impaired users and also the results produced are not in a uniform layout. This paper proposes a mechanism for the visually impaired blind users to by adding some speech related engines which readily converts the keywords provided as speech into textual searchable keywords and process the web to come up with the desired results to them.

Keywords: Web service, semantic web, web ontology, web service for blinds

1. Introduction
Different types of web resources in the Internet protects major functionalities of search engines and customers to get their needed results. Maximum parts of web resources are characterized as a mix of several technologies. Web resources for fulfilling a user's interest are generally re distributed and majority of the Web resources are returning results in a format that are not needed by most of the users. For instance, a user arranging a family trip needs to find and search plenty of Web resources to fulfill the need of transportation, hold convenience, and pretense for neighborhood attractions.
The extraordinary ideas of the Web resources are regularly extracted by the buyers in the individual Web space. The proposed architecture in this present paper accepts the Web resources as a significant environment to compose the information associated with a personalized Web space. Web resources with closely resembling usefulness can be represented by plenty of services (SOAP and RESTful) in a large portion of the current websites across the globe. This paper focuses just on SOAP [1] based services.
The semantic Web technologies based on ontology can augment countless aspects of management of web resources considerably. Ontology is the main core of semantic web used to characterize beliefs and mention the relationship between the notions. Semantic notions of the web assets are mostly marked by the consumer who utilizes the web space (PWS).
Generally, Web Page is considered as a piece of information with a huge volume of Web assets interconnected and networked. The web resource is usually known by Uniform Resource Identifier (URI). A URI depiction pronounces a web resource as "identifiable thing or object" [2]. Whereas in the semantic web, intangible resources and their semantic things are defined using the languages based on Resource Description Framework (RDF).

1.1 Web Service
A Web service is a module developed using computer language used to delivers services through a regulated interface [4]. The web service utilizes the Internet technology as a media for describing software parts and utilizes the Web Service Description Language (WSDL) [5]. The major drawback is that it could not handle and manage automatic discovery and hence Semantic Web Services (SWS) is used to accomplish this task of automatic discovery. Semantics allow automatic discovery and composition of Web services.
Web services are an evolving technology that has been identified as a main tool used to develop e-commerce in this technology driven century. The imperative need of the business houses is to combine with each other without any wired devices is very attractive and web service accomplishes this dream of dealings between the business firms. However, presently

the task of formulating processes related to Web is usually managed and coped at the expert range and hinders the permission of the conglomerates to rapidly change cohorts, functions and facilities at will.

1.2 Ontology: The expression "ontology" is characterized as an unequivocal determination of conceptualization. The Ontologies catch the structure of the domain (i.e.,) conceptualization. The conceptualization gives massive information about the sphere of talk (class seldom called ideas), properties of every idea unfurling different highlights and qualities of the ideas (spaces are once in a while called tasks or chattels) and limitations on openings (features called job confinements).
An ontology blended on the whole with a gathering of individual circumstances of classes creates a data base. In fact, there exists a scarcely discernible difference precisely where the specific ontology closes in addition to the specific learning base starts in addition to prospers inside the musings from the clients in addition to enhances related with data and figures.

2. Methodology: The present scenario allows the users to visit multiple websites to discover the suitable Web resources which might provide the much-needed data or the information. The visited details of users are not documented and recorded in a proper manner. Besides, clients can't naturally reuse the performed process for a repeating group. It is a tedious procedure to physically make Web resources every time new. The consequence of service composition may not give the ideal result.
Internet service discovery is performed by the semantic complementing algorithm. The Ontology may discover the Internet service choice given by the consumer by means of the semantic matching protocol. This improved matching idea adapted to select the particular web service selection is usually based on two choices,

1. Functional
2. Non-functional.

2.1 Dataset used

The present paper used 5000 data of three areas namely, Flight, Hotel and Cab and survived the proposed work with 5 possibilities on each selected area. Table 1 represents the utilized sample from Hotel dataset, Table 2 shows the processed data from Hotel and Table 3 tabulates the data from Cab dataset.

