INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG
DEPARTMENT OF CSE

COURSE-CODE : CSE - 4876

COURSE TITLE: Pattern Recognition and Image Processing Lab

DATE OF SUBMISSION: 1st April, 2024

Project Proposal about *Classification of Fruits and Vegetables*

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SECTION: 8BM

Classification of Fruits and Vegetables

Abstract - When it comes to dietary assessment and advice, fruit and vegetable classifications that are based on their content are the most beneficial. This study examined the relationship between fruit and vegetable levels of food components and the botanic family, color, plant part, and total antioxidant capacity (TAC) classification criteria. Based on dietary component levels and the categorization criteria, the foods were grouped into homogeneous clusters using a mathematical clustering technique. The botanic families of rose, rue (citrus), amaryllis, goosefoot, and legume; color groups of blue/black, dark green/green, orange/peach, and red/purple; and plant parts of fruit—berry, seeds or pods, and leaves—were the most helpful in terms of classification. Often, a combination of classification factors, such as color and plant component, best described clusters.

Introduction - Fruits and vegetables include phytochemicals that may reduce the risk of chronic disease, making them valuable sources of certain necessary elements for human health. Researcher classification of fruits and vegetables is crucial for evaluating the connections between nutrition, health, and illness. For instance, in order to evaluate intakes of particular food components, researchers that create meal frequency questionnaires frequently need to measure their fruit and vegetable questions. In order to help people choose the right kinds of fruits and vegetables to suit their nutrient and health demands, dietary advising materials requiring fruit and vegetable classification are also necessary. Food guides are available in many countries and provide recommendations for intake as well as graphical representations of the food groups and subgroups. Because the focus of food guidelines is not only on the key components of fruits and vegetables but also on which fruits and vegetables are generally available to and consumed by population groups, the fruit and vegetable groupings and subgroups differ from one country to the next.

Methodology:

1) Fruits Data Collection : Gather a diverse dataset of fruit images. These images should cover various types of fruits, different angles, lighting conditions, and backgrounds.

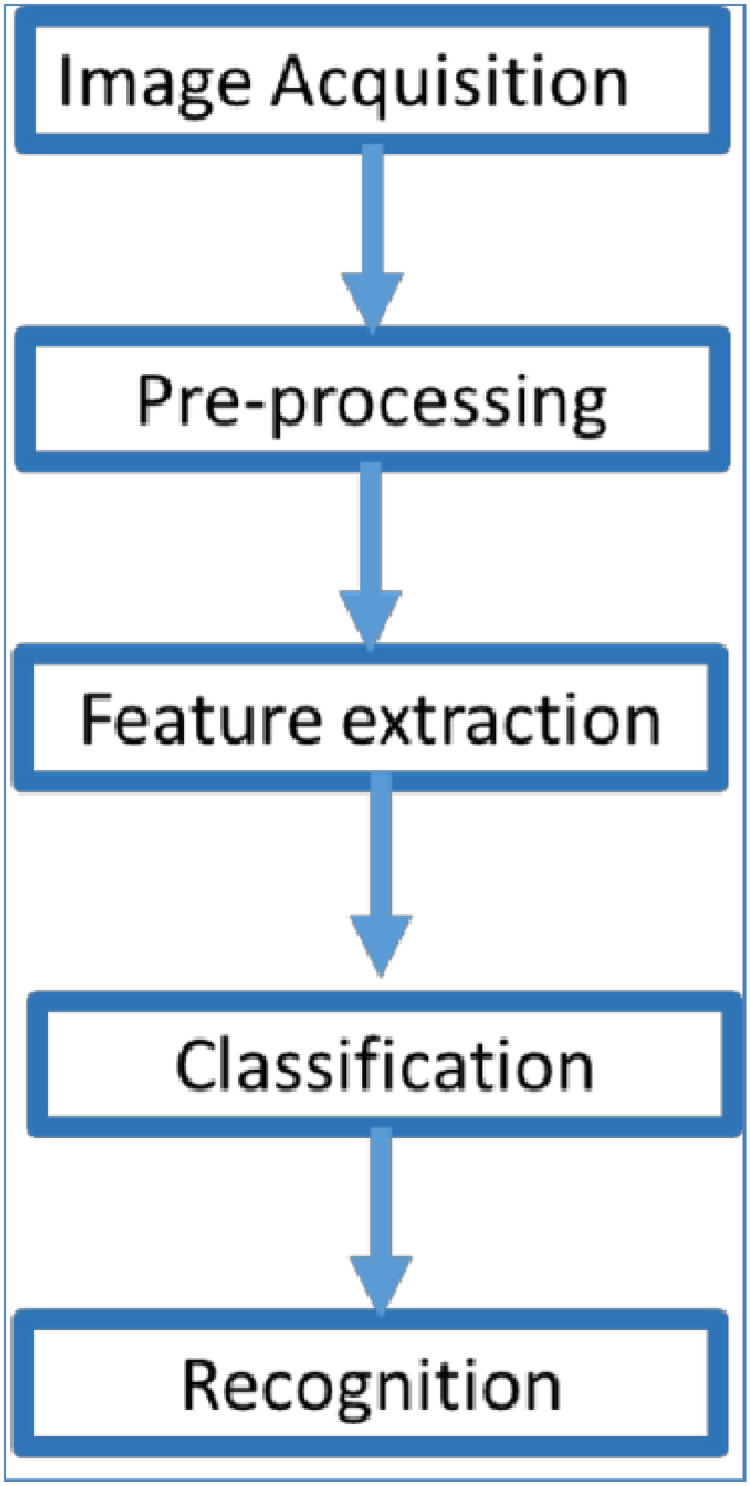
2) Fruits Data Preprocessing : Resize all images to a uniform size to ensure consistency.

