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## Web chat: Interactive application for disabled people

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### ABSTRACT

The World Wide Web (WWW) is one of the most important resources available which can be used to deliver information to any part of the world. Information can be made available in interactive ways. There are different forms of these resources such as education, employment, government, e-commerce, recreation, health care, and many more. It is also important that the Web can be accessible to everyone and everywhere, so websites should be developed in such a way that even the people who have disabilities should be able to make use of it. An accessible web can help disabled people to participate in many social activities and not make them feel omitted. Accessible websites are often the best way to interact with people with disabilities. So, this project aims at developing a chat bot which can help visually disabled people to browse through the website and learn about their products like any normal person.

**Keywords:** Chatbot, Web

### 1. INTRODUCTION

Web being universally accessible is one of its greatest powers. The main aspect is its access by everyone regardless of disability. Web accessibility means that all the websites, tools, and technologies that are designed and developed for the people with disabilities also can use them. More specifically, people can:

- Perceive, understand, navigate, and interact with the Web
- Contribute to the Web

Most of the online websites and web tools need to be developed and designed in such a way that even the people with disabilities also can use them. But as we know most sites and tools are developed with barriers of web accessibility, which make it difficult or highly impossible for some people to use. Making the web accessible will not only be beneficial for individuals but also for the businesses, and society.

Accessibility is essential for both the developers as well as the organizations that wish to create high-quality web tools and websites, and they should not exclude anyone from using their services and products. Web accessibility bounds all the disabilities that affect access to the Web, including:

- Auditory
- Cognitive
- Neurological
- Physical
- Speech
- Visual

Web accessibility is also beneficial to people who are not disabled, for example:

- People who make use of new technologies like mobile phones, smart watches and small screen devices
- Old aged people who find it difficult to make use of modern devices, and also people who have temporary disabilities such as a broken arm or lost their glasses etc.
- It can also help people who have may surrounding limitation and are not able to use their devices
- People who have a slower Internet connection, or who have limitation on bandwidth and expensive

How can e-commerce websites be made accessible even for visually disabled people? The answers to this question are steadily evolving in human computer interaction. We present a voice enabled chat bot which can help people browse through the website without the need to see the details of the product.

*The question that arises is why only a chat bot?*

It is considered that people are now spending more time in messaging than in social media, which is a huge turning point. Messaging apps are considered as platforms or tools of the future and bots will help their users to access all sorts of services. Opportunities should be built so that people receive better experience and can make use of all the features.

## **2. PURPOSE**

The main purpose of this project is that World Wide Web is one of the most important resources available which can be used to deliver information to any part of the world. Information can be made available in interactive ways. There are different forms of these resources such as education, employment, government, e-commerce, recreation, health care, and many more. It is also important that the Web can be accessible to everyone and everywhere, so websites should be developed in such a way that even the people who have disabilities should be able to make use of it. An accessible web can help disabled people to participate in many social activities and not make them feel omitted. Accessible websites are often the best way to interact with people with disabilities. So, this project aims at developing a chat bot which can help visually disabled people to browse through the website and learn about their products like any normal person.

## **3. SCOPE**

The resource that are available online are in deferent forms such as education, employment, government, ecommerce, recreation, health care, and many more. In this project we try to concentrate on e-commerce.

## **4. OVERVIEW**

It is also important that the web can be accessible to everyone and everywhere, so websites should be developed in such a way that even the people who have disabilities should be able to make use of it. An accessible web can help disabled people to participate in many social activities and not make them feel omitted. Accessible websites are often the best way to interact with people with disabilities. So, this project aims at developing a chat bot which can help visually disabled people to browse through the website and learn about their products like any normal person.

## **5. LITERATURE SURVEY**

In [2], Voice Recognition System (Speech-To-Text): Speech Recognition is a process in which a computer or device record the speech of humans and convert it into text format. It is based on the algorithm of acoustic and language modelling Acoustic modelling and Language modelling. Any speech recognition program is evaluated using two factors: Accuracy and Speed, The libraries used were

- Speech Recognition
- PyAudio

Speech Recognition is a library that helps in performing speech recognition in python. It supports for several engines and APIs, online and offline. e.g. Google Cloud Speech API, Microsoft Bing Voice Recognition, IBM Speech to Text etc.

In [1], Text-To-Speech Synthesis (TTS): Convert a written text into speech via microphone. There are several APIs available to convert text to speech in python. These interfaces would yield great benefits. To enable the deaf and dumb to communicate and contribute to the growth of an organization through synthesized voice. The libraries that were used are libraries:

- Pyttsx
- gTTS

Pyttsx advantage is can be used offline. gTTS is a very easy to use tool which converts the text entered, into audio which can be saved as a mp3 file.

In [1], Web accessibility for disabled: A case study of government websites in Pakistan presents the results that it is very difficult or impossible for a visually disabled person to access the electronic information available on the government website because the websites are not developed according to the W3C accessibility standards. The accessibility resources and guidelines are freely available but lack of awareness is the main hurdle in their use in the process of implementation.