Table 1: Flight dataset with 5 cases

Flight Dataset					
ID	**Source**	**Destination**	**Amount**	**Class**	**Service Type**
529	TRICHY (MAA)	Singapore (SIN)	$ 906.00	Business	529 - Singapore Airlines
346	TRICHY (MAA)	Singapore (SIN)	$ 861.00	Business	346 - Air-India
435	TRICY (MAA)	Singapore (SIN)	$ 763.00	Business	435 - Silk Air
501	TRICHY (MAA)	Singapore (SIN)	$ 303.60	Business	501 - Scoot Airlines
346	TRICHY (MAA)	Singapore (SIN)	$173.50	Economy	346 - Air-India

Table 2: Hotel Dataset

Hotel Dataset					
Id	**Place**	**Class**	**Amount**	**Duration**	**Service type**
101	Singapore	Deluxe Room	$142.00	1	101 - The Stamford
102	Singapore	Deluxe Room	$ 171.00	1	102 - Mandarin Orchard
103	Singapore	Premier Room	$ 225.00	1	103 - Royal Plaza
104	Singapore	Suite	$ 315.00	1	104 - Carlton Hotel
105	Singapore	Deluxe Room	$ 752.00	1	105 - Fairmont

Table 3: Cab Dataset

Cab Dataset				
Id	**Source**	**Destination**	**Mode**	**Rate**
002	Changi Airport Singapore	Swissôtel The Stamford	Grab Taxi	$21.00
003	Changi Airport Singapore	Mandarin Orchard Singapore	Grab Taxi Limo	$ 32.00
004	Changi Airport Singapore	Royal Plaza on Scotts	Grab Car Premium	$ 66
005	Changi Airport Singapore	Carlton Hotel Singapore	Grab Car Premium	$56.00
006	Changi Airport Singapore	Fairmont Singapore	Grab Taxi Limo	$ 26.50

2.2 Work flow of the proposed work

The main process dealt here was regarding the speech conversion and the natural language processing which enabling the blinds to provide their voice-based inputs and upon receiving the voice, the engine converts the voice data into textual format and the NLP process and makes it to readable keywords.

The work flow shown in the figure comprises of many stages as enumerated hereunder,

1. Accept the blind user voice input
2. Convert the voice to speech
3. Process the text using NLP
4. Identify the keywords present
5. Use semantic to search the web
6. Display the appropriate results with respect to low cost
7. Convert the text to voice

