Detection And Identification of Pills Using Machine Learning Models

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***Abstract*—"Life is a matter of choices and every choice you make makes you"- John C Maxwell. At present, many students make mistakes in their preference college list. Later, they end up regretting after allotment. Our College Admission Predictor System is a web-based application that allows students to register theirRank, Category, Preferred region, Preferred branch to predict their college admissions. The administrator can add college and batch details and allot seats tostudents. An attempt has made to develop an automated web application prediction model for a college admission system which can be used to make a wise choice of college before allotment. The computerization of the entrance seatallotment process is the main advantage of this project, making the process faster and more efficient. The system helps students make informed decisions about choosing the right college**

***Index Terms*— Web-based Application, Student Registration, Rank Prediction, Category-based Admission, Region-based Admission, Branch-based Admission**

I. INTRODUCTION

The delivery of healthcare services has evolved significantly over time, ushering in innovative advancements and technologies aimed at improving patient care and overall healthcare outcomes. However, this progress has not come without its share of challenges. Over the years, it has become increasingly evident that medical errors in healthcare provisioning have risen to become one of the leading causes of patient mortality, surpassing even some diseases, with an estimated 400,000 or more deaths occurring each year. The burgeoning volume of data from Electronic Health Records (EHRs) and healthcare institutions is emblematic of the growing prevalence of medical errors, with medication errors emerging as a predominant and treatable form of medical error. Not only do these errors have severe medical implications, but they also translate into substantial financial losses, as elucidated in the 2006 Institute of Medicine report . Consequently, addressing these challenges becomes pivotal, encompassing comprehensive solutions that extend from prescription to patient monitoring, thereby mitigating their adverse effects on patient well-being and healthcare costs The burgeoning volume of data from Electronic Health Records (EHRs) and healthcare institutions is emblematic of the growing prevalence of medical errors, with medication errors emerging as a predominant and treatable form of medical error. Not only do these errors have severe medical implications, but they also translate into substantial financial losses, as elucidated in the 2006 Institute of Medicine report . Consequently, addressing these challenges becomes pivotal, encompassing comprehensive solutions that extend from prescription to patient monitoring, thereby mitigating them A significant facet of medical errors is the misidentification of pills, a challenge that can have serious ramifications for patients. It is commonplace for individuals to underestimate the gravity of inaccurately identifying pills, yet the implications are far-reaching. The misidentification of pills, whether in terms of their name or shape, can lead to patient misuse, potentially resulting in medical poisoning and undesired medical complications . The inherent complexity of distinguishing or recognizing the chemical composition and the medical name of a specific drug, particularly when the drug is devoid of its original packaging or labeling, presents a formidable challenge. Moreover, most pills lack physical markings that indicate their name or composition, making it an arduous task for individuals who may be unfamiliar with the pill

In this paper our aim to tackle these challenges by harnessing the power of deep learning techniques, with a primary focus on utilizing Keras and TensorFlow to create a robust model for the identification of pills. The ultimate goal is to develop an innovative solution that empowers patients to verify

their medications accurately. This solution involves image recognition and deep learning techniques to create a system capable of identifying various pills. This system is envisaged as the foundation for a user-friendly mobile application, enabling patients to confirm the correctness of their medication intake simply by capturing an image of the pill with their smartphone's camera. Moreover, we seek to explore the suggestion of optional pills and dosage adjustments based on patient age, providing a comprehensive approach to medication management. In a world characterized by aging populations and an increasing prevalence of chronic diseases, the need for improved patient safety and accurate medication management has never been more

II.LITERATURE SURVEY

1. Detection of Broken Pharmaceutical Drugs using Enhanced Feature Extraction Technique. Author : S. Ramya, J. Suchitra, and R. K. Nadesh

Description : Medication has become more important in everyone's life; people are affected by many diseases. There are certain diseases which cannot be cured without medication. The production of medicine has increased a lot in recent days. During production there may be damages like breakage, cracks present in the tablets or capsules. Consumption of these damaged tablets may cause some problem in skin, eyes and mouth. Most of the tablets are not advisable to be consumed in broken form..

2. Automated medication-dispensing system in two hospital emergency departments. Author : J. O. Gordon, R. S. Hadsall, and J. C. Schommer

Description : Emergency departments (EDs) have often dealt with medication dispensing creatively, especially after regular business hours, when hospital pharmacy departments may be closed. Some have opted for keeping stocks of commonly prescribed medications in prelabeled "starter" containers.

III. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM: Previous studies have commonly preprocessed pill images and then used image classification models to learn the surface area information of pills to perform classification tasks within a data set. Despite their diversity, several pills share limited information on appearance features (ie, shape, color, and form). For example, many pills take the form of white circular tablets. This reduces the accuracy of pill identification and is a challenging factor in pill search models. Therefore, to increase the accuracy of pill identification, information on the characters imprinted on the pills can play a critical role. Researchers have also been aware of the importance of these characters and have attempted to solve this problem through image preprocessing.