In [7] An intelligent web-based voice chat bot: This paper presents the design and development voice recognition chat bot. To create a more user accessible chat system; a simpler input method using voice is introduced; creating and catering for a more personal and convenient experience.

In [6], Natural Language Processing Future Natural Language Processing is a technique where machine can become more human and thereby reducing the distance between human being and the machine. Therefore, in simple sense NLP makes human to communicate with the machine easily. There are many applications developed in past few decades in NLP. Most of these are very useful in everyday life for example a machine that takes instructions by voice.

In [4], Using NLTK for educational and scientific purposes Python and the Natural Language Toolkit (NLTK) allows any programmer, even a beginner, to get acquainted with NLP tasks easily without spending too much time on studying or gathering resources. It is a collection of modules and Corpora.

Libraries:

- nltk.tokenize: big quantity of text is divided into smaller parts called tokens.
- nltk.chat: performs pattern matching on the sentences typed by the user and respond with automatically generated sentences.

In [5], A Dive into Web Scraper World: Web scraping (web harvesting or web data extraction) is a computer software technique of extracting information from websites. Usually, such software programs simulate human exploration of the World Wide Web by either implementing low-level Hypertext Transfer Protocol (HTTP), or embedding a fully-fledged web browser, such as Mozilla Firefox. Web search engines and some other sites use web crawling or spidering software to update their web content or indexes of others sites web content. Web crawlers can copy all the pages they visit for later processing by a search engine, which indexes the downloaded pages so the users can search much more efficiently.

## 6. METHODOLOGY

The user will provide the input to the chatbot in the audio format. This input is first converted into the text format using Speech-To-Text API and then given as the input to the chatbot. The first step in the chatbot is the preprocessing of the input data and the main keyword is extracted from this pre-processed data. The model is trained using the machine learning technique. The extracted keyword is then classified based on the training data. Based on this classification decision will be taken by the chatbot whether to call API or not. The output from the chatbot will be in the text format, which will be converted to the audio format using Text-To-Speech API, and this audio will be delivered to the user.

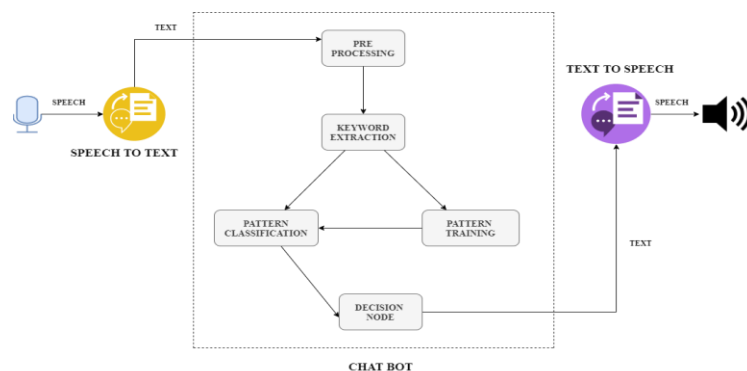


Fig. 1: System Architecture

### 6.1 Chat Bot

It is a computer program that performs conversation with human beings with the help of Internet. The chat bot is trained using deep neural network. It involves the following operations:

**6.1.1 Pre-processing of data:** The sentences given as input are first tokenized as separate words and then the words are stemmed. The stemmed words are then considered as the input to the DNN.

**6.1.2 Keyword extraction:** The words in the input from the user, which do not add much meaning to the sentence, are first removed. These are called stop words. Stop words are often removed from the text before training deep learning and machine learning models since stop words occur in abundance, hence providing little to no unique information that can be used for classification or clustering.

**6.1.3 Pattern training:** The input to the DNN is all the different words available in the patterns. There are two hidden layers with 8 nodes each. The numbers of nodes in the output layer are equal to the number of different tags available. Each of the output node i.e. tag is assigned with a probability at the end which helps in deciding which output node out of all the other nodes is more favourable. TensorFlow framework is used to implement the DNN model.

The chat bot is trained for to reply considering 5 different classes.

```

{
  "intents": [
    {
      "tag": "greeting",
      "patterns": ["Hi there", "How are you", "Is anyone there?", "Hey", "Hola", "Hello", "Good day"],
      "responses": ["Hello, thanks for asking", "Good to see you again", "Hi there, how can I help?"],
      "context": [""]
    },
    {
      "tag": "goodbye",
      "patterns": ["Bye", "See you later", "Goodbye", "Nice chatting to you, bye", "Till next time"],
      "responses": ["See you!", "Have a nice day", "Bye! Come back again soon."],
      "context": [""]
    },
    {
      "tag": "thanks",
      "patterns": ["Thanks", "Thank you", "That's helpful", "Awesome, thanks", "Thanks for helping me"],
      "responses": ["Happy to help!", "Any time!", "My pleasure"],
      "context": [""]
    },
    {
      "tag": "noanswer",
      "type": "string",
      "patterns": "[a-z]*",
      "responses": ["ebay.py"],
      "context": [""]
    },
    {
      "tag": "options",
      "patterns": ["How you could help me?", "What you can do?", "What help you provide?", "How you can be"],
      "responses": ["I can guide you through Adverse drug reaction list, Blood pressure tracking, Hospital"],
      "context": [""]
    }
  ]
}
    
```

Fig. 2: Five different classes for training the chatbot for replies

The result is classified as one of the tags and based on the pattern; certain response is generated as an output. At the end of classification, each of the tags is assigned with a probability value. The tag with the highest probability indicates that the user input is best recognized as that tag and the response is generated accordingly.

