

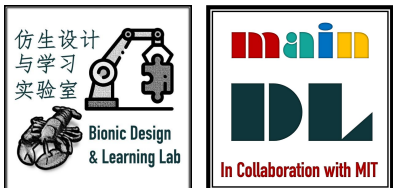
# Identifying Fruit and Vegetable Types and Grasping the Dregs Based on Deep Learning

Ding Zhuoyang 12110111 | Yin Zhiqi 12112346

Qiu Tian 12111904 | Tong Xuan 12111917

Hu Xinshu 12112727 | Lu Jingxuan 12111546

2024/3/26



# Proposed Project Title Summary

---

## *Summary*

In today's China, with the growth of population and the acceleration of urbanization, the food safety problem of public canteens has become a key concern. In our project, we will use visual recognition and machine learning methods to identify the types of fruits and vegetables and pick out the unfresh ones with robotic arm, aiming to achieve a sorting success rate of 85% or higher. Through this project, we can reduce the labor demand for traditional vegetable and fruit sorting, reduce the workload and working time of the chef. At the same time, this design optimizes the sorting process and improves the efficiency of sorting. At the national level, this project can respond to the call of "Artificial Intelligence +" and further promote the innovative development of digital economy.

We searched for many articles on visual recognition and machine learning. Among them, we selected three articles as our main references. These three articles all focused on the recognition and classification of common fruits and vegetables, including visual recognition and machine learning. This was of great help to our project.

# Proposed Project Title Summary

---

## *Summary*

The main data sources are the datasets provided in the paper and the datasets designed by ourselves. After being processed to some extent, these datasets will be input to the deep learning model we have established for training.

The project will refer to the visual recognition and machine learning models and algorithms in other papers, analyze the advantages and disadvantages of different models and algorithms, and then modify and optimize our model. For example, data preprocessing and vision transformers(ViT).

Finally, we will analyze the output results of our model from both qualitative and quantitative perspectives. From a qualitative perspective, we expect the model to accurately identify the types of fruits and vegetables and extract those that are not fresh. From a quantitative perspective, we expect the model's recognition accuracy and extraction success rate to reach 90% or higher.

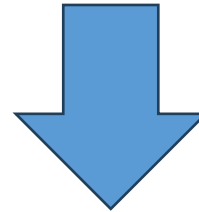
# What is the problem that you will be investigating?

---

*Why is it interesting?*

**Growth of population**

**Acceleration of urbanization**



**Food safety issues in public canteens**

# What is the problem that you will be investigating?

---

## *Why is it interesting?*

The current problem of sorting ingredient through chefs

- The cost of human and material resources is high
- Long duration
- human subjective problem

# What is the problem that you will be investigating?

*Why is it interesting?*

- Example:

<b>教职工总数</b>	16619	<b>在学学生人数*</b>	60919
其中: 教师	3831	本科生	16291
职工	9848	其中: 国际学生	780
博士后	2940	硕士生	22657
		其中: 专业学位	16382
		国际学生	1597
		博士生	21971
		其中: 专业学位	3810
		国际学生	445
		港澳台学生	1052

# What is the problem that you will be investigating?

---

## *Why is it interesting?*

The interesting points of this project are as follows:

- Reduced the labor demand for traditional vegetable and fruit sorting, reducing the workload and working hours of chefs.
- Optimized the sorting process and improved the efficiency of sorting.
- Respond to the call of "Artificial Intelligence +" and further promote the innovative development of the digital economy.

# What reading will you examine?

*To provide context and background*

- Apostolopoulos ID, Tzani M, Aznaouridis SI. A General Machine Learning Model for Assessing Fruit Quality Using Deep Image Features. *AI*. 2023; 4(4):812-830.

<https://doi.org/10.3390/ai4040041>

- Karadağ, A.E., & Kiliç, A. (2023). Non-destructive robotic sorting of cracked pistachio using deep learning. *Postharvest Biology and Technology*.