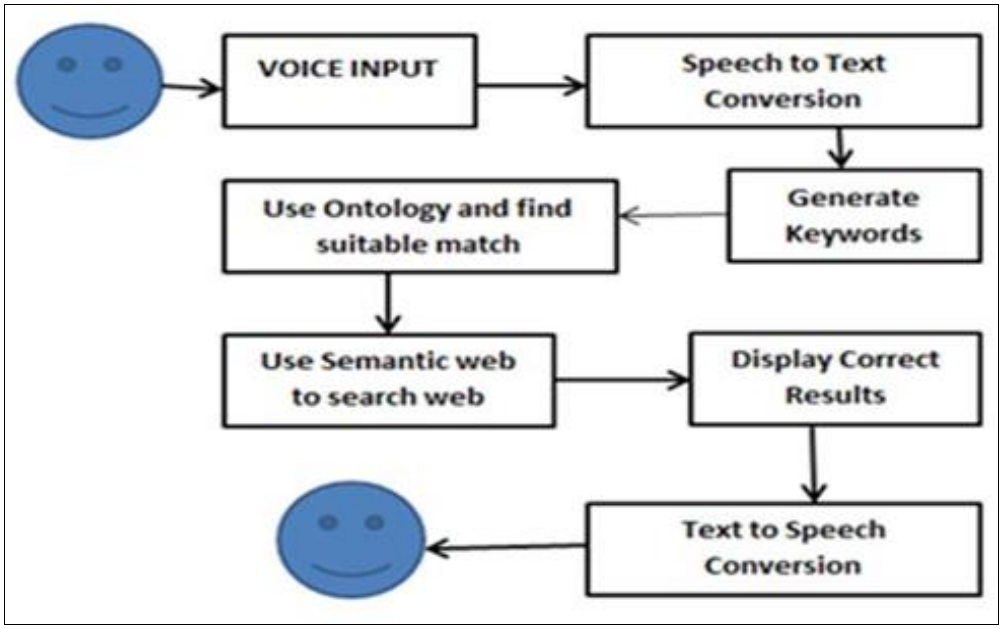

Fig1: Proposed framework for the blind user

The system accepts the voice input from the visually impaired blind user and the blind user will deliver the needs through voices to get the appropriate result. The present paper deals with the travel portal which comprises of reservation of flight, accommodation and cab bookings. The Speech to Text Conversion or simply STC is a major process here in the application as the blinds are the most important entity or end user who are going to get benefitted by the proposed system. Individual interact with others in several modes like facial expression, fixing their gaze, motion, mainly speech is considered as the foremost mode of interaction while communicating. The talk is primary mode associated with communication among individual and also the most accepted method of swapping information among individuals is speech [6]. Speech to Text conversion (STC) system is broadly used in plethora of areas. Speech conversion can be portrayed as a process of transforming the speech signal from the users to a human understandable jargon by utilizing some algorithmic computer programs.

The methodology involved in the conversion process is initiated from the voice input. Here of the voice is inputted in a noisy environment, the background noisy voice should be eliminated completely to ensure better conversion of textual contents.

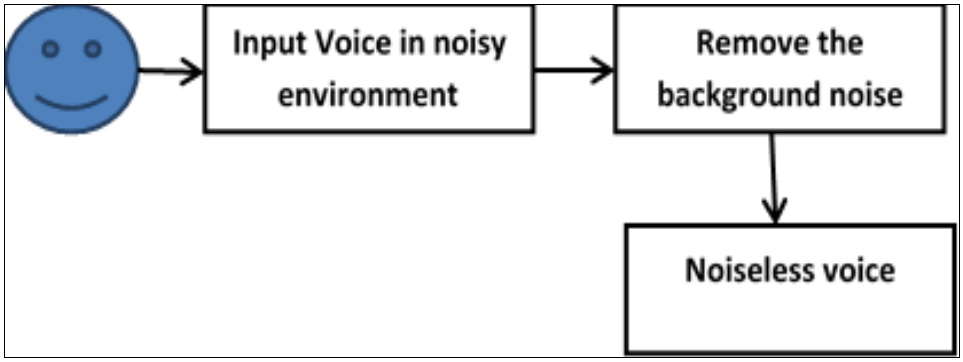

Fig 2: Background noise removal process

The noise from user input voice is removed by using a popular technique called end point detection as shown in Figure.2 [7]. This method is basically performed using the zero crossing rates present in the voice signals and they are calculated to differentiate the foreground or the main voice from the noisy backgrounds. The formula to find the zero crossing is shown in equation (1), where ZCR is the zero crossing rates and n is the number of voice utterances.

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

The basic speech to text conversion STC workflow is showed in the figure 3. This diagram clearly depicts the overall working of the STC.

