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CRACKED EGG DETECTION FOR POULTRY INDUSTRIES USING IOT

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ABSTRACT

The crack on eggshell detection procedure employs image processing techniques and consists of seven steps, beginning with the input of egg image data into the system to obtain visual information. The JPEG extension is the sharpest and picture format, and it may be imported into the application for image processing. When the egg picture is seen, it then changes to grey. Then, for faster processing, convert the colour image to gray scale. Using the canny edge detector approach and interfering with image noise to find the edge. Then, within the chicken egg, locate and fill in the holes for it is possible to compute. Then, invert the colour to find a crack that is clear and compare it to an egg crack. Recognition and output are the final steps, and template matching recognizes template matching for high performance. The system would send image notification if it detected an egg crack.

KEYWORDS: *Image processing; Internet of Things (IOT); Easy detection; Cost*

INTRODUCTION

Asia is the world's largest egg-producing area. 616 million dozen eggs are cracked each year, accounting for 38% of global output. The broken eggs were not employed in the culinary sector, hotels, or other similar establishments. As a result, the cost of transporting the cracked egg has doubled. Cracks are found before shipping in this approach, lowering costs. The eggs are collected from the chicken farm, placed on a tray, and delivered. Before being transported, eggs are inspected for any damage or cracks. Asia is the world's largest egg-producing area. 616 million dozen eggs are cracked each year, accounting for 38% of global output. The broken eggs were not employed in the culinary sector, hotels, or other similar establishments. As a result, the cost of transporting the cracked egg has doubled. Cracks are found before shipping in this approach, lowering costs. The eggs are collected from the chicken farm, placed on a tray, and delivered. Before being transported, eggs are inspected for any damage or cracks.

LITERATURE

Ahmad Fakhri Ab Nasir.et.al (2019) discussed eggs as a source of food in high demand by humans. Human operators cannot work perfectly and continuously when conducting egg grading. Instead of an egg grading system using weight measure, an automatic system for egg grading using computer vision (using egg shape parameter) can be used to improve the productivity of egg grading. This presents the comparison of egg classification by the two above-mentioned methods. Lastly, feature selection (information gain ratio) and feature extraction (principal component analysis) are performed using a k-nearest neighbour classifier in the classification process. Two methods, namely, supervised learning (using weight measure as graded by egg supplier) and unsupervised learning (using egg shape parameters as graded by ourselves), are conducted to execute the experiment.

Cedric Okinda.et.al (2020) explained chicken egg production line systems, grading based on vision systems is challenging due to ambient light conditions and egg occlusion problems. This study introduces a depth image-based chicken-egg volume estimation system. Two modes of egg configurations on a sorting line were evaluated; single-egg (no occlusion) and multi-eggs (partially occluded, i.e., simple and complex). Contour curvature analysis and k-closest M-circle-centre algorithms were used to segment the occluded eggs. Thirteen regression models based on the egg image (single egg) features were trained. This introduced system can be applied as an accurate, consistent, fast, and non-destructive in-line sorting technique of chicken eggs in a production line system.

H. Peng.et.al (2009) proposed of crack detection in eggs was proposed with multi-level wavelet transform and texture analysis technology. First, G gray level images of all egg images were decomposed into approximation and detail sub-images at various levels by wavelet transform. Then, the feature vector which was composed of wavelet texture energy features, and the gray-level co-occurrence matrix features of the detail sub-images were analyzed and computed. Finally, with the most appropriate and effective eight parameters as inputs, the best BP neural network correct discerning rate to detect eggs without crack and eggs with linear crack, mesh crack, and point crack.

Amin Nasiri.et.al (2020) proposed that egg quality and safety are significant concerns of consumers and modern food industries a novel and precise assessment of egg sorting using a deep convolution neural network (CNN), which is a state-of-the-art computer vision method to perform classification tasks. Layer, dense layers, a batch normalization layer, and a dropout layer. The modified model was trained based on intact, bloody, and broken (breakage, crack, or hole on the eggshell) eggs, which were combined with being dirty. Performance evaluation of the CNN model through 5- fold cross-validation showed that it outperforms traditional machine vision-based models.