- Liu Zhen. (2019). Master's degree thesis on visual recognition and maturity detection technology of guava in natural environment, South China Agricultural University.

<https://link.cnki.net/doi/10.27152/d.cnki.ghanu.2019.000626>

doi:10.27152/d.cnki.ghanu.2019.000626.



# What data will you use?

## *How to find the data?*

- Search for datasets through the content of the paper:

Data Article

An extensive dataset for successful recognition of fresh and rotten fruits



Nusrat Sultana, Musfika Jahan\*, Mohammad Shorif Uddin

Department of Computer Science and Engineering, Jahangirnagar University, Dhaka, Bangladesh

### ARTICLE INFO

*Article history:*  
Received 9 April 2022  
Revised 12 August 2022  
Accepted 19 August 2022  
Available online 24 August 2022

Dataset link: [Fresh and Rotten Fruits Dataset for Machine-Based Evaluation of Fruit Quality \(Original data\)](#)

*Keywords:*  
Image classification  
Agriculture  
Fruit dataset  
Deep learning  
Computer vision

### ABSTRACT

Detection of rotten fruits is very crucial for agricultural productions and fruit processing as well as packaging industries. Usually, the detection of fresh and rotten fruits is done manually which is an ineffective and lengthy process for farmers. For this reason, the development of a new classification model is required which will reduce human effort, cost, and production time in the agriculture industry by recognizing defects in the fruits. This article offers a major dataset to the researchers to develop effective algorithms for recognizing more variety of fruits and overcome the limitations by increasing accuracy as well as decreasing computation time. This dataset contains sixteen types of fruit classes, namely fresh grape, rotten grape, fresh guava, rotten guava, fresh jujube, rotten jujube, fresh pomegranate, rotten pomegranate, fresh strawberry, rotten strawberry, fresh apple, rotten an-

### Specification Table

Subject	Computer Science
Specific subject area	Image Classification, Image Recognition, Deep Learning, and computer vision.
Type of Data	Images
How the data were acquired	From 16th to 31st March 2022, we collected various varieties of fresh and rotten fruit images from different fruit shops and real fields using a Single-lens reflex digital camera (Nikon D5600) to get raw fruit images.
Data format	Raw jpg
Parameters for data collection	Fresh and rotten images of different fruits were collected separately. There exist various types of fruit images including grape, guava, jujube, pomegranate, apple, banana, orange, and strawberry.
Description of Data Collection	No pre-treatment of the samples was done in any research work before. With the assistance of a domain specialist from an agricultural organization, we collected all the fruit images.
Data source location	<i>Location:</i> Different fruit shops and real field <i>Zone:</i> Savar, Dhaka <i>Country:</i> Bangladesh
Data Availability	<i>Repository name:</i> Mendeley Data <i>Data identification number (DOI number):</i> <a href="https://doi.org/10.17632/bdd69gyhv8.1">10.17632/bdd69gyhv8.1</a> <i>Link of the dataset:</i> <a href="https://data.mendeley.com/datasets/bdd69gyhv8/1">https://data.mendeley.com/datasets/bdd69gyhv8/1</a>

# What data will you use?

## *How to find the data?*

- Search for datasets through the content of the paper:

### Fresh and Rotten Fruits Dataset for Machine-Based Evaluation of Fruit Quality

Published: 9 April 2022 | Version 1 | DOI: 10.17632/bdd69gyhv8.1

Contributors: Nusrat Sultana , Musfika Jahan , Mohammad Shorif Uddin

#### Description

(1) Everyone is interested to get fresh and quality fruits. As fruits are going to be rotten after the passing of time. Hence, fruit quality has substantial economic consequences. It is estimated that roughly one-third of the fruits are rotten causing huge financial loss. Furthermore, the sale of fruits will be impacted because consumers believe that spoiled fruits are harmful to their health. Classification of fresh and rotten fruits is usually carried out by people, which is ineffective for fruit farmers, sellers as well as fruit processing industries.