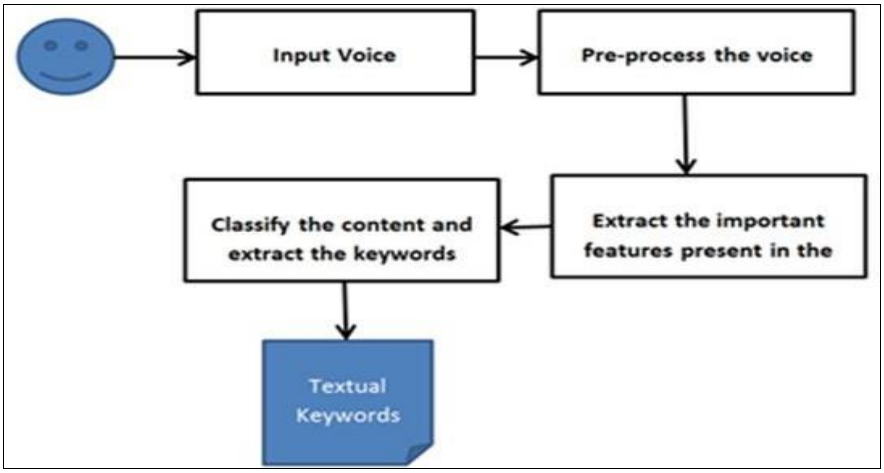

Fig 3: Work flow diagram of the speech to text conversion

2.3 Pre-processing

The preprocessing is the most important process used for removing unwanted things from the given input. Here the preprocessing is done to convert the input voice into a clarity and noise free from the background. The work flow of pre-processing used for removing the noise from user input voice is shown in Figure.4.

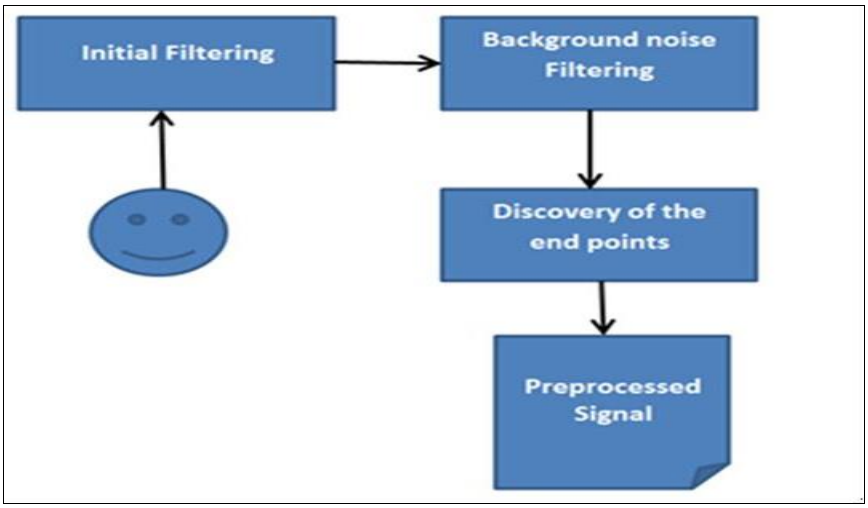

Fig 4: Preprocessing the voice signal

2.4 Voice Recognition

Hidden Markov Model (HMM) is used for recognizing voices and presents a high and accurate recognition rate when compared with the other methods available. In acknowledgment or order of the voice signal, there are numerous ways to deal with perceive the test sound file. The techniques of voice recognitions are namely Artificial Neural Network, Dynamic Time Wrapping and Fuzzy methods. The accuracy levels of the HMM model is tested using providing some interesting voice inputs and tested how the system responds with and the accuracy is compared with the other approaches as shown in the Table.4

Table 4: Accuracy comparison for the input voice

Input Voice: want to book airline ticket to reach Singapore from my native Trichy on 22-09-2020 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.			
Approach	**#Correctness**	**#False/not recognized**	**Accuracy**
ANN	78%	3%	73.8%
DTW	81%	9%	74%
Fuzzy	76%	7 &	70%
HMM	91%	1%	89.6%

The Table.4 clearly demonstrates and signifies that the HMM approach is superior to the other three approaches with respect to the recognition rate and accuracy. The false recognition or the false positives with respect to the words pronounced are checked for almost 25 different user voices and the after summarizing the figures and the value obtained it is quite evident that the Hidden Markov model produced the best result with respect to the accuracy and outscored the other methods by a huge magnitude regarding the recognition accuracy and precision. The accuracy of recognizing voice is presented in Figure 5.

