19 July, 2024

GROUP PROJECT

Mold Detection in Bread Using DIP

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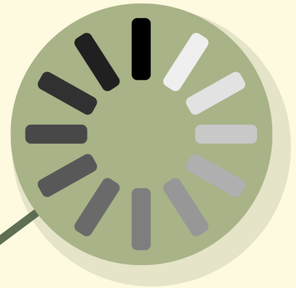
Agenda

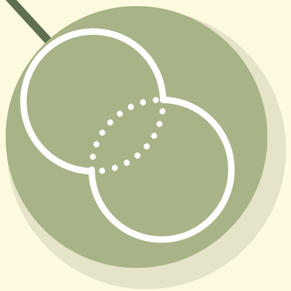


Introduction

- Digital Image Processing
- Use case introduction
- Why choose DIP?

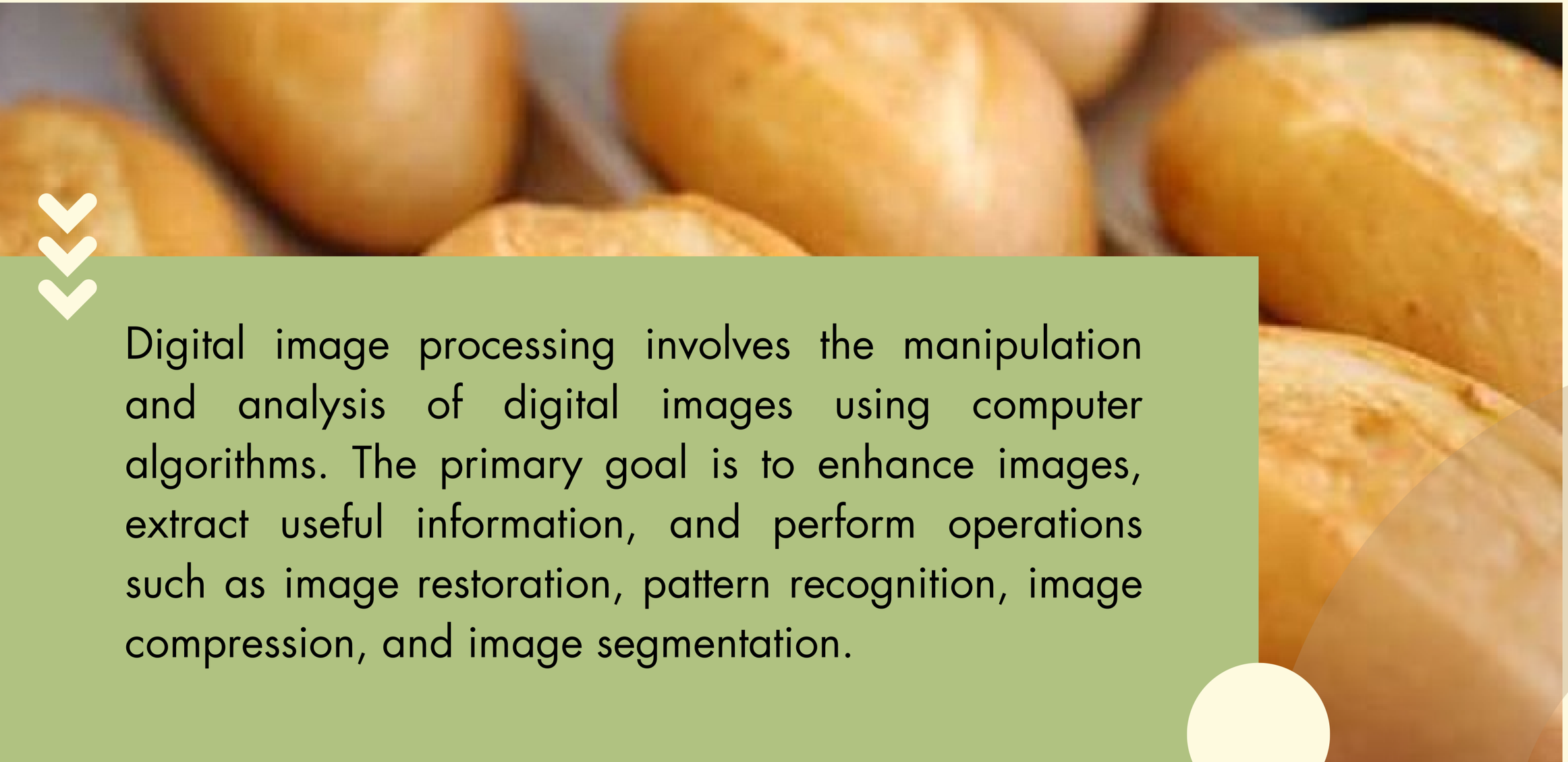
Use case

- Steps
- Demo



Conclusion and Q&A

INTRODUCTION



Digital image processing involves the manipulation and analysis of digital images using computer algorithms. The primary goal is to enhance images, extract useful information, and perform operations such as image restoration, pattern recognition, image compression, and image segmentation.

INTRODUCTION

