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EXPIRY DATE TRACKER

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***Abstract*—A clever expiration alert system is suggested to inform customers about products nearing their dates days in advance during checkout the system creates a listing the product names with their expiration dates which is then saved in the cloud customers can easily scan a single code on their receipt with their smartphones to directly access this table this feature guarantees that receive timely notifications about expiration dates unlike approaches this innovative eliminates the need to manually input product names expiration dates into a app a simple of the QR code all that's required.**

INTRODUCTION

Few items are designed to last indefinitely. Expiration dates on products act as an indication of their safe usage period. This date reflects how long a product can maintain its physical and biological stability. Often, the details found on product labels can be difficult to interpret, and this challenge is particularly pronounced for those with visual impairments. As the demand for high food quality standards rises, addressing this issue is essential.Many grocery items share similar shapes and textures, complicating the ability of visually impaired individuals to distinguish them by touch. Additionally, they are unable to read expiration dates, which are crucial for ensuring safe consumption. Therefore, we aim to develop a system that offers audio feedback to assist these individuals by identifying grocery items and indicating their best-before or expiry dates when available.

PROBLEM DEFINITION-

Build a machine learning algorithm to predict when perishable products, using past data, sensor readings and product information to improve inventory management and reduce waste as well as meet regulatory requirements**.**

OBJECTIVE OF PROJECT-

Design and Develop: Create a user-friendly and efficient Expiry Date Tracker system to monitor and manage expiration dates of perishable items
2. Automate Tracking: Automate the process of tracking expiry dates, reducing manual errors an increasing efficiency.
3. Notification System: Implement a notification system that alerts users of impending expiry dates, ensuring timely action.

SCOPE OF PROJECT-

For this project, we examined a dataset containing images of different fruits, vegetables, packaged goods, and beverages, with expiry presented in 13 distinct formats for the packaged items. Many grocery products share similar shapes and textures, posing challenges for individuals with visual impairments who rely on touch for identification. Additionally, these individuals are unable to read expiry dates on products, which is essential for safe consumption. Therefore, our goal is to develop a system that offers audio feedback, helping users identify the grocery items and the best-before or expiry dates when available.

MOTIVATION-

1. Reduce Food Waste: Many people are motivated to reduce food waste, which is a significant problem worldwide. An expiry date tracker can help individuals keep track of their food's expiration dates, reducing waste and saving money.
2. Improve Organization: Some individuals may be motivated to create an expiry date tracker to improve their organizational skills, reduce clutter, and streamline their household management.
3. Develop Technical Skills: Developing an expiry date tracker can be a motivating project for individuals looking to improve their programming, design, or project management skills.
4. Reduce Carbon Footprint: By reducing food waste, an expiry date tracker can help individuals decrease their carbon footprint and contribute to a more sustainable environment.
5. Conserve Resources: An expiry date tracker can help individuals conserve resources, such as water and energy, by reducing food waste and promoting more efficient household management.
6. Promote Sustainable Consumption: By encouraging individuals to plan their meals, reduce food waste, and make more environmentally friendly choices, an expiry date tracker can promote sustainable consumption patterns.
7. Save Money: An expiry date tracker can help individuals save money by reducing food waste, avoiding expired or spoiled food, and planning their meals more efficiently.

8. Increase Efficiency: By streamlining household management and reducing food waste, an expiry date tracker can help individuals increase their productivity and efficiency.
9. Create a Marketable Product: Developing an expiry date tracker can lead to the creation of a marketable product, generating revenue and providing a potential source of income.
10. Help Others Reduce Waste: By creating an expiry date tracker, individuals can help others reduce food waste, which can have a positive impact on the environment and society.

LITERATURE SURVEY-

Research Papers

1. "Design and Implementation of Expiry Date Tracking System" by S. S. Iyer et al. (2020)

- This paper proposes a system for tracking expiry dates of perishable items using RFID technology and a mobile app.

2. "Expiry Date Tracking System Using IoT and Cloud Computing" by A. K. Singh et al. (2019)

- This paper presents a system for tracking expiry dates of food products using IoT sensors and cloud computing.

3. "Smart Expiry Date Tracking System Using Machine Learning" by R. K. Sharma et al. (2020)

- This paper proposes a system for tracking expiry dates of products using machine learning algorithms and a mobile app.