Anastasiia Karpenko.et.al (2018) described many domains are trying to integrate with the Internet of Things (IoT) ecosystem, such as public administrations starting Smart City initiatives all over the world. Cities are becoming smart in many ways: smart mobility, smart buildings, smart environment and so on. However, the problem of non-interoperability in IoT hinders the seamless communication between all kinds of IoT devices.

Different domain specific IoT applications use different interoperability standards. These standards are usually not interoperable with each other. IoT applications and ecosystems therefore tend to use a vertical communication model that does not allow sharing data horizontally across the different IoT ecosystems. In 2014, The Open Group published two domain-independent IoT messaging standards O-MI and O-DF aiming to solve the interoperability problem. In this article we want to describe the practical use of O-MI/O-DF standards in a mobile application for the smart city context, in particular for the Smart Mobility domain, electric vehicle (EV) charging use case. The proof-of-concept of the mobile application for EV charging was developed as a part of an EU (Horizon 2020) Project.

A. Image Processing

According to the computer lexicon, image processing is a technique for processing data using images. The computer will read the image and convert it to data that has been scaled, rotated, and adjusted for analysis. It is now both acceptable and intriguing.

B. Picture Mode Gray Scale

The intensity of each color point in an image is determined by the amount of bits used, such as 8-bit grayscale images with 256 total color levels. Normally, the grey scale image will be in the range 0-1 or 0-255. There is a minor color gradient between white and black that is maintained by the pixel value. It refers to the brightness of each pixel in a color level.

C. Edge Detection

The intensity of each color point in an image is determined by the amount of bits used, such as 8-bit grayscale images with 256 total color levels. Normally, the grey scale image will be in the range 0-1 or 0-255. There is a minor color gradient between white and black that is maintained by the pixel value. It refers to the brightness of each pixel in a color level.

D. Template Matching

The picture matching method [4] is similar to image communication, and the development process is dependent on localization if the localization is incorrect. For localization, the learning employs all of the characteristics or image features available. The image matching is a learning process involving inheritance and data collecting for categorization, with the number increasing over time. There are two components to the recognition process. The first stage is the learning phase, which entails identifying patterns for testing and storing them in a database. Another is the process of capturing with unknown image data, which is part of the test. Prior to testing and comparison with the database format to recognize in the example.

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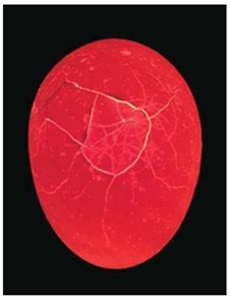
PROPOSED METHOD

A. *Input Egg Image Data*

B. Get visual information as a starting step. The image generated by this input method has a JPEG file extension. A camera, a box, a white color scene, and a flashlight were used to take the photo, with the flashlight bringing the eggs inside the box. The floor into the egg is clear, allowing



you to see the features of the skin and eggshell.

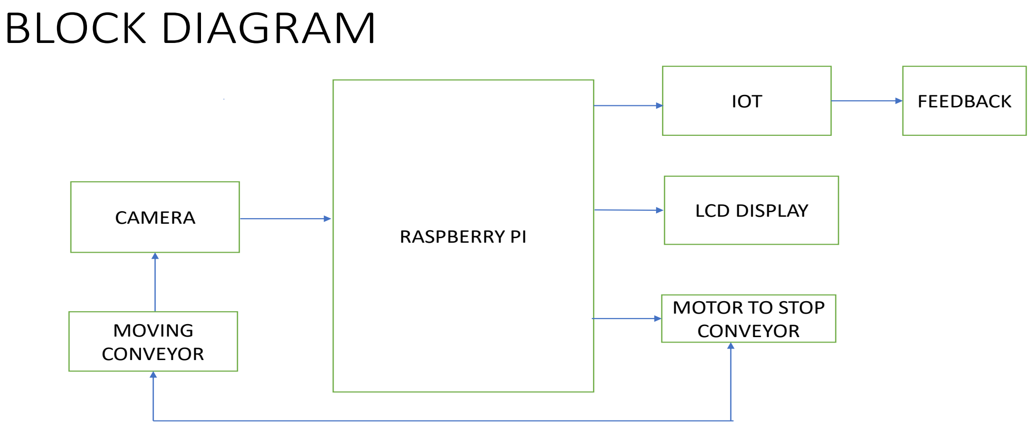
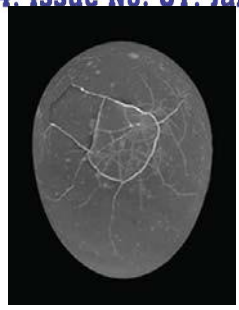