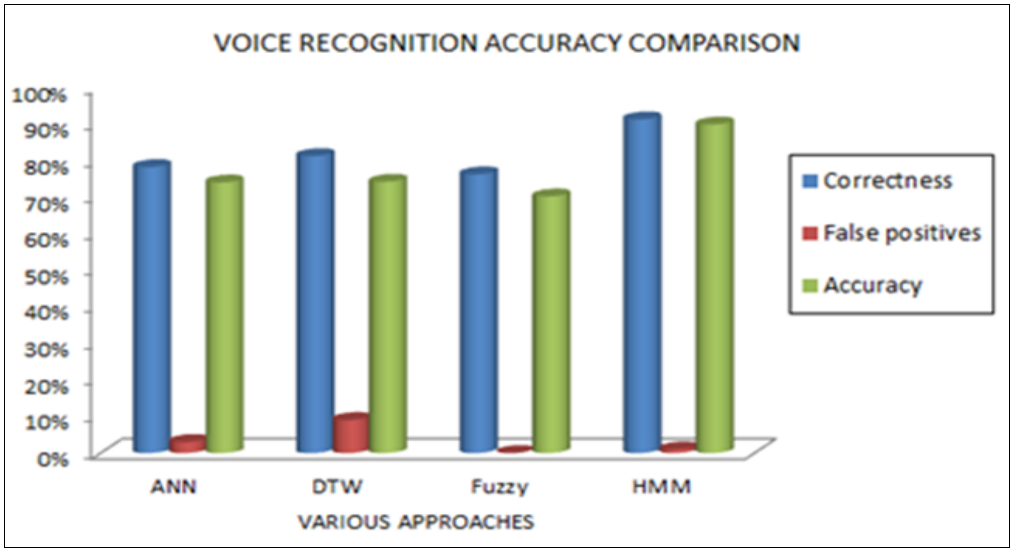

Fig 5: Accuracy comparison regarding voice recognition

2.5 Keyword Extraction

This process is used to remove the stop words that are not promising and useful for the search and the concept of stemming is employed to discover the keywords and pick the promising words alone from the list of words recognized by the HMM recognizer. The stemming is one of the most important processes in NLP which is used to remove the unwanted prefixes and suffixes and retains only the original root word.

Stop words are often used occurring immaterial words. This progression sifts through the normal words utilized in the majority of the archives to encourage express inquiry. Generally, stop words or normally utilized words like "the", "that", "this", "for", "yet", "what" are expelled from the sentences to decrease the extent of the information. The removal of these words won't influence the general execution of the keyword mining and subsequently the common utilized words are wiped out from the recognized words deserting just the promising words. The procedure to find the keywords is showcased in the Figure 6.

Procedure FindKeywords (Data D)

Inputs : Recognized voice words D
Outputs : Keyword kW
Begin:

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: Pseudo code to find the keywords

This procedure carries out the extraction process of the keywords required from the words recognized and the data present are extracted as keywords omitting the stop words and unpromising words present.

The travel service comprises of three services which are not atomic in the existing works and this frame work shown in the Figure 7, that merges the services and generates a composition one and additionally the QoS aspects are included in the layer to satisfy the consumers.

