



IOT Based Medicine Recognition System for Elderly

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IOT BASED MEDICINE RECOGNITION SYSTEM FOR ELDERLY

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Abstract - The proposed method is an intelligent medicine recognition system based on deep learning techniques. The proposed system can assist chronic patients in taking multiple medications correctly and avoiding in taking the wrong medications, which may cause drug interactions, and can provide other medication-related functionalities such as reminders to take medications on time, medication information, and chronic patient information management.

INTRODUCTION

Currently, the world's society is aging. Among the 7.5 billion people in the world, the elderly population accounts for 600 million, including 480 million people with chronic diseases. According to statistics from the World Health Organization (WHO), the average elderly person suffers from 1.4 chronic diseases, and the typical medication dosage of an elderly person is five times that of a younger person. Elderly people are also seven times more likely to take the wrong medicine because of declining physiological functions.

The WHO also indicates that one-third of the world's deaths are caused not by diseases themselves but by the incorrect use of the costs associated with such improper drug use amount to nearly 28.5 billion U.S. dollars every year. The editor coordinating the review of this manuscript and approving it for publication was Habib Ullah. Due to the above

Due to the abovementioned problem of deaths caused by the improper use of drugs, the smart medicine pillboxes available on the market are constantly being updated.

A. Objective

In the present world patients are taking multiple medications which may lead to wrong medication consumptions. The above problem motivated to take up the project, that helps patients especially elderly people.

B. Design concept of the proposed system

To address the problems posed by patients with chronic diseases taking multiple medications for those diseases, we propose an intelligent medicine recognition system based on deep learning technology. This system can automatically identify pills and assist patients with chronic diseases in understanding the dosage of their medications and other related information, thus mitigating the problem of patients taking the wrong medications.

Currently, smart medicine pillboxes are often used to organize drugs and help patients take medicine and combine a variety of drugs, but they ignore the potential adverse effects of placing different drugs together. To address this problem, we use deep-learning-based image recognition technology to achieve immediate multiple drug placement and instant recognition and to provide voice explanations of medication information.

The proposed system consists of an intelligent medicine recognition device, an app running on an Android-based mobile device, a deep learning training server, and a cloud-based management platform. The proposed system is designed as a personalized service for patients with multiple chronic diseases taking multiple medications.

C. Components Required

Hardware Components:

- Raspberry pi 3B
- Camera
- Piezo buzzer
- Wooden box
- Push button

Software Components:

- Raspberry OS
- Python
- Kodular Android

D. System Architecture

➤ INTELLIGENT MEDICINE RECOGNITION DEVICE

Chronic diseases have become the largest health concern for modern people. These chronic diseases often lead to the use of many different types of drugs, resulting in confusion and difficulty in storage. Therefore, we have designed an intelligent medicine recognition device. The internal structure of the proposed device consists of a 5 MP camera, a GPU-based embedded computing system module (NVIDIA Jetson TX2 module [37]), a push button, and a 15 W amplifier-speaker unit. The GPU-based embedded computing system module controls the speaker to send voice reminders to remind patients to take their medicine. This module also controls a 5 MP camera to capture pictures of the drugs to be recognized and instantly recognizes them.

➤ ANDROID-BASED MOBILE DEVICE APP

To communicate with the proposed intelligent medicine recognition device and instantly comprehend a chronic patient's medication status, we have also developed an Android-based mobile device app, which allows chronic patients to communicate with the proposed intelligent medicine recognition device through the cloud-based management platform. Its functions include QR code scanning for connecting to the intelligent medicine recognition device, drug package information storage, medication status querying, medication time reminders, and other related

functions. The steps of operation of the proposed Android-based mobile device app are described as follows. First, the user scans the QR code on a drug package using the QR code scan option to transfer the drug package information, such as the drug name and medication time, to our cloud-based management platform for storage.

➤ CLOUD-BASED MANAGEMENT PLATFORM

In addition to viewing medication records on the proposed Android-based mobile device app, a patient's medication records stored on the proposed cloud-based management platform can also be viewed via a website, as shown in Fig.6. The back-end information system of the proposed cloudbased management platform is implemented with PHP and MySQL. The related information stored in the MySQL database includes the mobile app client data, the QR code information obtained via the mobile app by medication packages, and the drug recognition results generated by the proposed intelligent medicine recognition device.