(2) In the recent era, computer vision techniques are very promising in performing such types of classification and detection tasks.

(3) With a view to developing computer vision-based algorithms, an extensive fruit dataset is presented containing sixteen types of fruit classes, namely fresh apple, rotten apple, fresh banana, rotten banana, fresh orange, rotten orange, fresh grape, rotten grape, fresh guava, rotten guava, fresh jujube, rotten jujube, fresh pomegranate, rotten pomegranate, fresh strawberry and rotten strawberry. Fresh and rotten classifications are done with the help of a domain expert from an agricultural institute.

(4) A total of 3200 images of fresh and rotten fruits are collected from different fruit shops and real fields. Then from these original images, a total of 12335 augmented images are produced by using rotation, flipping, zooming, and shearing techniques to increase the data number.

Citations not available

#### Dataset metrics

#### Latest version

Version 1

Published:

9 Apr 2022

DOI:

10.17632/bdd69gyhv8.1

#### Cite this dataset

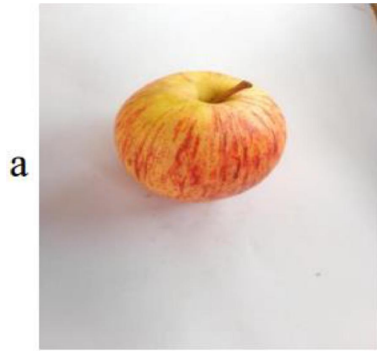
Sultana, Nusrat; Jahan, Musfika; Uddin, Mohammad Shorif (2022), "Fresh and Rotten Fruits Dataset for Machine-Based Evaluation of Fruit Quality", Mendeley Data, V1, doi: 10.17632/bdd69gyhv8.1

[Copy to clipboard](#)

# What data will you use?

## *How to find the data?*

- Search for datasets through the content of the paper:



# What data will you use?

## *How to find the data?*

Search for datasets through the content of the paper:

“A General Machine Learning Model for Assessing Fruit Quality Using Deep Image Features”

- FruitNet: Indian Fruits Dataset with Quality: <https://www.kaggle.com/datasets/shashwatwork/fruitnet-indian-fruits-dataset-with-quality> )
- FruitQ dataset: <https://www.kaggle.com/datasets/sholz/fruitq-dataset>
- Lemon quality dataset: <https://www.kaggle.com/datasets/yusufemir/lemon-quality-dataset>
- Mango varieties classification and grading: <https://www.kaggle.com/datasets/saurabhshahane/mango-varieties-classification>

# What data will you use?

---

*How to find the data?*

Design based on network pictures

For some of the mentioned fruits and vegetables, we will make reasonable design based on the actual situation of the picture of the ingredient, so that this picture can basically meet the different states of fruit and vegetable in real life.