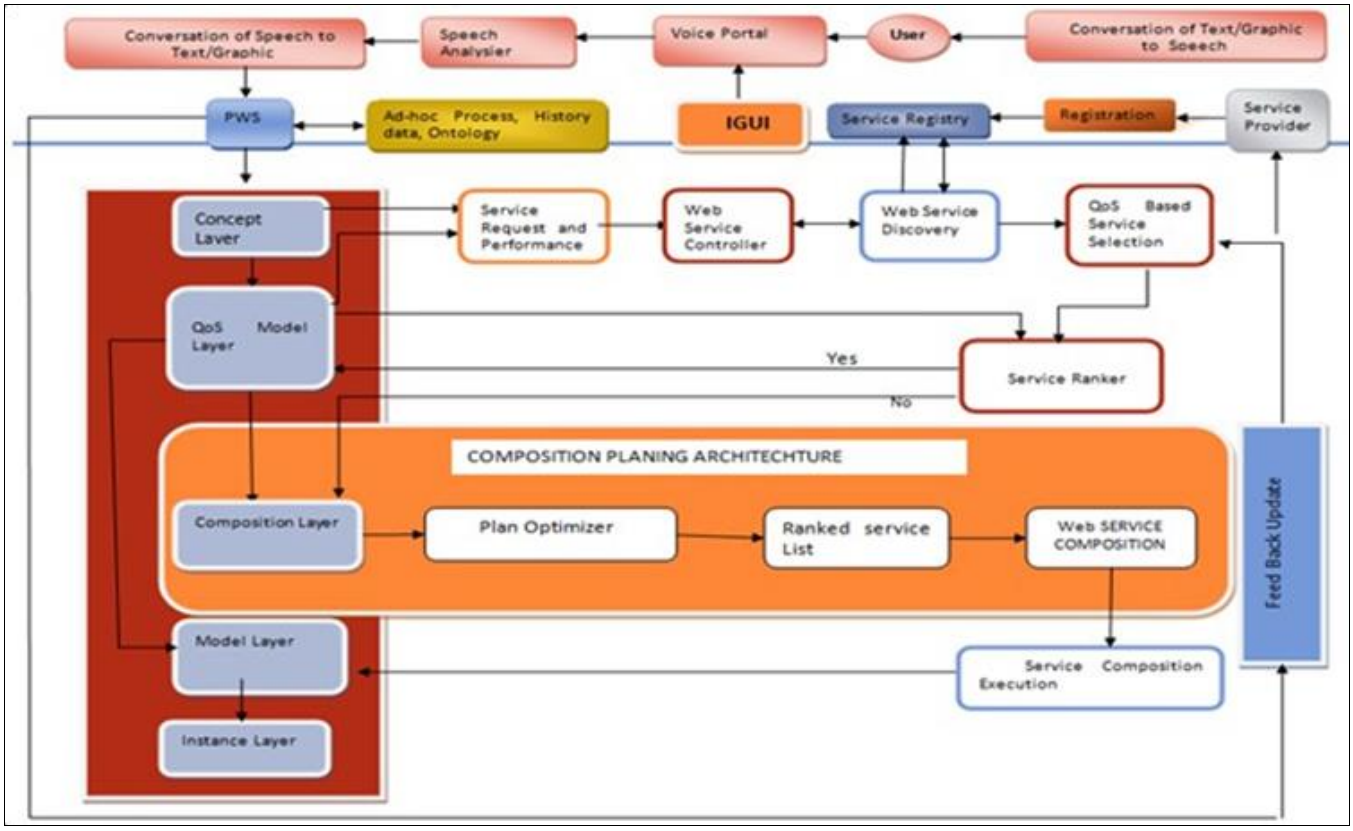

Fig 7: Application framework for blind voice-based ontology

3. Result Analysis

The present paper considered three cases namely, Airline, Hotel and Cab and carried out layer wise process. The number of candidate services considered is five namely {A, B, C, D, E}, where A, B, C, D, and E are various vendors or service providers who provides the three tasks.

A case study is carried out with the text shown in Figure 8 as a blind users' request with various number of tasks "n". Performance of the several tasks are analyzed with the obtained results and are tabulated.

I would link to travel from Chennai to Singapore 27.07.2018 in the international flight at 10:00 PM in business class for minimum price and I have to stay in a hotel room at Mandarin Orchard hotel Singapore in luxury double room with AC and I would like to have Indian style of vegetarian food for two days with minimum cost and I need a cab service for my pick- ups from the airport to hotel and vice versa at an affordable cost.

Fig 8: Case study text

The number of Tasks is "n" and the numbers of candidate services are denoted as "m", so the possible composition plans that can be generated is defined by mn = 53 = 125 composite.

Table 5: Prices offered by different vendors

Candidate Service	Airlines cost	Hotel cost	Cab cost	Total cost
A	916	140	20	1076
B	860	172	30	1062
C	760	223	67	1050
D	300	311	57	668
E	172	757	27	956

The basic prices which are offered by the vendors are illustrated in the Table 5and from these composite-plans are generated. To generate the composite-plan an algorithm was proposed and named generateCPLANS and its pseudo codes

are displayed in the Figure 9. This algorithm clearly forms various combinations of the candidate and sums up the cost present in the combination to create a new plan.

