International Journal of Scientific Research & Engineering Trends
Volume 9, Issue 2, Mar-Apr-2023, ISSN (Online): 2395-566X

Automated Product Identification System For Visually Impaired

Subhadip Ghosh, Soumen Maity, Sourav Chowdhury, Sudip Kumar Ghosh, Debmitra Ghosh
Department of Computer Science and Engineering,
JIS University,
Kolkata, India

Abstract- This model intends to create a speech recognition system. A novel dataset is created, which consists of spoken words. The dataset is to train our system as well as to test the performance of the system. This dataset is not the same as the other conventional datasets generally used for this recognition system. The exciting and challenging aspects of this project are discussed. The content of the dataset and its collection and verification process are also discussed. Along with the system details, a methodology is used to reproduce and compare metrics to check the accuracy of this task. In the end, the performance result of the model is shown.

Keywords- Python, Speech Recognition.

I. INTRODUCTION

In this smart world, no one can end a day without using any embedded systems products. This makes our human life very smarter and comfortable. Globally, visual impairment is the leading regret factor. Like today, printed text is everywhere in the form of reports, bank statements, product packages, school handouts, bills, receipts, instructions on medicine bottles, etc. Normal people can easily read this printed text, but for the blind, it is a very difficult task for persons to their identification. And while optical aids, videocassettes, and screen readers can help blind and visually impaired user's access documents, there are few devices that can provide good access to common handheld items such as product packaging and items printed with text such as prescription drugs bottles.

The ability of people who are blind or severely visually impaired to read printed product labels and packaging will enhance independent living and promote economic and social independence. Today, there are already several systems that have some functionality for portable use, but do not handle product labelling. For example, portable barcode readers designed to help blind people identify different products in a large product database can allow blind users to access information about those products through speech and Braille.

However, a major limitation is that it is very difficult for blind users to locate the barcode and point the barcode reader at the barcode correctly In these and similar situations, some reading support systems such as pen scanners can be used. Such systems integrate optical character recognition (OCR) software that offers scanning and text recognition functionality, and some have integrated voice output. However, these systems are generally designed and work best with document images with simple backgrounds, standard fonts, a small range of font sizes, and well-organized characters. The goal of each product is nothing more than to achieve a leading position in the market.

For this purpose, the product should have some basic features such as low cost, portability, ease of operation and maintenance. Thus, the proposed system is effectively designed with these aspects in mind. It can be easily implemented in supermarkets where all kinds of things are available under one roof. For this reason, a system for the visually impaired to identify hand-held objects or a product with a voice announcement is designed.

II. BACKGROUND AND EXISTING SYSTEM

Blindness is one of the world's most feared afflictions. Very difficult task for the blind people to distinguish between the packaged goods and to search for a particular product in a super- market. In the existing systems in market product's barcode must be scanned to know details about the product. It is Difficult for a blind person to scan every product's barcode correctly. Sometime it may happen that a blind person has to search the whole shelf or section to find a particular product.

The article [2] is used to decode the barcode signal in the presence of false edges HMM (Hidden Markov Model) model. The problem of reading barcodes from images captured by a camera has been addressed in some recent works. The problem of localization and segmentation of a barcode in an image is simplified by assuming that certain constraints apply. A barcode is assumed to be horizontal in the image when viewed close enough that its long width exceeds approximately two-thirds of the width of the image; although the authors emphasize that

the method can be easily applied to the situation of unknown orientation, the performance of the algorithm with barcodes observed from a greater distance is unknown. Other research is based on the assumption that the morphological structure of binarized image regions can reveal the barcode. However, the binarization process may fail for images that are noisier than sharp.

The problem of decoding barcode signals from a laser scanner, which are 1D waveforms (time series) representing barcode slices, has been a primary focus of previous barcode reading research. To improve the decoding process, one work [1] focuses on the best method to deblur the curves to recover the location of closely spaced edges.

Another paper [3] discusses that during contact, the passive RFID tags in each shelf are powered by radio waves from the RFID reader. An audio file is recorded using the APR9600 IC microcontroller to identify the desired product. Each shelf has its own unique audio file. The information on the tag is read by the reader and sent to the microcontroller via a unique code. The unique EPIC (Electronic Product Identification Code) is received by the microcontroller, which then processes the code. The audio file that matches the received code is then played through the speaker.

III. PROPOSED SYSTEM

We are implementing a system where a blind customer will speak or ask for a product's information or its availability and answer will give by the system automatically. In response the system will give output as audio.

For implementation we shall be using various python libraries, Natural language processing and a database to store information about the product. To implement this system in first phase we have implemented a real time speech to text recognition system and a text to speech converter system.