# What data will you use?

---

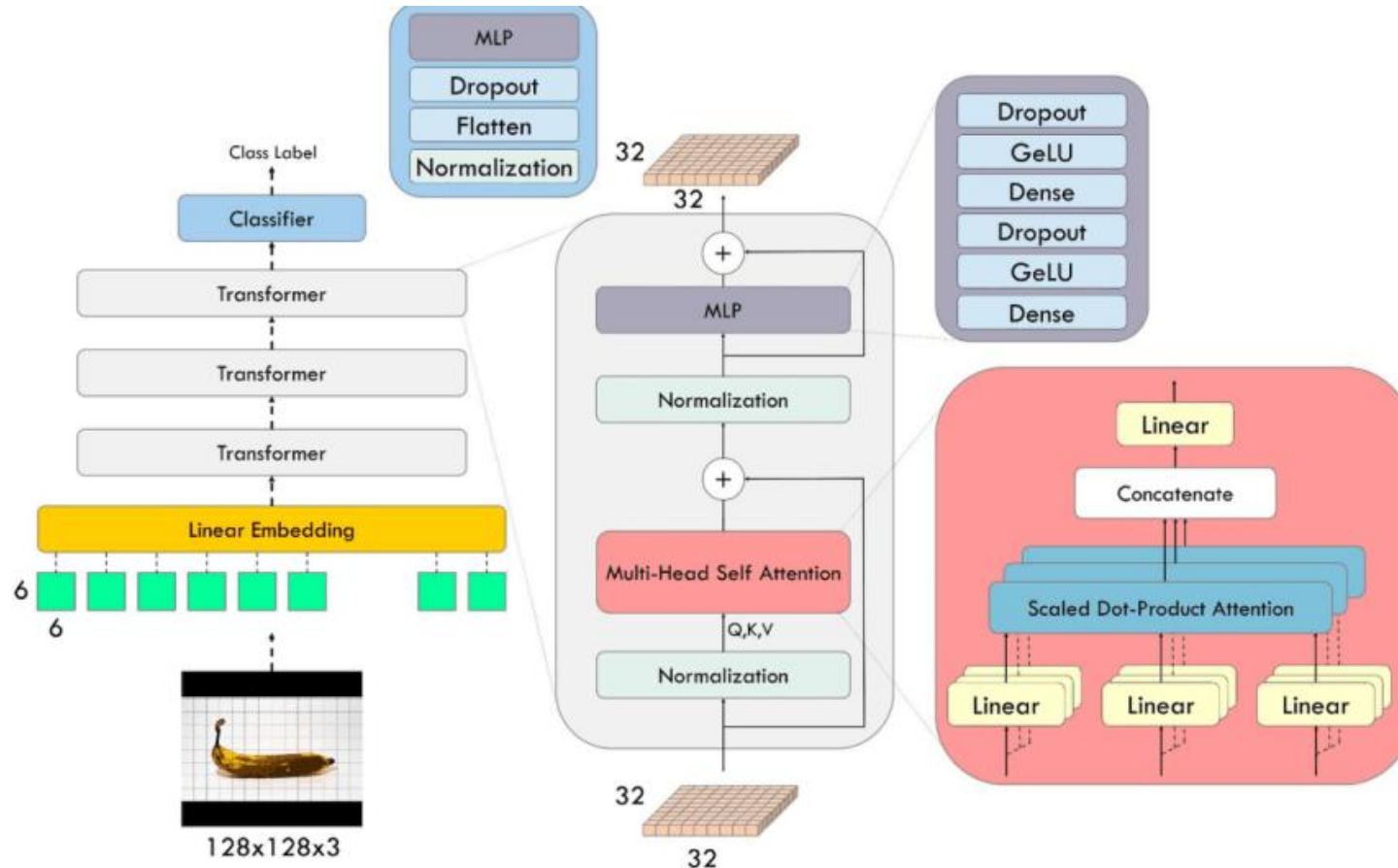
*If you are collecting new data, how will you do it?*

- Build deep learning algorithm
- Preprocess the dataset
- Input the processed dataset into the model
- Training model
- Input the test set and compare the results

