RICE SAFETY TRACEABILITY SYSTEM FOR PEOPLE'S HEALTH USING MACHINE LEARNING AND BIG DATA

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Overview:

The traceability system is a management system for managing risk that is able to track the movement of food at certain stages of production, processing, and distribution. Many countries are trying to implement this system in various commodities through regulations they have set to ensure the quality and safety of food. Rice is an essential commodity in India because the majority of India population consumes it as a daily carbohydrate intake. Based on data from the Agricultural Datacenter and Information, the average rice consumption in India reaches 84.9 million tons annually. Nevertheless, the supply chain of rice in India still faces several problems, one of them is traceability. Traceability has become a pressing issue because of the complexity of the supply chain network of rice and the rise of various quality risks along the supply chain. One of the risks that often occurs is the process of quality manipulation carried out by the rice milling industry and rice traders. In practice, the quality manipulation can occur in several ways. Those are:

1. Mixing of rice between varieties and between qualities.
2. Re-mixing of rice that has experienced a quality decline (reprocessing).
3. Adding dangerous chemicals, such as chlorine and aromatic compounds in rice.
4. The use of packaging labels that are not in accordance with the contents.

Problem Statement:

Quality has become a vital distinctive feature for competition in the world market of food products. To obtain a good quality end product, quality is more and more managed along the whole food chain from the supplier of raw materials to the consumption. Striving for quality is not a free choice. It is not possible to detect the quality of rice by seeing the rice, so we need a systemic approach to detect the rice quality.

Significance and Relevance of Work:

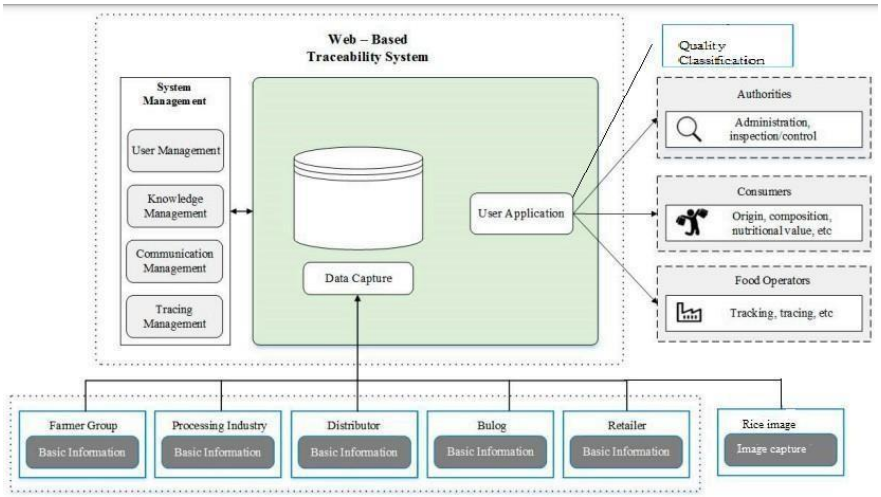


Figure 1: System Architecture

The above figure describes application systems and their role in supporting supply chain business processes, which include

- Key application concepts that are needed.
- Logical structure of information systems that can provide an overview of information exchange between systems and the roles of each actor.
- Designing modules from information systems.

The architecture of rice traceability system consists of several management systems:

User management, knowledge management, communication management, and traceability management. User management consists of modules that can be accessed by every actor, including system administration (government), consumers, and food operators. Knowledge management is part of the traceability system in the agroindustry, used to assist in decision- making for supplier selection and customer relationship management. Communication management provides communication facilities between actors, while traceability management is part of the system used to trace the products. In this application user will pass the rice grain images as input our application will classify and detects the rice. Grain is mix or in image or not for the results to be detected from images.

Objectives:

- To ensuring rice safety in the whole process of rice production, inventory, distribution and sales.
- To guarantee the integrity, reliability and safety of traceability information from a technical level.
- To save the people life to avoid food infection.
- To make alert to the customers if there is any spoiled / mix in rice detected.
- To use image processing algorithms to analyze grains quality by its size.
- To use machine learning algorithms for classification.

- To analyze and classify the quality of rice grains and if any stones are detected.

