# Research of Phase Correlation Method for Identifying Quantitative Similarity in Adjacent Real-time Streaming Frame

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## Abstract

To minimize the damage by wild birds and acquire the benefits such as protection against weeds and maintenance of water content in soil, the mulching black color vinyl after seeding should be carried out. Non-contact and non-destructive methods that can continuously determine the locations are necessary. In this study, a crop position detection method was studied that uses infrared thermal image sensor to determine the cotyledon position under vinyl mulch. The moving system for acquiring image arrays has been developed for continuously detecting crop locations under plastic mulching on the field. A sliding mechanical device was developed to move the sensor, which were arranged in the form of a linear array, perpendicular to the array using a micro-controller integrated with a stepping motor. The experiments were conducted while moving 4.00 cm/s speed of the IR sensor by the rotational speed of the stepping motor based on a digital pulse width modulation signal from the micro-controller. The acquired images were calibrated with the spatial image correlation. The collected data were processed using moving averaging on interpolation to determine the frame where the variance was the smallest in resolution units of 1.02 cm. Non-linear integral interpolation was one of method for analyzing the frequency using the normalization image and then arbitrarily increasing the limited data value of 16 × 4 pixels in one frame. It was a method to relatively reduce the size of overlapping pixels by arbitrarily increasing the limited data value. The splitted frames into 0.1 units instead of 1 pixel can propose more than 10 times more accurate and original method than the existing correction method. The non-integral calibration method was conducted by applying the subdivision method to the pixels to find the optimal correction resolution based on the first reversed frequency. In order to find a correct resolution, the expected location of the first crop was indicated on near pixel 4 in the inversion frequency. For the most optimized resolution, the pixel was divided by 0.4 pixel instead of one pixel to find out where the lowest frequency exists.

## Keywords

Infrared thermal image sensor, Moving system for image measurement, Spatial image correction, Phase correlation

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