

Automated Visual Inspection for Onion Sets Selection

Monitoring and selection product in the agricultural and food industry is mostly done through manual labor. Automating this visual monitoring process seems inevitable in the long term.

An automated inspection and selection system removes the costs of manual labor and, more importantly, guarantees that the products are of an objectively high quality.

Is it possible to create a system that objectively measures onion sets through image processing?

There is no simple solution, but with a specially developed LED lighting, a matching camera and a diverse selection of detection algorithms we can deal with this issue.

This report presents to you the results of a research into a representative set of onions. Even though a germinating onion isn't included here, earlier research has shown that it has the same color as the lighter parts of the onion.

Objective: quality inspection and selection of onion sets.

Demands: approving onions that have a skin, indicated by the red-brown color, while rejecting onions with partially or completely removed skin, indicated by the light yellow color.

Detection Algorithm and Results



Image 1: Locate the position and determine the measuring area of every onion individually.

1. Locate Onion Position

Detect the presence and locate the position of the onion. In the image (image 1) the red rectangle indicates the position and size of the onion. Every onion has an index number starting with index 0.

2. Inspection Skin

Onion 2, 3 and 9 have a completely intact skin and have been approved (see image 1). Onion 8, 11, 12 and 13 are of lesser quality but still good enough to be approved. Onion 4, 6, 7 and 10 have no skin and are rejected. The skin of onion 0 and 1 is damaged. They are therefore rejected. Onion 5 has too little germinating power to be approved

3. Results

These are the results of combination of different detection algorithms. The higher the 'relative detection value', the better the onion is. This graph shows which onions are rejected if the minimum value for being approved is 0.15.

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0	reject
1	reject
2	accept
3	accept
4	reject
5	reject
6	reject
7	reject
8	accept
9	accept
10	reject
11	accept
12	accept
13	accept

Onion accept/reject overview

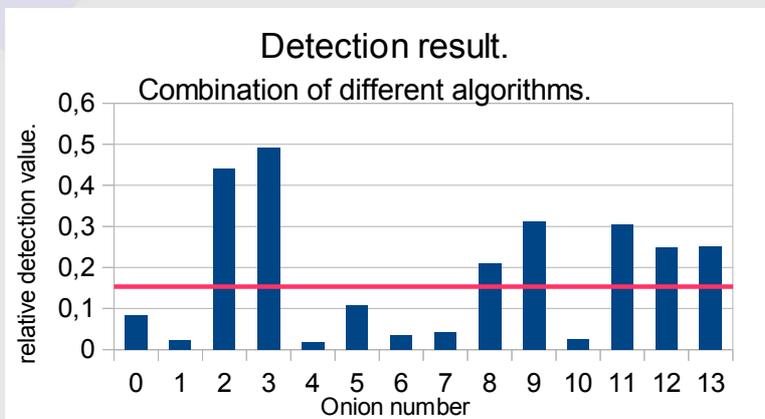


Image 2: Detection result, above the approved/rejection limit (=0.15; red line) is approved, below this limit is rejected.