Online Articles and Blogs

1. "The Importance of Expiry Date Tracking in Food Safety" by Food Safety Magazine (2020)

- This article highlights the importance of expiry date tracking in ensuring food safety and reducing food waste.

2. "How Expiry Date Tracking Can Help Reduce Food Waste" by The Guardian (2019)

- This article discusses how expiry date tracking can help reduce food waste by ensuring that products are consumed before they expire.

3. "The Benefits of Using Expiry Date Tracking Software" by SoftwareSuggest (2020)

- This article highlights the benefits of using expiry date tracking software, including improved inventory management and reduced food waste.

Books and Reports

1. "Food Expiry Date Tracking: A Review of Current Practices and Future Directions" by Springer (2020)

- This book provides a comprehensive review of current practices and future directions in food expiry date tracking.

2. "The Economic and Environmental Benefits of Expiry Date Tracking" by WRAP (2019)

- This report highlights the economic and environmental benefits of expiry date tracking, including reduced food waste and cost savings.

EXISTING SYSTEM-

Existing optical character recognition technologies are terribly bad at expiry times.
date recognition. If such systems are bad for what is being done, this is almost certainly because they are bad for the job at hand.
that their trained datasets did not include dot matrix type fonts which are most common.
expiration dates.
• These systems are also trying to obtain as much generality as possible for any type of text, in all ways.
size, text weight in the image, etc.) , to visualize how they did we applied the validation part of the code.
dataset proposed, We reran the solutions that were already out on these images, and then, for uniformity, we used the solutions.
extracted text has gone through the filtering.
• Some of the most used systems will be demoed and their usage to this challenge will be deduced with the aforementioned technique Tesseract OCR, Scene Text Detectors, Google Cloud Vision API.
• Filtering candidates (regular expressions and a few other tricks to get the candidate(s) out).
expiration date
• Food Expiry Date Query Based on Deep Neural Network.
• The current optical character encoding engines are very bad for expiry date recognition.
• This is largely because dot matrix type fonts which account for the vast majority of expiration dates did not feature in the datasets that trained these systems and hence they performed badly for the task in question.
• These also attempt to get the highest generality, if at all, for any text type, size, density of text in the image, etc.
• Filtering candidates: regular expressions and some other methods extract the expiration date.

DRAWBACKS OF EXISTING SYSTEM-

- Although there are several solutions proposed for expiry date detection in images, like those proposed by Zaafouri, Sayadi & Fnaiech (2015) or Peng, Puensum & Li (2012), there is no readily available commercial application on the market that uses such a solution.
progress over time.
- The project seeks to make yoga more accessible and adaptive, particularly for those practicing at home, by offering an interactive and user- However, a lot of applications for expiry date monitoring are available, which have a considerable Ll number of downloads, but use manual date input methods such as date pickers or text fields.
- These applications, which are addressed to both companies and individuals, send notifications to the user when a product reaches its expiry date.
Unfortunately, manually entering the expirationdate for each product can be very time consuming.
- Another problem is that current laws do not oblige manufacturers to include the expiry date of each item in Braille format on the packaging, so people with visual impairments cannot access this important information.

PROPOSED SYSTEM-

Machine Learning (ML) Solution for Expiry Date Detection using ML:

1. Image analysis using Convolutional Neural Networks (CNNs)
2. Sensor data integration (temperature, humidity)
3. Text recognition (OCR) for label analysis
4. Predictive modeling using Recurrent Neural Networks (RNNs)

Approaches:

1. Internet connectivity: Use offline-capable ML models
2. Manual data entry: Automate data collection using sensors and image analysis
3. Limited scalability: Use distributed computing and cloud services
4. Inaccurate predictions: Use ensemble methods and hyperparameter tuning
5. Lack of real-time monitoring: Use real-time data streaming and processing

HARDWARE REQUIREMENTS

Camera:

Resolution: High-resolution cameras (such as 12MP or higher) are optimal for capturing clear images of product labels.

Sensor Size: A larger sensor size can enhance image quality, particularly in low-light scenarios.

Focus: Autofocus features are crucial for obtaining sharp images of products from various distances.

Interface: High-speed interfaces, like USB, are necessary for efficient data transfer.