Procedure generateCPLANS (Candidate Service Table T)

Inputs : Candidate service table T
Outputs : Composition Plans for blind

Begin:

1. Load the CS table T
2. Identify CandidateNames N→cN
3. Find the total number in cH→ Total
4. For I = 1 to Total do begin
5. Fetch N and form 3-Itemset randomly
6. Calculate the cost corresponding to the 3-Itemset regarding Airline, hotel and Cab
7. Store the 3-Itemset and Cost → RES[ ]
8. End For
9. Return RES[ ]

End Procedure

Fig 9: pseudo code to generate composite plans

The generated first plane from Figure. 9 is {A-A-A} which assumes that if the airline, hotel and cab are carried out by the vendor A, the total cost is calculated and equal to 1076. Another example is, if the algorithm creates a combination {A-C-D} this means the for airline booking the vendor "A" cost, Hotel booking vendor "C" cost and for Cab booking vendor "D" cost are considered and the total cost calculated here is equal to 916+223+57 = 1192.

All the plans are constructed and the total numbers of plans constructed are equal to 125. The plans built by the proposed algorithms are presented in Table 6 and from these composite plans the frame work searches, selects and executes the tasks to satisfy the user request.

Table 6: Composite plans generated by the procedure

Plan ID	Flight cost	Hotel cost	Cab cost	Total ID	Plan ID	Flight cost	Hotel cost	Cab cost	Total ID	Plan ID	Flight cost	Hotel cost	Cab cost	Total cost
1	916	140	20	1076	24	172	757	30	959	47	860	140	30	1030
2	860	172	30	1062	25	172	757	67	996	48	860	140	30	1030
3	760	223	67	1050	26	172	757	57	986	49	860	140	67	1067
4	300	311	57	668	27	916	172	20	1108	50	860	140	57	1057
5	172	757	27	956	28	916	172	30	1118	51	860	140	27	1027
6	916	140	30	1086	29	916	172	67	1155	52	860	223	20	1103
7	916	140	67	1123	30	916	172	57	1145	53	860	223	30	1113
8	916	140	57	1113	31	916	172	27	1115	54	860	223	67	1150
9	916	140	27	1083	32	916	223	20	1159	55	860	223	57	1140
10	860	172	20	1052	33	916	223	30	1169	56	860	223	27	1110
11	860	172	67	1099	34	916	223	67	1206	57	860	311	20	1191
12	860	172	57	1089	35	916	223	57	1196	58	860	311	30	1201
13	860	172	27	1059	36	916	223	27	1166	59	860	311	67	1238
14	760	223	20	1003	37	916	311	20	1247	60	860	311	57	1228
15	760	223	30	1013	38	916	311	30	1257	61	860	311	27	1198
16	760	223	67	1050	39	916	311	67	1294	62	860	757	20	1637
17	760	223	57	1040	40	916	311	57	1284	63	860	757	30	1647
18	760	223	27	1010	41	916	311	27	1254	64	860	757	67	1684
19	300	311	20	631	42	916	757	20	1693	65	860	757	57	1674
20	300	311	30	641	43	916	757	30	1703	66	860	757	27	1644
21	300	311	67	678	44	916	757	67	1740	67	760	140	20	920
22	300	311	27	638	45	916	757	57	1730	68	760	140	30	930
23	172	757	20	949	46	916	757	27	1700	69	760	140	67	967
70	760	140	57	957	93	300	172	67	539	116	172	223	20	415
71	760	140	27	927	94	300	172	57	529	117	172	223	30	425
72	760	172	20	952	95	300	172	27	499	118	172	223	67	462
73	760	172	30	962	96	300	223	20	543	119	172	223	57	452
74	760	172	57	989	97	300	223	30	553	120	172	223	27	422
75	760	172	27	959	98	300	223	67	590	121	172	311	20	503