3) Feature Extraction or Deep Learning : Extract relevant features from the images using techniques like Histogram of Oriented Gradients (HOG), Local Binary Patterns (LBP), or color histograms.

4) Model Training : Split the dataset into training, validation, and testing sets. Train a machine learning model (e.g., SVM, Random Forest, k-Nearest Neighbors) or a deep learning model (e.g., CNN) on the training data.

5) Model Evaluation : Evaluate the trained model on the testing set to assess its performance metrics such as accuracy, precision, recall, and F1-score.

6) Model Deployment : Once satisfied with the model's performance, Provide an interface (e.g., web application, API) for users to upload images and receive predictions about the fruit type.



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Fruit and vegetable recognition system images Methodology

Discussion: There are a variety of methods that can be used to conduct cluster analysis. This study reflects the method thought most appropriate for the nature of the database; however, several additional methods of cluster analysis were also explored. While it was found that cluster membership did shift with each variation in methodology, it was apparent that certain fruits and vegetables repeatedly grouped together regardless of the algorithm employed. Despite the variation of clustering results observed from different algorithms, this work suggests that there is value in employing mathematical clustering as a guide toward useful groupings.

Future Scope: Wide-ranging applications in every aspect of life have been made possible by recent advances in computer vision. Classifying fresh food is one such application field; nevertheless, fruit and vegetable classification has proven to be a challenging task that requires additional development. Classifying fruits and vegetables can be difficult because of their irregular intra class traits and similarities between classes. Because the area is so diverse, choosing the right data acquisition devices and feature representation strategy is also essential. While methods for classifying fruits and vegetables have been established for robotic harvesting and quality assessment, the state-of-the-art has been created for short datasets and limited classes. One important hurdle with current machine learning algorithms is the multi-dimensional structure of the problem, which offers significantly hyper dimensional features. This paper offers a thorough assessment of various cutting-edge computer vision techniques that have been suggested by researchers to categorize fruits and vegetables.

Conclusion: Nutritionists are provided with the suggested fruit and vegetable classifications as a way to more precisely classify fruits and vegetables according to food components that are important for public health. The categories could be helpful to researchers creating meal frequency surveys for clinical or epidemiological investigations, to instructors instructing students on food composition, and to dietitians advising patients and clients on diets.