This study aims to apply modern technology to automate and enhance the accuracy of mold detection, creating a solution that can be easily integrated into existing production lines. Early and accurate mold detection helps protect consumer health and minimizes economic losses for bread manufacturers and suppliers.

WHY CHOOSE DIP?

DIP OR CNN?

- Simplicity and Speed
- Resource Efficiency
- Interpretability
- Data Availability
- Development Time and Complexity
- Stability and Reliability

Mold Detection

Picture Processing

- Reading Images
- Color Space Conversion (BGR to HSV)

Mask Creation

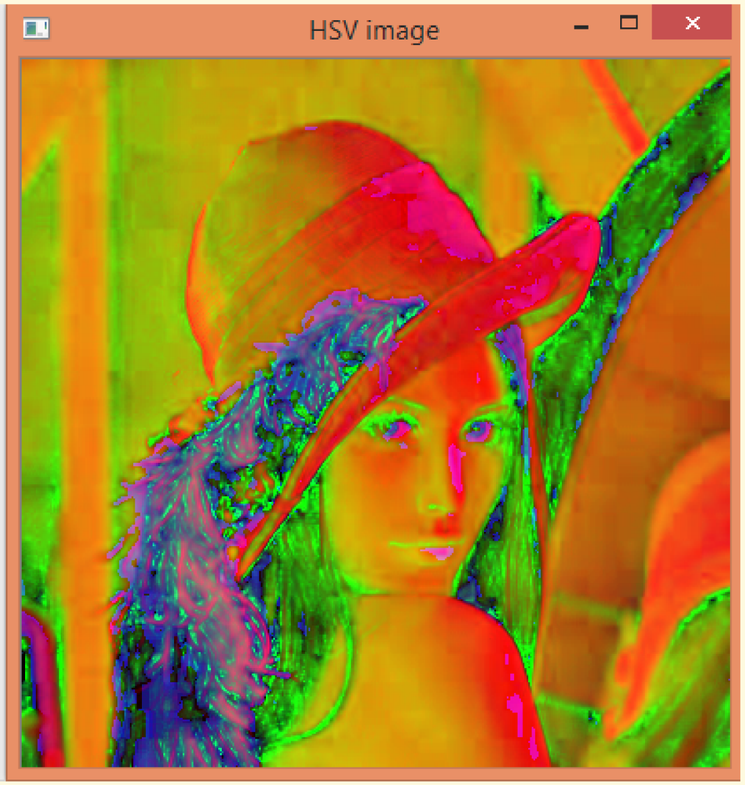
- Defining Color Thresholds
- Creating Color Masks
- Finding Contours and Drawing