E. Methodology

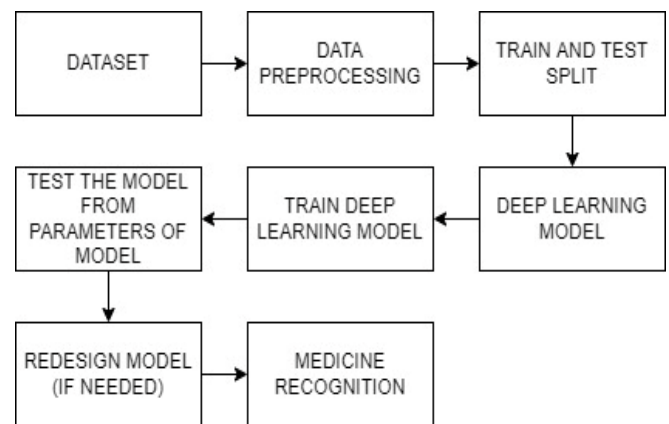


Fig: Methodology of Medicine Recognition System.

If we have medicine in the background so first we are detecting medicine and then classifying it. Classification one medicine belongs to A category one belongs to B category. By this the Dataset is gained

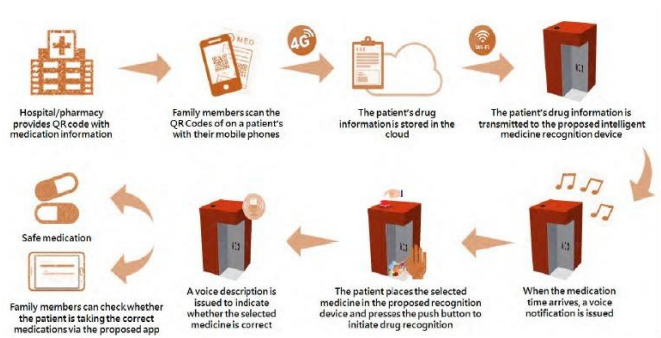
We use here deep learning like mobile net, single shot detector, the next step is to choose the right deep learning model is train the deep learning model of these data set

Once we divided in to ratio of 750 & 250 i.e 3:1 then we pass that 750 images into the model to train it so we come up with a new model and that is the model we will use it in production.

So we will pass 250 images & basically if it performing fine , if it is not again we redesign , like again capturing the data set doing the data proposing , training and testing.

Next data preprocessing where in we look at the thousand images and see if the medicine is present where in we start labelling them.

F. Block diagram



- Input from the camera is taken as input to the Raspberry Pi where the image is deleted and the data is shared to the Android.
- As shown the fig no. 2, the camera captures the picture of the medicine by the information in the QR Code present on the medicine prescribed by doctor.
- The camera and push button are connected to the Raspberry Pi OS. The python runs on Raspberry Pi OS, which decodes all the information.
- The cloud is AWS. At the output we have buzzer, which beeps if the medicine not prescribed by the doctor is given.
- Also a warning message are mail is send to the us

G. Advantages

- Compact size and portable- Easy to move the device from one place to another place.
- Operating principle is simple- Any elderly person can easily use the device
- Non-skilled person also can operate this device.
- Require very little power to operate and requires only low internet bandwidth.

H. Limitations

- With time there will always be new drug will be coming to the market . so we need to update accordingly.
- Having more high quality images captured in good lightning condition improves the accuracy

I. Applications

- This device can be extensively used in elderly care centers
- It can used in hospitals
- It can used in houses with elderly people

J. Expected outcomes

When a image of the medicine is captured it should detect the medicine and send the notification to the user .

RESULTS

As a result, when using the proposed system, chronic patients do not need to worry about forgetting to take their medicine. They need only download the proposed Android-based mobile device app and scan the QR codes on their medicine packages to store the corresponding medication information. Then, they can access related services, such as medication reminders and records. Consequently, the proposed system can effectively reduce the problem of drug interactions caused by taking incorrect drugs, thereby reducing the cost of medical treatment and giving patients with chronic diseases a safe medication environment.

CONCLUSION

Chronic patients, including 480 million elderly people in the world today, suffer from a variety of diseases. In the treatment of multiple chronic diseases, many drugs are needed, and physiological functions decline. Cognitive ability is reduced, possibly causing patients to take the wrong medicine. Therefore, elderly people have become a high-risk group for adverse drug events

To solve the problem of taking the wrong medicine, in this paper, we have successfully developed an intelligent medicine recognition system named ST-Med-Box based on deep learning technology. This system can recognize drugs and deliver recognition results in a systematic and practical way. The chronic disease drug recognition rate of the proposed system reaches 96.6% or higher; thus, it can help patients to take their medications more safely and securely.

The proposed system can automatically provide notifications stating the names of drugs and

indicating medication times to address the problem of lapses in human judgment. Moreover, the proposed system incorporates a cloud-based database to provide patients with additional integrated information services.

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FUTURE WORK

In our future work, we will cooperate with a pharmacy to train the system on more drugs. We will first ask pharmacies to apply to participate in our research and identify a suitable pharmacy with which to collaborate. As the pharmacy continues to provide us with chronic disease drugs for testing, we will continue to perform deep learning training to continuously improve the recognition accuracy of the system.

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