3.1.1 DISADVANTAGES OF EXISTING SYSTEM:
• Less accuracy.
• There is no proper prediction.

3.2 PROPOSEDSYSTEM: Our method considers the imprinted characters on pills as crucial information for pill identification. We adopted a character-level language model and convolutional networks for recognizing other features (ie, shape, color, and form). In addition, we divided the types of pills in the training and evaluation data sets to improve generalizability and thus the identification of new pills. We overcame the limitations of the existing pill search models by designing a system that focuses on imprinted characters. First, the object detection model You Only Look Once (YOLO) [28] version 5 [29] was used to learn the locations and types of imprinted characters in a pill image. Next, the object recognition model was used to learn the shape, color, and form of the pill

3.2.1 ADVANTAGES OF PROPOSED SYSTEM:
• Better Prediction.
• Implemented Deep Learning Algorithms
.

3.3.SYSTEM REQUIREMENTS

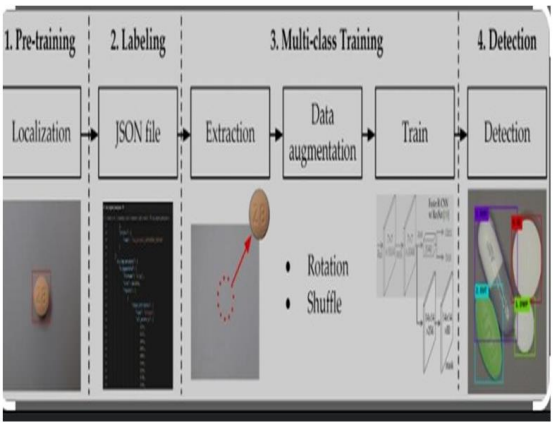
3.3.1.HARDWARE REQUIREMENTS(minimum):
• System : Pentium IV 2.4 GHz
• Hard Disk : 40 GB
• Ram : 512 Mb. 3.3.2.
SOFTWARE REQUIREMENTS:

3.3.2 SOFTWAREREQUIREMENTS: Functional requirements for a secure cloud storage service are straightforward:

1. The service should be able to store the user's data;

2. The data should be accessible through any devices connected to the Internet;
3. The service should be capable to synchronize the user's data between multiple devices (notebooks, smart phones, etc.);
4. The service should preserve all historical changes (versioning);
5. Data should be shareable with other users;
6. The service should support SSO; and
7. The service should be interoperable with other cloud storage services, enabling data migration from one CSP to another

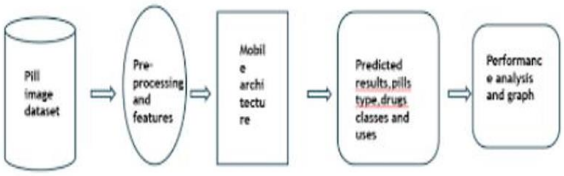
IV. SYSTEM ARCHITECTURE



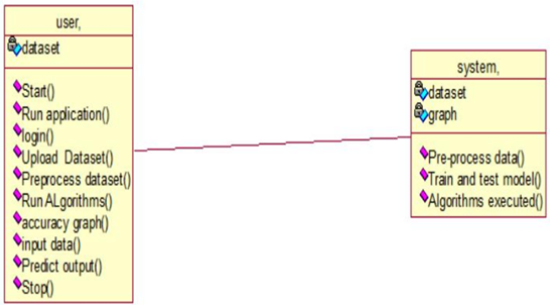
V. SYSTEM DESIGN

DATA FLOW DIAGRAM:

The data flow for detecting cyberbullying on social media using machine learning involves several interconnected modules that process and manipulate data at different stages of the detection pipeline. Initially, data is sourced from social media platforms such as Twitter, Facebook, or Instagram, where users post content. This raw data is then collected using various techniques, including APIs provided by the platforms or web scraping methods. Upon collection, the data undergoes preprocessing, where it is cleaned of noise, tokenized into individual words or tokens, and standardized through processes like removing stopwords and normalization. Subsequently, the preprocessed data is labeled to identify instances of cyberbullying behavior, either manually or through crowdsourcing platforms, marking each instance as cyberbullying or non-cyberbullying.



CLASSDIAGRAM: In software engineering, a class diagram in the Unified Modelling Language (UML)isatypeofstatic structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



VI. SOFTWARE ENVIRONMENT

6.1 What is Python: Python is currently the most widely used multi-purpose, high-level programming language. Python allows programming in Object-Oriented and Procedural paradigms. Python programs generally are smaller than other programming languages like Java. Programmers have to type relatively less and indentation requirement of the language, makes them readable all the time. Python language is being used by almost all tech-giant companies like– Google, Amazon, Facebook, Instagram, Dropbox, Uber… etc. The biggest strength of Python is huge collection of standard libraries which can be used for the following

- Machine Learning
- GUI Applications (like Kivy, Tkinter, PyQt etc.)
- Webframeworks like Django (used by YouTube, Instagram, Dropbox)
- Image processing (like Opencv, Pillow)
- Webscraping (like Scrapy, BeautifulSoup, Selenium)
- Test frameworks
- Multimedia