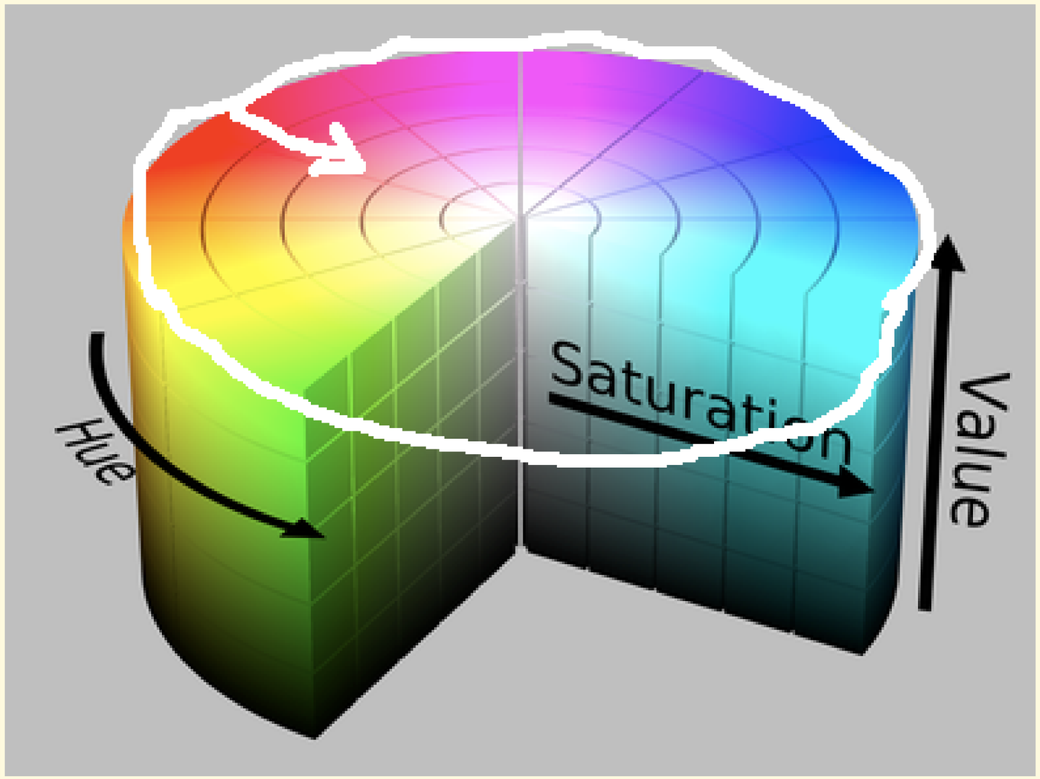
Mask Combination

Applying Masks and Drawing Bread Contours and Mold Contours

PICTURE PROCESSING

- The first step in image processing is to read images from files and resize them for the subsequent processing steps.
- Not only reduces computational resources but also accelerates the processing speed.
- In the HSV space, color information is represented as angles in a color wheel (Hue), the intensity of the color (Saturation), and the brightness of the color (Value).



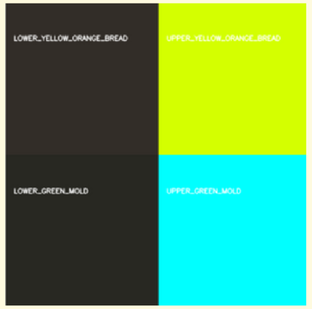


MASK CREATION

Defining Color Thresholds

- Determined based on the specific color characteristics of the bread and mold
- The color of the bread is typically golden or yellowish, while the mold can be green