Processor:

CPU: A robust CPU is essential for image processing, executing machine learning models, and performing OCR tasks.

GPU: A dedicated GPU can greatly enhance the processing speed for complex image processing and machine learning operations, particularly for real-time use cases

Memory:

RAM: Ample RAM is required to efficiently manage large images, intermediate processing results, and the machine learning model.

Storage: storage capacity is necessary to hold images, model data, and system logs.

SOFTWARE REQURIMENTS-

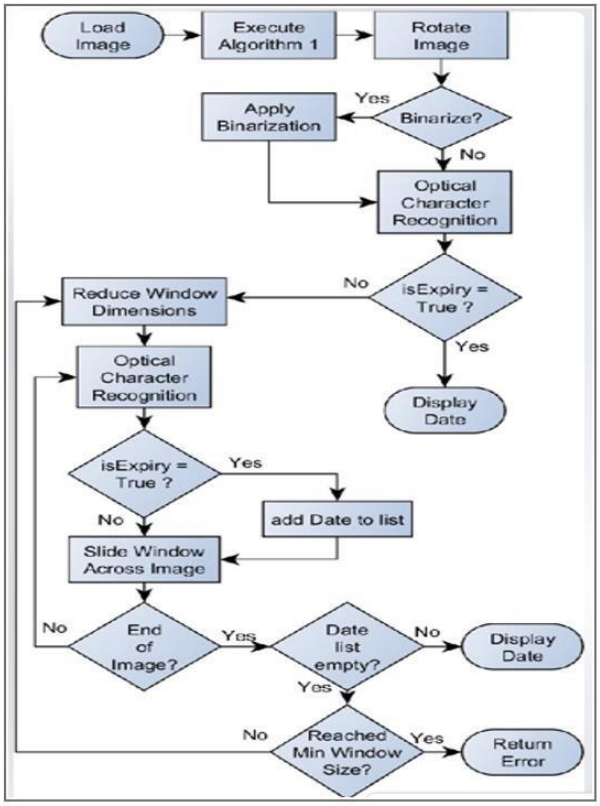
Image Processing Library:

Open CV:A powerful library for computer vision tasks, including image processing, object detection, and optical character recognition (OCR).
PIL (Pillow Fork): A user-friendly Python Imaging Library for basic image manipulation tasks.
Machine Learning Framework:
TensorFlow or PyTorch: For training and deploying deep learning models, especially for complex scenarios
like real-time object detection and OCR.
Scikit-learn: For simpler machine learning tasks, like classification and regression.
Programming Language:
Python: A versatile language with extensive libraries for data science, machine learning, and image processing.
C++: For performance-critical applications and direct hardware interaction.

SYSTEM DESIGN-

SOFTWARE DESIGN-

Figure 5.1 Design Components



UML stands for Unified Modelling Language. UML is a standardized general-purpose modelling language in the field of object-oriented software engineering.

The standard is managed, and was created by, the Object Management Group. The goal is for UML to become a common language for creating models of object-oriented computer software.

In its current form UML is comprised of two major components: a Meta- model and a notation. In the future, some form of method or process may also be added to; or associated with, UML. The Unified Modelling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modelling and other non software systems. The UML represents a collection of best engineering practices that have proven successful in the modelling of large and complex systems. The UML is a very important part of developing objects-oriented software and the software development process.

The UML uses mostly graphical notations to express the design of software projects.

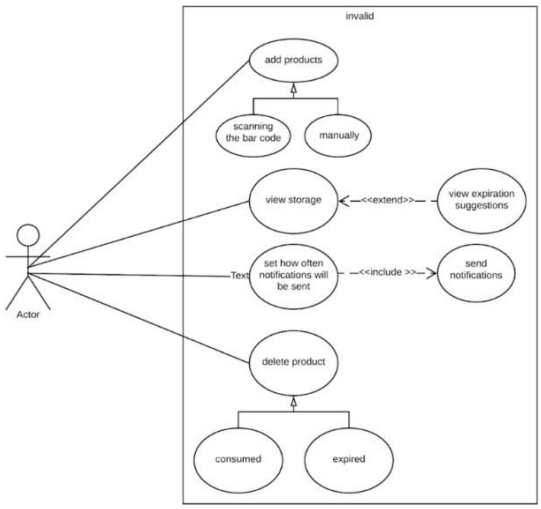
GOALS The Primary goals in the design of the UML are as follows:

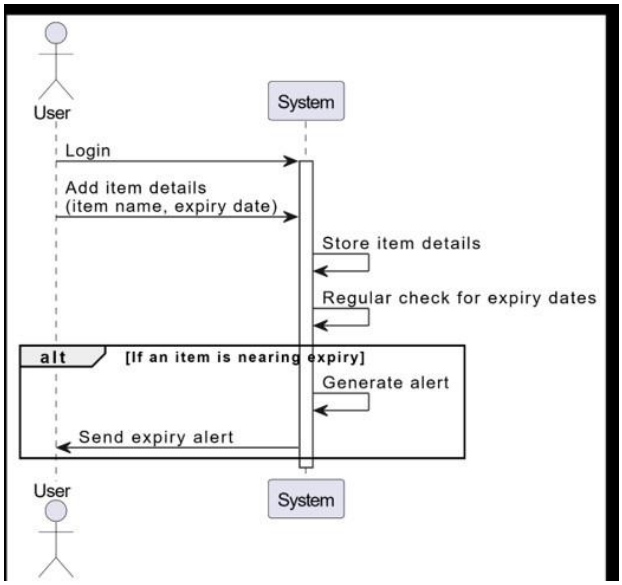
1. Provide users a ready-to-use, expressive visual modelling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modelling language.
5. Encourage the growth of OO tool.

TYPES OF UML DIAGRAM

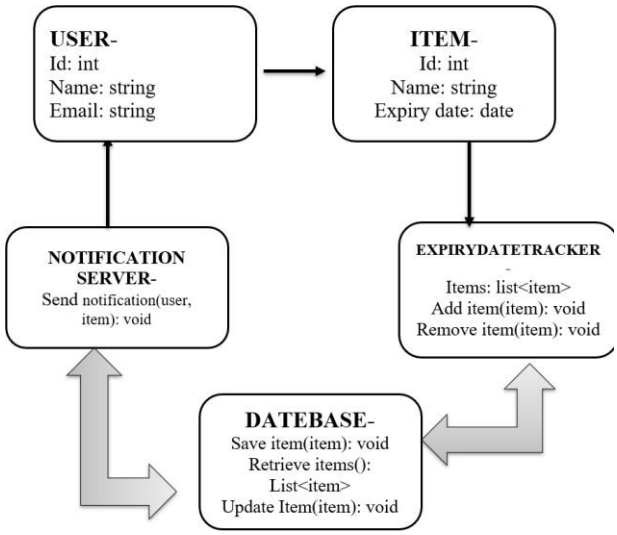
Each UML diagram is designed to let developers and customers view a software system from a different perspective and in varying degrees of abstraction. UML diagrams commonly created in visual modelling tools

A. USECASE DIAGRAM





b: Sequence diagram



C.Class daigram

CONCLUSION

In conclusion, the application is able to show a list of all items by color coding it as well as sorting it in order of high priority. The application is also able to automatically discover the name of the products using barcode scanning and tries to detect the date of expiry by OCR scanning but is unsuccessful in doing so in most attempts. It was also able to provide preference editing options which makes the application
easy to customize. Overall, this application would definitely be very useful in preventing food wastage as well as saving money.

FUTURE WORK

1. Integrate with popular calendar apps: Integrate the expiry date tracker with popular calendar apps like Google Calendar, Apple Calendar, or Microsoft Outlook.
2. Expand to track other types of products: Expand the tracker to include other types of products, such as cosmetics, medications, or household cleaning supplies.
3. Integrate with IoT devices: Integrate the tracker with IoT devices, such as smart refrigerators or pantries, to automatically track expiry dates.

Artificial Intelligence and Machine Learning

1. Predictive analytics: Implement predictive analytics to forecast the likelihood of a product expiring soon based on historical data and usage patterns.
2. Image recognition: Integrate image recognition technology to allow users to upload images of product labels or packaging to automatically extract expiry date information.
3. Natural Language Processing (NLP): Implement NLP to allow users to interact with the tracker using voice commands or text-based inputs.

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7"FoodExpirationTrack" - https://play.google.com/store/apps/details?id=com.touchsi.keepemfresh