A REAL TIME VISION SYSTEM FOR ESTIMATION OF SIZE DISTRIBUTION AND COUNTS OF EGGS

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Abstract

The size of eggs is an important measure of product quality in egg production. When using hardware machines, the weight of egg can be easily measured. However, when using a real time vision system, the egg size distribution in daily production is not in use. In this work, we present an application in the domain of image and video processing for classifying and counting eggs passing on a conveyor belt. The weights of the eggs are estimated by calculating their surface area on the video sequence. Finally, the results can be provided to the producer in order to be informed about his daily production. The performance of algorithm is evaluated by comparing with the actual values of the eggs on the conveyor belt.

Methodology

In this project an application has been developed to process real time video sequences of eggs. This environment was setup to take videos and this video sequences has been processed with an open source image processing library which is OpenCV using with C++ programming language.

Detection Phase

In this project, to make shapes more obvious and to reduce shadow, brightness and contrast are set. The color of spindles on the conveyor belt is yellow and color of egg is white. Color channels are separating to remove yellow spindles in the image. Smoothing algorithm is applied to remove noise on the image. Then, edges are found by using edge detection algorithm. Next, contours are found on the edge detected image. Finally, elliptical shapes are extracted from the image.

Counting Phase

Eggs are sliding over the conveyor belt and they can be seen in many frames. For this reason each of them has to be traced not to count same eggs over and over again. Two main vectors (kind of sequence container) are used for tracing eggs. One of them stores ellipses that found on each frame and the other one is used for keeping information of all eggs on the screen.

Results

<table>
<thead>
<tr>
<th>True Positive</th>
<th>False Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 Small Eggs</td>
<td>145</td>
</tr>
<tr>
<td>150 Medium Eggs</td>
<td>143</td>
</tr>
<tr>
<td>150 Large Eggs</td>
<td>145</td>
</tr>
</tbody>
</table>

Table 1.0. Results of calculation of areas

<table>
<thead>
<tr>
<th>Real Counts of Eggs</th>
<th>Found by Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Video 1</td>
<td>289</td>
</tr>
<tr>
<td>Sample Video 2</td>
<td>383</td>
</tr>
<tr>
<td>Sample Video 3</td>
<td>347</td>
</tr>
<tr>
<td>Sample Video 4</td>
<td>427</td>
</tr>
</tbody>
</table>

Table 2.0. Comparison table of total counts

Future Work

For the feature work, this application will be tested with better conditions. For example, if the spindles on the conveyor belt replaced with black spindles results will be better. Smart phone applications and mail system can be developed to see instantaneous production. This project, can be integrated to machine for automatic sorting and counting.

References

1) Masoud Nosrat, Ronak Karimi, Mehdi Harii “Detecting circular shapes from areal images using median filter and CHT”, Global Journals Inc, January2012
3) Zhiqing Wen, Yang Tao, “Building a rule-based machine vision system for defect inspection on apple sorting and packing lines”, Elsevier, 1999

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