Upper and Lower HSV color for



- Bread
- Green mold

MASK CREATION

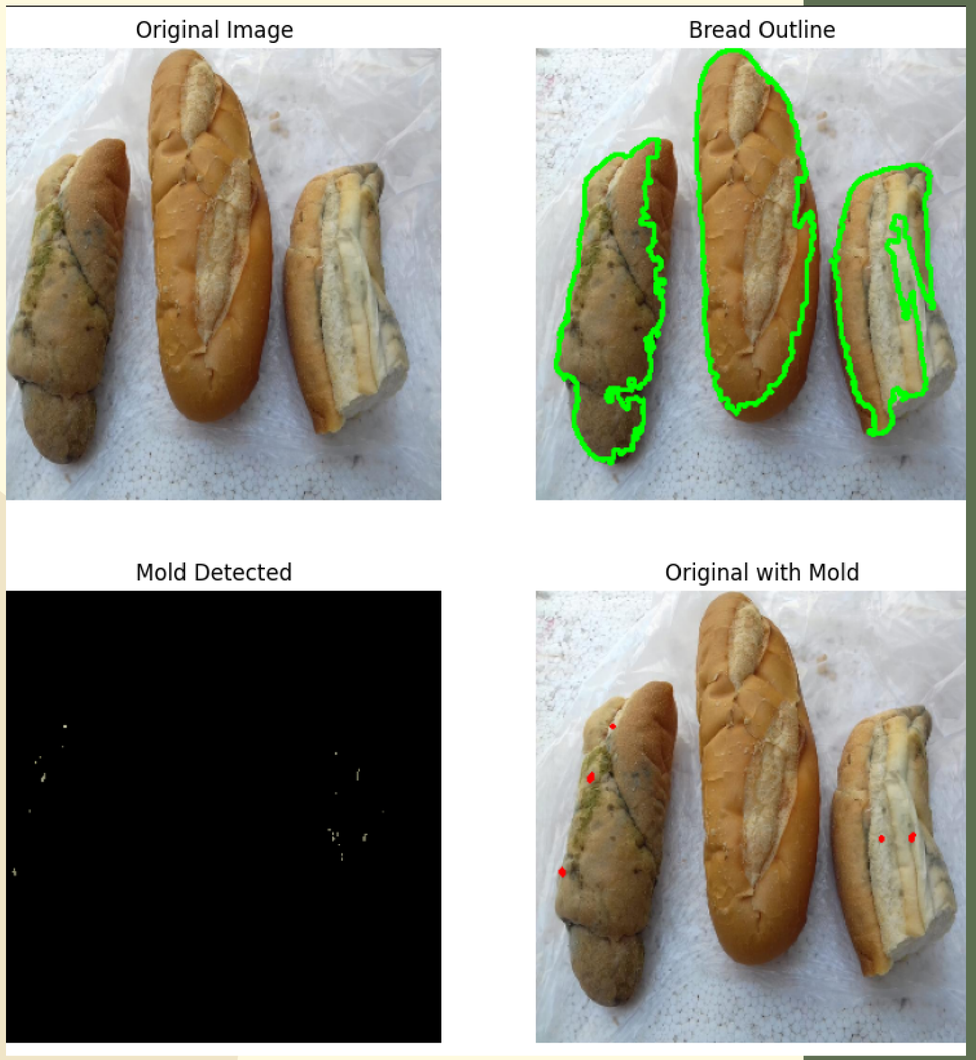
Defining Color Thresholds

- Determined based on the specific color characteristics of the bread and mold
- The color of the bread is typically golden or yellowish, while the mold can be green

Creating Color Masks

- Creating color masks clearly distinguishes the regions of interest, facilitating the subsequent analysis and detection steps.