VII. SYSTEM IMPLEMENTATION

<!DOCTYPE html>

```
{%load static %}

<html>

<head>

<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />

<title>Academic Project</title>

<link rel="stylesheet" href="https://cdn.jsdelivr.net/bxslider/4.2.12/jquery.bxslider.css">

<link rel="stylesheet" href="{%static 'css/animate.css'%}">

<link rel="stylesheet"

href="https://stackpath.bootstrapcdn.com/bootstrap/4.1.1/css/bootstrap.min.css"

integrity="sha384-

WskhaSGFgHYWDcbwN70/dfYBj47jz9qbsMId/iRN3ewGhXQFZCSftd1LZCfmhkt

B" crossorigin="anonymous">

<link rel="stylesheet" type="text/css" href="{%static 'style.css'%}"/>

<link rel="stylesheet" type="text/css" href="{%static 'tablestyle.css'%}"/>

<link rel="stylesheet" href="https://use.fontawesome.com/releases/v5.1.0/css/all.css"

integrity="sha384-

lKuwvrZot6UHsBSfcMvOkWwlCMgc0TaWr+30HWe3a4ltaBwTZhyTEggF5tJv8tbt

" crossorigin="anonymous">

<!-- Font Google -->
```

VIII SYSTEM TESTING

SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

TYPES OF TESTS

Unit testing Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results. Integration testing Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional Test Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

Valid Input : identified classes of application outputs must be exercised.

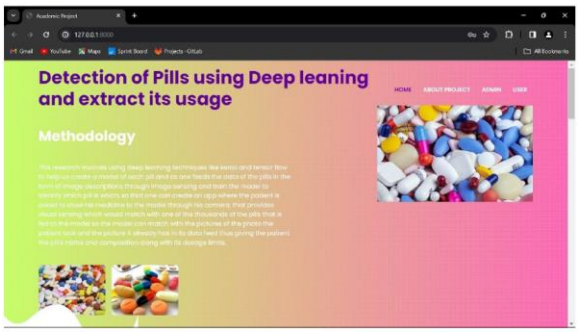
Input: : identified classes of invalid input must be rejected.

Systems/Procedures: interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is

complete, additional tests are identified and the effective value of current tests is determined.

IX SCREENSHOTS

INDEX :



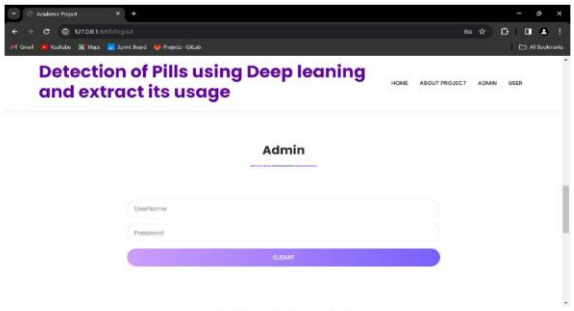


Fig 9.2: Admin Login Page

ADMIN HOME :

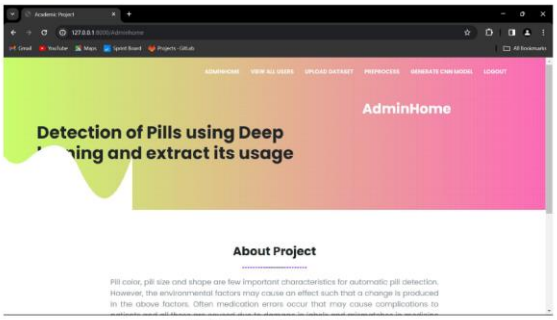


Fig 9.5: Admin Home Page

MODEL GRAPHS :

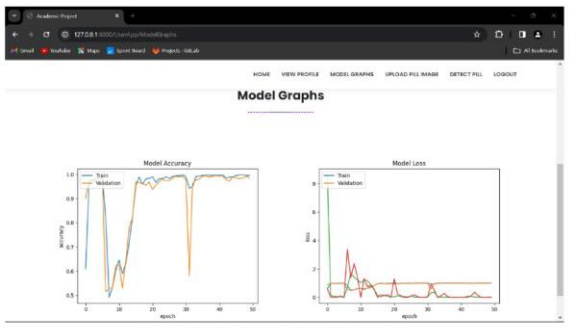


Fig 9.9: User Signup Page (Signup Successful)

CONCLUSION

In conclusion, the literature survey provides a comprehensive overview of the application of deep learning techniques in the detection of pills, showcasing a paradigm shift in pharmaceutical image analysis. The reviewed studies collectively demonstrate the potential of deep learning models in automating the identification and classification of pills, offering a range of benefits to the healthcare industry.

The evolution from traditional image processing methods to sophisticated deep learning architectures highlights the capacity of neural networks to learn intricate features from pill images. Convolutional Neural Networks (CNNs) and other deep learning models have shown remarkable success in accurately detecting pills based on visual characteristics such as shape, color, and imprints.

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