1. Speech to text recognition system:

- Here we have built a voice recognition pipeline that can take the audio and transcribe it to text.
- Here we have created two interactive buttons named as START and STOP. For this we have used Jupyter widgets which are imported from **ipywidgets** python library. When we press START button audio recording will be started and whatever we say will be transcribed into text and on pressing STOP button system will stop recording.
- To record speech through our system microphone we have used some functions of **pyaudio** python cross-platform I/O library.
- For speech recognition we shall use **vosk** which is a practical speech recognition library in python. In **vosk** library there are more than 20 pre-trained models on different languages. It provides continuous large vocabulary transcription. Later we shall use speech recognition model which will be trained by a novel dataset. That dataset will consist of blind person's voice. Till now we could not accumulate enough sample data to train model so we have not used that dataset yet.
- Here multithreading concept is used to run audio recording and transcribing process simultaneously.

2. Text to speech converter:

For this implementation we have used **pyttsx3** library. **Pyttsx3** is a text-to-speech conversion library in Python. Unlike alternative libraries, it works offline and is compatible with both Python 2 and 3. An application invokes the pyttsx3.init() factory function to get a reference to a pyttsx3.

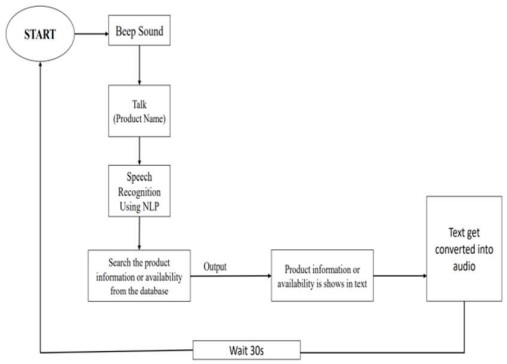

Fig 1. Flowchart of the proposed model.

IV. RESULT AND DISCUSSION

The proposed system is easy to use, efficient, and portable at a low cost thanks to its use of text to speech recognition and vice versa. In order to provide a user-friendly environment for visually impaired individuals, it makes better use of natural language processing. This will be an effective real-time embedded product that boosts business sales and can be found in retail establishments. In the future, the proposed system will be made to be portable and integrated with the trolley, which is used in supermarkets to dump purchased goods. Ultrasonic sensors will be installed in the trolley to detect obstacles and prevent blind people from colliding with one another.

V. FUTURE SCOPE

Innovations like avoiding accidents and obstacles when moving alone may be included in future work. Alarms that use ultrasonic technology can be used to prevent accidents. The visually impaired may be able to live independently in the future thanks to these implementations. To implement this system, a dataset of

speech of blind person's is used and a smaller number of sample data is present as we have collected them manually. So, dataset building can be improved more by collecting large number of sample data.

VI. CONCLUSION

The system is groundbreaking, practical for visually impaired individuals, and was developed as a prototype. Hey can shop while standing on one leg thanks to this fully automated product. It removes the hesitation and gives customers confidence to shop for their needs because it does not require additional skills to operate. This system makes it simple for visually impaired people to learn about objects by utilizing speech-to-text and text-to-speech recognition. The business's sales will rise as a result of this efficient real-time product in supermarkets. When compared to the other papers discussed in the references, this proposed paper produces superior results.

REFERENCES

[1] E. Joseph and T. Pavlidis. Blurring of two-level curves. IEEE Transactions on Image Processing, 2, 1993.
[2] S. Kresic-Juric, D. Madej, Fadil Santosa Application of hidden Markov models in barcode decoding.
[3] N. Sugandhi, M. Mathankumar. A Low-Cost Smart Shopping Facilitator for the Visually Impaired 2013 International Conference on Advances in Computing, Communications and Informatics (ICACCI).
[4] M.Mathankumar, TKavitha, "Design and Implementation of Smart Supermarket System for vision Impaired", in International Journal of Engineering and Technology (IJET), Vol 5 No 1, pp 215-219, Feb-Mar 2013.
[5] Aravind, Mouriya, Pavitra, Ramya- "Smart shopping for visually impaired using RFID"- March 2019.
[6] Meera Santhanakrishnan, Sharmikha Sree Rajarathinam - "Effective Shopping Method for Visually Impaired People using Optical Character Recognition" - International Journal of Advanced Technology and Engineering Exploration - October 2019.
[7] J. Johnson, M. Douze, and H. Jégou, "Billion-scale similarity search with GPUs," Feb. 2017, [Online].
[8] 10 facts about blindness and visual impairment, World Health Organization: Blindness and visual Impairment, 2009.