**6.1.4 Pattern classification:** The input is classified as any of the target tags on the basis of the training set of data containing patterns and tags.

**6.1.5 Decision node:** Decision node helps in deciding if the eBay API should be called by the bot to answer the user input or not. Whenever the input is classified as “noanswer” tag, the API is called for requesting the information for that particular input product. The response of the API is features of the product. The conversation is continued by taking user input for each of the features extracted for that particular product. In this way, details of the product with much more specific requirements of the user are extracted.

## 6.2 eBay API

Application Programming Interface (API) is the set of rules and tools for building software applications. Here we use the API provided by eBay, which is used to interact directly with the eBay database. The Finding API provides programmatic access to the next generation search capabilities on the eBay platform. It lets you search and browse for items listed on eBay, and provides useful metadata to refine searches and enhance the search experience. This API has several calls to help buyers and sellers find items on eBay. Call finds Items Advanced searches for items on eBay by category or keyword or both. This call response contains details about items matching the search criteria. By default, eBay returns a specific set of data in the response to the call. Item Filters are constraints applied to search queries, category browsing, or eBay store browsing. Filters provide better control over the search results by narrowing the range of items returned. The item Filter node contains name/value pairs to describe specific filters. Item filters are optional input parameters. In addition to filters, certain properties can be specified to control the way data is returned. These do not control which data is returned, but rather how it is sorted and the volume of the response. For example, sort Order field in search requests can be used to specify the order in which the returned items are sorted and pagination Input. Entries per Page field specify the maximum number of items to return for any given request.

## 7. RESULTS

### 7.1 Training

The chat bot is trained for normal conversation on the basis of five different classes, which includes goodbye, greeting, “noanswer”, options and thanks. When input is classified as the class "noanswer", the API call is made to retrieve product details and if the input is classified as any of the other classes then the output is on the basis of trained pattern and responses for that particular class.

### 7.2 Conversation based on trained general classes

This is how a conversation between a chat bot and user looks like when the input is being classified as general classes. The response for such general questions is selected from the trained pattern and response for the particular class that it has been classified as.

```
user: hi
bot: Hello, thanks for asking
user: bye
bot: Bye! Come back again soon.
user: thanks
bot: Happy to help!
user: laptop
bot: enter the brand
```

Fig. 3: Conversation based on the classes that are trained

### 7.3 Conversation based on API information

Whenever a product name is given as input, the chat bot identifies the product and classifies that input as "noanswer" class. Then that information is used to call the eBay API for the product information. The chat bot also asks for certain extra questions for getting a product, which is more suitable for the user as per their specific requirements.

```
user: hp laptop
bot: enter the minimum price
user: 50000
bot: enter the maximum price
user: 60000
bot: The total is 59056.74
The shipping price is 8333.96
The current price is 50722.78
The title is New HP 17z 17.3" FHD IPS Laptop AMD Ryzen 5 3500U 12GB 256GB SSD Vega 8
{"total": " 59056.74", "shipping price": " 8333.96", "current price": " 50722.78", "title": " New HP 17z 17.3" FHD IPS Laptop AMD Ryzen 5 3500U 12GB 2
56GB SSD Vega 8"}
user: shirt
bot: enter the minimum price
user: 200
bot: enter the maximum price
user: 500
bot: The total is 550.04
The shipping price is 188.65
The current price is 361.39
The title is Embroidered Vintage Name Tag Patch for Uniform Work Shirt Sales Mechanic Tech RW
{"total": " 550.04", "shipping price": " 188.65", "current price": " 361.39", "title": " Embroidered Vintage Name Tag Patch for Uniform Work Shirt Sale
s Mechanic Tech RW"}
```

Fig. 4: Conversation based on the API Information

## **8. CONCLUSION AND FUTURE WORK**

The chatbot is able to take in audio as input and extract keywords using natural language processing techniques to get the required product information, which information is then used to extract available product details from eBay website and giving audio as output to the questions asked. After returning the available product details, the conversation is continued by asking about more details, which helps in limiting the search and return a product, which is best suitable for the user according to his/her requirements. Based on the results obtained it is observed that more work can be done on improving the understandability of the chatbot so that it can help user to get the product information which is best suitable for their requirements.

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