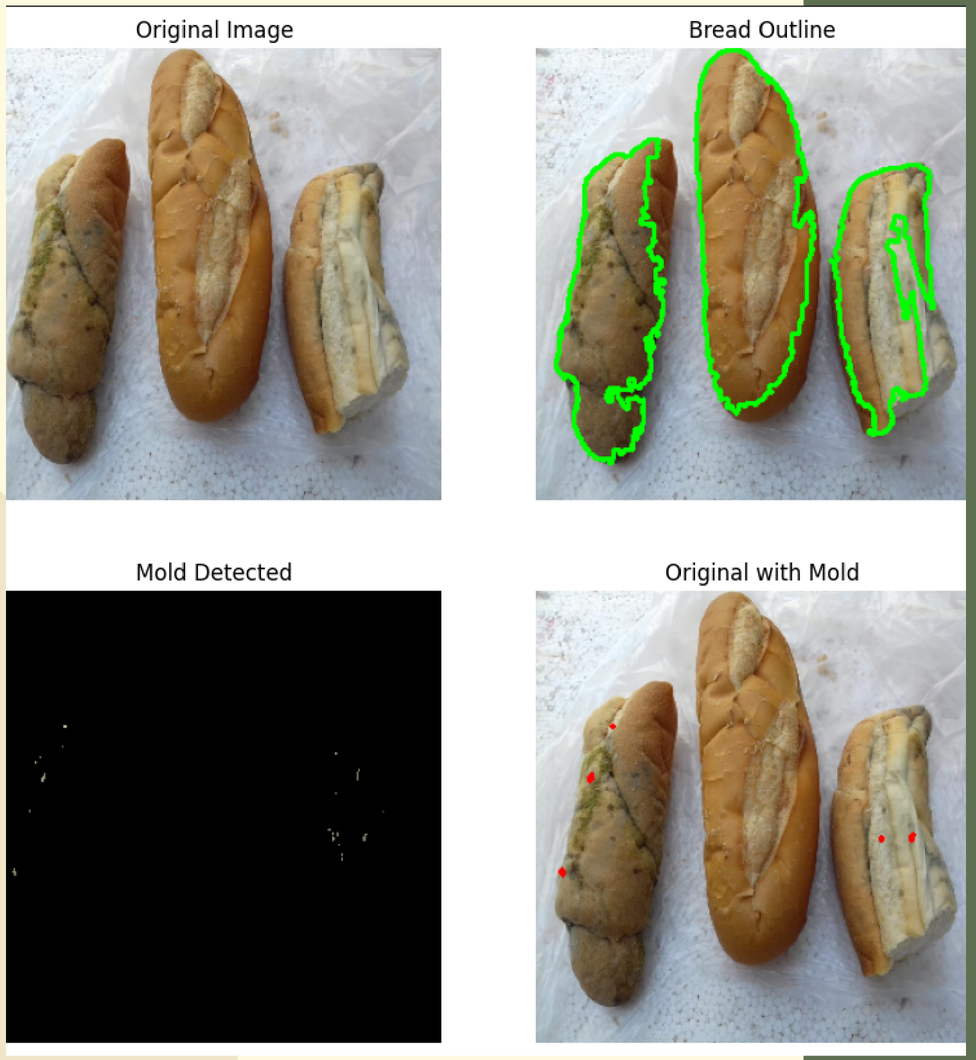
MASK COMBINATION



Mask Combination

- To ensure mold is detected only within the bread regions, bread masks and mold masks are combined. This process eliminates confusing regions and focuses on areas likely to contain mold.

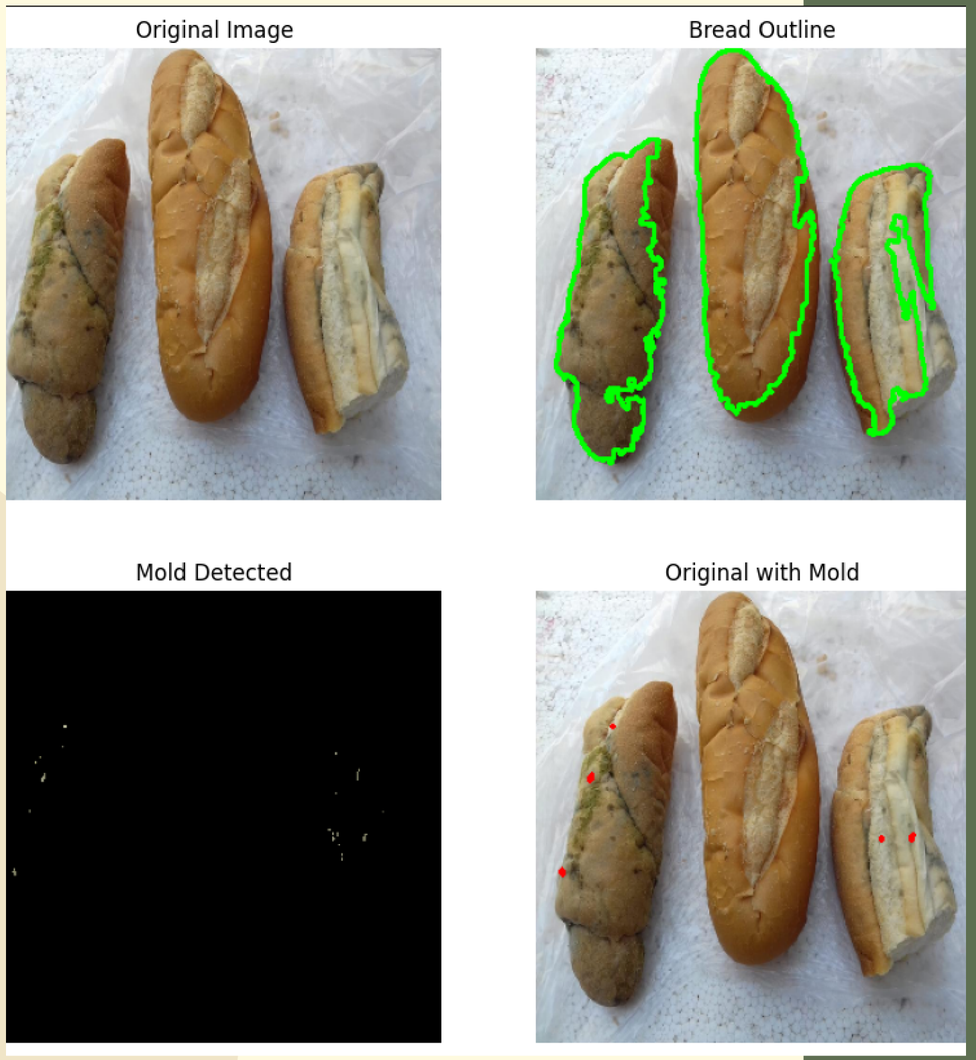
MASK COMBINATION



Mask Application

- Mask application via a bitwise AND operation combines two binary masks to produce a new binary image that highlights the overlap between the areas of interest defined by the original masks.