Image of crack on egg

C. Converts to Gray Scale

After the image has been turned to grayscale. When Y = denotes the grey level at the pixel location we want to locate, the converter to grayscale images for efficient processing and very rapid firing up conversion from RGB to grey scalar denotes the red intensity at the desired location. G = green intensity at the location you're looking for. B stands for the color intensity in the desired location.



Egg image converted to gray scale image.

D. Invert Color

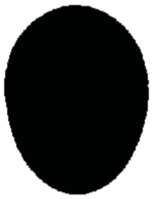


Image from complement command.

Imcomplement command image Imcomplement command identified a crack, thus shift image from black to bright and bright to black. When the image has a fracture or is not clear. Bring to memory by adjusting the black and white. As illustrated in the template matching detects template matching for high performance. The image that will be output is the template image. The template matching command compares the model image to the destination image.

E. Compared crack of egg

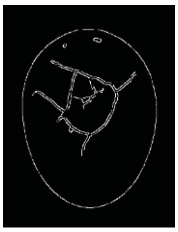


Image from Canny edge detector

Image from template matching

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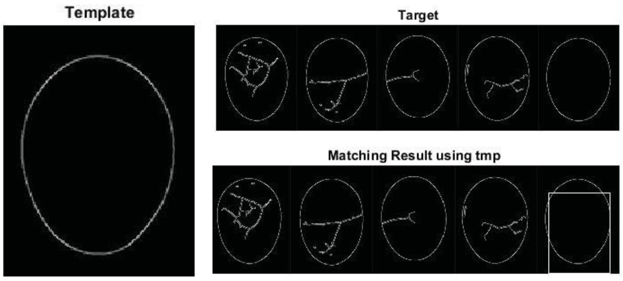
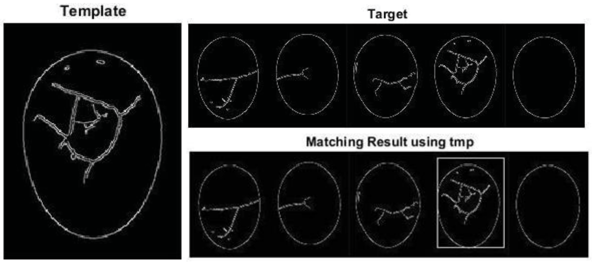
Compared crack of egg and points of interest by separating the characteristics of the image between both the images.

F. Recognition and Output





Recognition of egg not crack.

Recognition of egg crack.

TABLE I. CHECK THE CRACK OF THE EGG WITH IMAGE PROCESSING TECHNIQUES.

Picture to shoot in the box	**Picture From Program**	**Appearance of eggs**	**Output From Program**	**Accuracy of Program**
		Crack of Eggs	Crack of Eggs	Correct
		Crack of Eggs	Crack of Eggs	Correct
		Crack of Eggs	Crack of Eggs	Correct
		Crack of Eggs	Crack of Eggs	Correct
		Crack of Eggs	Crack of Eggs	Correct

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G. Internet of Things

The information as the egg is cracked or not is given to the mobile software. So that the detection can be done through online with the graphic representation the line will be peak at the time of crack egg passing. The date and time of the cracked egg is also identified.

CONCLUSION

(A) (B) (C)

To create an egg creeper detection system. The device used to shoot is a camera, and image processing systems have experimental procedures. (A) is a regular photograph without any processing, (B) is a photograph shot with the camera and taken inside the box. The eggs are lighted, and the result of detection is (C). The eggs are placed in a box with a flashlight in this experiment. The image is sharp and the floor inside the egg to see the nuances of the skin is apparent (B). This could be a mistake in the process of locating the edges and subsequent processes, so pay attention and concentrate from start to finish. Image processing techniques were used to develop an egg break detection system. Used to remove broken eggs, which can save operating expenses and manpower, reducing operating time and increasing the efficiency of egg production that will be sold to fulfil market demand.

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