Methodology:

K-nearest neighbors (KNN) is a type of supervised learning algorithm used for both regression and classification. KNN tries to predict the correct class for the test data by calculating the distance between the test data and all the training points. Then select the K number of points which is close to the test data. The KNN algorithm calculates the probability of the test data belonging to the classes of 'K' training data and class holds the highest probability will be selected. In the case of regression, the value is the mean of the 'K' selected training points.

The K-NN working can be explained on the basis of the below algorithm:

- Step-1: Select the number K of the neighbors.
- Step-2: Calculate the Euclidean distance of K number of neighbors.
- Step-3: Take the K nearest neighbors as per the calculated Euclidean distance. **Euclidean Distance:** Euclidean distance is calculated as the square root of the sum of the squared differences between a new point (x) and an existing point (y).

$$\text{Euclidean} \quad \sqrt{\sum_{i=1}^{k}(x_i - y_i)^2}$$

- Step-4: Among these k neighbors, count the number of the data points in each category.
- Step-5: Assign the new data points to that category for which the number of the neighbor is maximum.
- Step-6: Our model is ready.

Image pre-processing

Filter is applied to remove noise which occurs during the acquisition of image. Filter also sharpens the image. Threshold algorithm is used to segment the rice grains from the black background.

Shrinkage morphological operation

Erosion is applied to separate the touching features of rice grains without losing the integrity of single feature. Dilation process follows erosion process. The goal of dilation is to grow the eroded features to their original shape without re-joining the separated features.

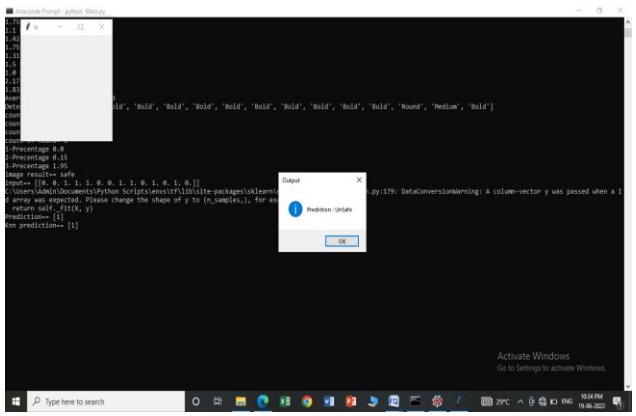
Edge detection

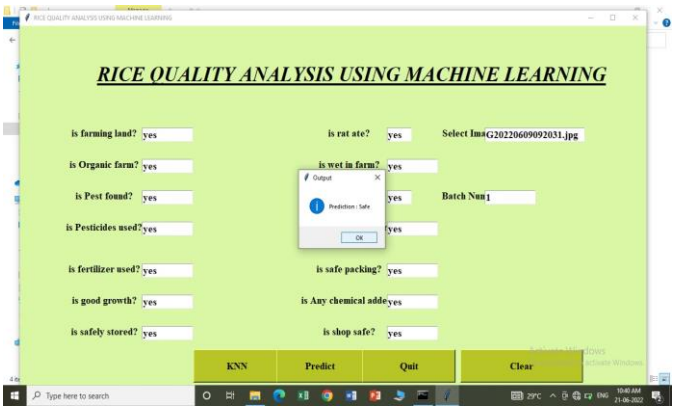
Edge detection helps to find out the region of boundaries of rice grains. We use canny algorithm to detect the edges.

Conclusion:

In the context of disease and control, strengthening rice safety data analysis based on the application of rice safety traceability technology can effectively improve the effect of rice safety management, which is conducive to the development of epidemic prevention and

control, and has practical value for the solution of future food safety issues. So as to better protect people's life, health and safety. The use of Machine Learning and Big Data technology to regulate rice safety can effectively curb the emergence of major rice safety incidents. Finally by determining the rice is safe or not we can help people from facing issues related to health and also can alert others who have bought the product.





Scope for future work:

In this project we are using KNN algorithm and image processing techniques to detect the rice quality. In this project we can identify the quality of rice is safe or unsafe based on the parameters. In future we can extend this work to identify the variety of rice and other grains quality checking, we can apply deep learning concepts to improve accuracy of detecting rice quality.