# What method or algorithm are you proposing?

*The algorithms and models will be used in the project*

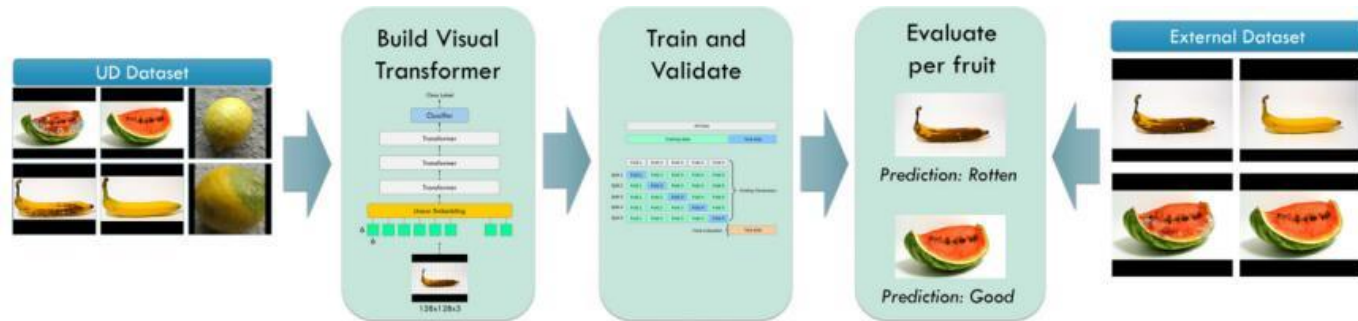
- Vision transformers



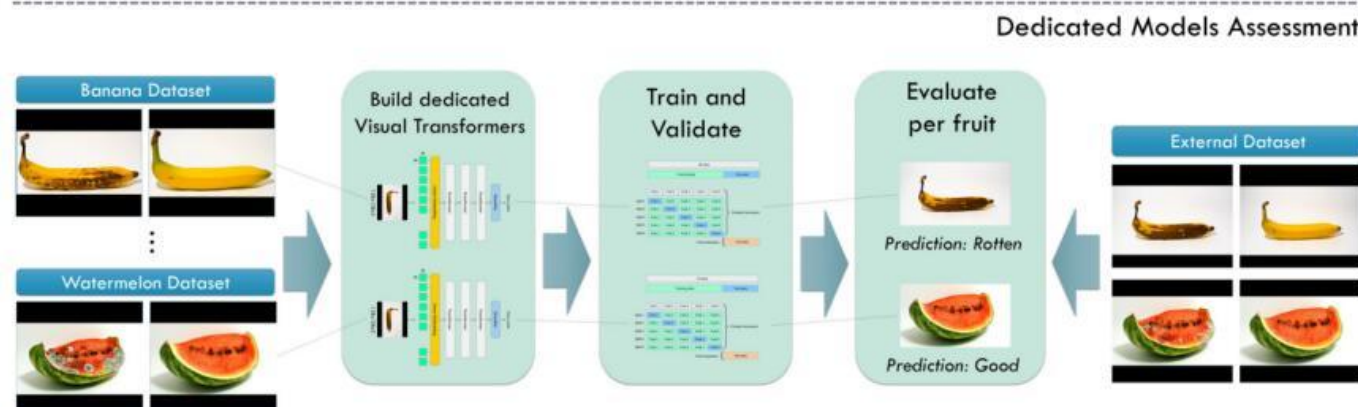
# What method or algorithm are you proposing?

*The algorithms and models will be used in the project*

- Research methodology



General Model Assessment



Dedicated Models Assessment



# How will you evaluate your results?

## *Qualitative and quantitative analysis*

- Qualitative analysis
  - The model can identify fruit and vegetable varieties
  - The robotic arm can sort stale vegetables and fruits
- Quantitative analysis
  - The accuracy of identifying fruits and vegetables reaches 90% or above
  - The success rate of grasping fruits and vegetables reaches 90% or above
  - The final success rate reaches 85% or above

# How will you evaluate your results?

---

## *Qualitative and quantitative analysis*

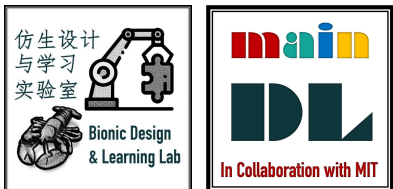
- Output results
  - Table: The success rate of recognition and grasping
  - Image: The situation of grabbing fruits and vegetables
- Extended work
  - Compare the accuracy of other models on this issue, summarize the advantages and disadvantages, and then make improvements and optimizations

# Thanks for listening

Ding Zhuoyang 12110111 | Yin Zhiqi 12112346

Qiu Tian 12111904 | Tong Xuan 12111917

Hu Xinshu 12112727 | Lu Jingxuan 12111546



AncoraSIR.com



SUSTech  
Southern University  
of Science and Technology