Robust Determination of Bubbles Size Distribution based on Image Analysis

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Bubbles detection is a very useful in various critical machine vision [1] application areas such as medical technology, process control, energy and the petroleum industry. The most common type of sensors used are ultrasonic or capacitor based. The application of computer vision methods and algorithms in the detection of bubbles and features extraction of bubbles including diameter, area, and radius provide high efficiency and accuracy for bubbles recognizing system. Especially with different environments, the input image has a diverse and complex image background. This is one of the key issues that need to be studied. In this paper, we present a new and effective method to be used in solving the problem of bubbles detection. This method consists of three main steps: First, image preprocessing improves image quality and details each object in the image, followed by background subtraction image and contour detection. Method is proposed to be used for image segmentation based on Graph cuts algorithm, which is applied specifically to those models which employ a max-flow/min-cut optimization. Hough transform algorithm is applied to the collection of a center point of bubbles or components points, which are presented in a contour of bubbles.The efficiency has been optimized for a continuous update of a list of voting points based on the accumulator size and position of bubbles. The final step is identification and calculation of features. Using a data source provided by ASTI Holdings Pte Ltd (S'pore) [2] to test the proposed method demonstrates the effectiveness of the method when detecting and calculating bubbles that are not too large and do not overlap.

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