INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

Survey on Drug Pill Recognition using Data Science and Machine Learning

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ABSTRACT: Aging is a natural process typically characterized by loss of capabilities such as vision or memory. These transformations interfere with quotidian tasks performance sometimes leading to dangerous situations for senior adults. One of the most relevant is related with the wrong ingestion of medication or even forgetfulness. This kind of mistakes represents a real threat to elder's health and life. Furthermore, the existing technological solutions concerned with this problematic, are designed for professionals or general public disregarding elderly needs in particular. Thus, in order to overcome this lack of support, it will be presented an image processing tool, which represents the first steps for a larger toolset adapted for elderly persons, under construction. The procedures followed by this proposal include image acquisition and pill characterization based on its shape, dimensions and colors. The system uses these features in the learning step to describe and store pills information on local database. Later, in the recognition step, the same features are determined and com-pared against database in order to provide the user with relevant information's related with the pill underrecognition.

KEYWORDS: Healthcare, Machine Learning, Data Mining, Image Processing

I. INTRODUCTION

The advancing of age also brings loss of capabilities such as vision and memory, which exposes elderly persons to dangerous situations. A common one is related with medication. Elderly persons tend to forget or fail the correct ingestion of medication which can lead to serious health damages. On the other hand, when they realizethissituation, their self-confidence gets weakened creating the need of a support to change this scenario. Given the situation of Europe - that will continue increasing the imbalance between taxpayers and beneficiaries every year. It is highly unavailable that this support arises from health care system. Thus, in this system, it is proposed an alternative solution based on technological trends, namely mobile devices. This solution is a subset belonging to wider tool support for elderly, under development. It applies computer vision techniquestoaid elderly persons on pill identification task, aiming a reinforcement of confidence and autonomy.

II. LITERATURE REVIEW

A. D. Ushizima, A. Carneiro, M. Souza, and F. Medeiros. "Investigating pill recognition methods for a new national library of medicine image dataset"

Correctly identifying pills has become a critical task in patient care and safety. Using the recently released National Library of Medicine (NLM) pill image database, this paper investigates descriptors for pill detection and characterization. We describe efforts in investigating algorithms to segment NLM pills images automatically, and extract several features to assembly pill groups with priors based on FDA recommendations for pill physical attributes. Our contributions toward pill recognition automation are three-fold: we evaluate the

1,000 most common medications in the United States, provide masks and feature matrices for the NLM reference pill images to guarantee reproducibility of results, and discuss strategies to organize data for efficient content-based image retrieval.[1]

B. Z. Yaniv, J. Faruque, S. Howe, K. Dunn, D. Sharlip, A. Bond, P. Perillan. "The national library of medicine pill image recognition challenge: an initialreport"

In January 2016 the U.S. National Library of Medicine announced a challenge competition calling for the development and discovery of high-quality algorithms and software that rank how well consumer images of prescription pills match reference images of pills in its authoritative RxIMAGE collection. This challenge was motivated by the need to easily identify unknown prescription pills both by healthcare personnel and the general public. Potential benefits of this capability include confirmation of the pill in settings where the documentation and medication have been separated, such as in a disaster or emergency; and confirmation of a pill when the prescribed medication changes frombrandto generic, or for any other reason the shape and color of the pill change. This is an initial promising step towards development of an NLM software system and application-programming interface facilitating pill identification.[2]

C. R. A. Calix, R. Gupta, M. Gupta,andK. Jiang. "Deep gramulator: Improving precision in theclassificationofpersonal health experience tweets with deeplearning"

Healthsurveillanceisanimportanttasktotrackthehappenings related to human health, and one ofitsareasis pharmacovigilance. Pharmacovigilancetracksandmonitors safe use of pharmaceuticalproducts.Twitterdatacanbeusedforthistaskgiventhatuserspostheirpersonal health related experienceson-line. One problem with Twitter data, however, is that itcontainsalot of noise. Therefore, an approach is neededtoremovethe noise. In this paper, severalmachinelearningalgorithmsincludingdeepneuralnetsareusedtobuildclassifiers that can help to detectthesePersonalExperience Tweets (PETs). Finally, weproposeamethod called the Deep Gramulatorthatimprovesresults. Results of the analysis are presentedand discussed.[3]

D. TheW.J.Chang,L.-B.Chen,C.-H.Hsu,C.-P. Lin, and T.-C. Yang. "A deep learning-basedintelligent medicine recognition system forchronic patients"