76	760	311	20	1091	99	300	223	57	580	122	172	311	30	513
77	760	311	30	1101	100	300	223	27	550	123	172	311	67	550
78	760	311	67	1138	101	300	757	20	1077	124	172	311	57	540
79	760	311	57	1128	102	300	757	30	1087	125	172	311	27	510
80	760	311	27	1098	103	300	757	67	1124					
81	760	757	20	1537	104	300	757	57	1114					
82	760	757	30	1547	105	300	757	27	1084					
83	760	757	67	1584	106	172	140	20	332					
84	760	757	57	1574	107	172	140	30	342					
85	760	757	27	1544	108	172	140	67	379					
86	300	140	20	460	109	172	140	57	369					
87	300	140	30	470	110	172	140	27	339					
88	300	140	67	507	111	172	172	20	364					
89	300	140	57	497	112	172	172	30	374					
90	300	140	27	467	113	172	172	67	411					
91	300	172	20	492	114	172	172	57	401					
92	300	172	30	502	115	172	172	27	371					

Total numbers of plans generated by the proposed algorithm is 125 and it is shown clearly here in this table

The plans are sorted according to the cost and the lowest plan is fetched to the first place and it enables the user to plan accordingly travelling with low cost and affordable price. The Table 7 shows the top fifteen sorted plans that are useful to the visually impaired users.

Table 7: Cost wise Sorted plans

Plan ID	Flight Cost	Hotel cost	Cab cost	Total cost
106	172	140	20	332
110	172	140	27	339
107	172	140	30	342
111	172	172	20	364
109	172	140	57	369
115	172	172	27	371
112	172	172	30	374
108	172	140	67	379
114	172	172	57	401
113	172	172	67	411
116	172	223	20	415
120	172	223	27	422
117	172	223	30	425
119	172	223	57	452
86	300	140	20	460
118	172	223	67	462
90	300	140	27	467

4. Conclusion

The present paper proposed a new mechanism for the visually impaired people by adding speech recognition facilities in the normal web service technologies. A case study has been carried out with three areas namely Flight, Hotel and Cab with selected datasets and samples.

The blind user is provided with the most important data such as airline reservation, hotel reservation and more importantly the can to be picked up at the airport at a very affordable rate that suits the Indian users. The produced result is again converted into voice so that the blind user may find it easy to select the most suited service from the web. The proposed framework clearly outscored the existing framework by a good margin with respect to user satisfaction especially the blinds.

References

1. Chauhan S, Singh D, Singh AK. Artificial intelligence in the military: an overview of the capabilities, applications, and challenges. Journal of Survey in Fisheries Sciences. 2022;9(2):984-991. DOI:10.53555/SFS.V9I2.2911.
2. Kiran, Singh D, Goyal N. Analysis of how digital marketing affected by voice search. Journal of Survey in Fisheries Sciences. 2023;30(2):407-412. DOI:10.53555/SFS.V10I3.2890.
3. Tyagi Y, Singh D, Singh R, Dawra S. Analysis of the most recent trojans on the Android operating system. Educational Administration: Theory and Practice. 2024;30(2):1320-1327. DOI:10.53555/KUEY.V30I2.6846.
4. Singh S, Singh D, Chauhan R. Manufacturing industry: a sustainability perspective on cloud and edge computing. Journal of Survey in Fisheries Sciences. 2023;10(2):1592-1598. DOI:10.53555/SFS.V10I2.2889.
5. SOAP v1.2. 2007. http://www.w3.org/TR/soap12-part1.
6. Berners-Lee T, Fielding R, Masinter L. Uniform resource identifiers (URI): generic syntax. Available from: http://www.ietf.org/rfc/rfc2396.txt.
7. Kritikos K, Plexousakis D. Requirements for QoS-based web service description and discovery. IEEE Transactions on Services Computing. 2009;2(4):320-337.
8. Web Services Architecture.

http://www.w3.org/TR/wsa-reqs. WSDL v1.1. 2001. http://www.w3.org/TR/wsdl.
9. Gaikwad SK. A review on speech recognition techniques. International Journal of Computer Applications. 2010;10(3):16-23.
10. Lokhande NN. Voice activity detection algorithm for speech recognition applications. In: International Conference in Computational Intelligence (ICCIA). 2011. p. 221-226.