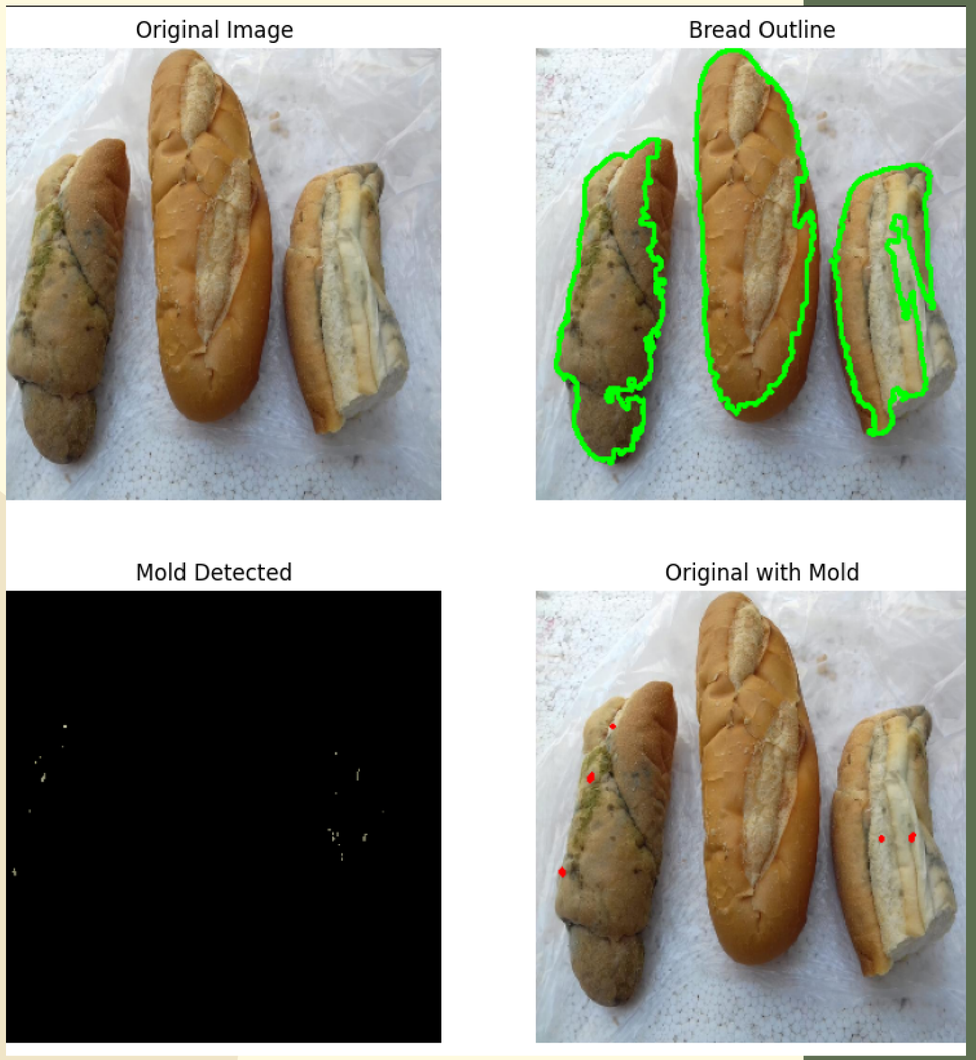
CONTOURS DRAWING



Draw mold contours

- The algorithm scans the binary image for areas of white pixels that are connected. Each of these areas is considered a contour.
- Filter out contours that are too small to be considered mold.
- After filtering, the contours that represent mold are drawn onto the original image.

COMBINATION ALL



CONCLUSION

This method not only enables quick mold detection but can also be applied to various other food items to ensure food safety. As technology advances, image processing techniques will become increasingly important in protecting consumer health and safety.

DRAWBACK

- This method relies hardly on the predefined range of mold color so it cannot cover all the cases

Q&A

THANK YOU