This paper proposes an intelligent medicine recognition system based on deep learning techniques, named ST-Med-Box. 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. 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. Currently, 80 different medicines can be recognized by the proposedsystem.[4]

E. M. Ervasti, M. Isomursu, and I. I. Leibar. "Touch- and audio-based medication management service concept for vision impaired older people"

The service concept allows older users with vision impairments to manage their daily medications autonomously by providing them means to identify medicines and retrieve personal medication information. In order to demonstratethe feasibility of the concept, an early prototype called Blind NFC was implemented. It is a NFC enabled PDA with a basic functionality of reading the medicine name and dosage information aloud by touching the medicine package. Findings revealed that older users learned and used the basic functionality of touch- and audio-based system quite easily. They found potential value in the technology also in tagging and identifying other everyday physical objects than medicine packages and using their own self recorded audio messages for marking objects.[5]

III. MOTIVATION

In general, visually impaired elderly people will be more likely to take the wrong medicines or forget to take their medication. The study also reported that the subject. Accordingly, errors in drug use affecting visually impaired patients are expected to cause high medical losses, and such patients may not have access to sufficient support in this regard. To overcome this problem, we consider the need for a means of drug pill recognition for visually impaired

chronic patients. The proposed system can support the medication-use safety of visually impaired chronic patients.

IV. PROBLEM DEFINATION

The aim of this project is to Design and Develop means of drug pill recognition for visually impaired chronic patients.

V. EXISTING SYSTEM

Tending elderly person for medicines is done on their own or some nurse needs to be with them to help them. Disadvantage is that elderly or visually impaired lose their confidence as they need to be dependent on someone else. Advantage can be they need to have company some other person all the time.
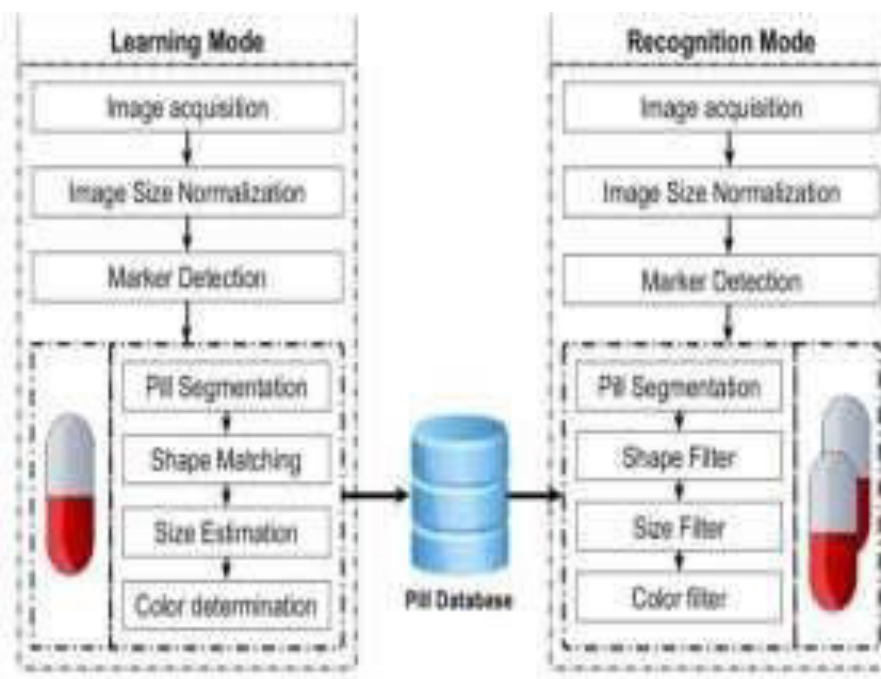
VI. PROPOSED ARCHITECTURE

Fig: System Architecture

VII. CONCLUSION

We have proposed drug pill recognition system using data mining and machine learning ,for visually impaired chronic patients. The proposed system ,based on intelligent drug pill recognition box, a mobile device app, and a cloud-based information management platform and is de-signed to support safe medication use. The proposed system uploads medication information to the cloud-based management platform to build medication-use records, allowing family members orcare-giverstomonitorthemedicationstatusofvisually impaired chronic patients by using the mobile device app. Hence, the proposed system can effectively mitigate the problem of drug interactions caused by taking incorrect medications, thereby reducing the cost of medical treatment and providing visually impaired chronic patients with a safe medication environment. For future work, the same system can be utilized for people for all criteria. More feature can be added.

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