SEGREGATION OF ASSEMBLY PARTS USING AUTOMATION

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Abstract- In Lock and Key manufacturing industries the quality check of keys and lock parts is performed manually using various gauges, callipers and visual check. This manual checking is very slow & also sometimes inaccurate and human-dependent. In this paper, the main aim is to check misalignment of visual features of key i.e. logo and hole/rectangle on key sing its captured image. The purpose of the paper is to implement Real-Time key inspection using Image Processing which uses Computer Vision methodology with the combination of matlab software for segregating faulty keys. The defects are identified within economical cost and give less error prone inspection in real time. Primarily the system captures digital key images by image acquisition device i.e. external webcam and converts the RGB images into binary. Later, the features of the keys are evaluated using figure ground algorithm. Thus, the key may be declared as defective or non-defective.

Keywords- Figure-ground classification, MATLAB

I. INTRODUCTION

A defect in the keys is a major reason for poor quality and of embarrassment for lock/key manufacturers. Quality Check Process is an integral part of any manufacturing company. Quality check ensures that the manufactured product is produced with the proper standards that have been established. A poor product quality can greatly degrade the company's image and affect the customer preferences.

A Logo on a key will be checked for its alignment on the key according to the company standards. Company Logo on a key plays a significant role in Building a company identity. Logo is an extremely important part of having a successful business. There are several reasons why having a logo and company identity is so important: it gives your business a sense of legitimacy, it makes your product recognizable and memorable. They encourage product identification and bring in business.

The existing quality i.e. misalignment check process is manual. The human dependency of the quality check introduces a lot of disadvantages like higher error rate, slow speed etc. Thus there is a need to automate this process to improve the processing speed, efficiency and accuracy. Same is the case for the key manufacturing process in industries.

Automation of the process will reduce the possibility of human error and also reduce the overall processing time. This can be achieved by using Digital Image Processing techniques.

The objective of our research is to propose a Real Time Quality check technique for keys which will sort keys as non-defective or defective depend upon standards set.

1. SCOPE AND MOTIVATION

Automation of the quality check process of keys will reduce the manpower required in the industry. This would increase profit margins. The quality check of keys also influences the quality check process of locks. Presently, three keys are manufactured per lock and the lock is tested against all three keys. The total cycle time for this process is 24 seconds per lock. However if this automated technique is used the cycle time will hence reduce i.e. rise in production rate. Also, the implementation of this technique can be used to check the serial number on keys and thus making numbering process more efficient. Only those keys will be numbered whose quality is found satisfactory.

3. PROPOSED APPROACH

Figure-ground segmentation is fundamental operation with a use in many vision applications .It aims at producing a binary segmentation of the image, separating foreground regions from their background. Modern approaches include solutions based on graphs, information theory, or variation theory. As a trade-off, interactive methods have produced impressive results with a sufficient amount of user guidance.

The ideas of multiple hypotheses and classifier fusion have also been used in the segmentation studies. Current state-of-the-art interactive segmentation methods suffer from several limitations; some are restrictive assumption about latent distributions, an inability to treat complicated scene topologies, or an inefficient similarity measure.

In this paper, an iterative figure- ground classification method is used which gives good results in a broadly applicable environment. Foreground extraction is achieved by first generating a large amount of hypotheses through an iterated background prior propagation routine, then fusing best hypotheses to obtain the final result.

The algorithm leads to a good result for challenging scenes in both segmentation accuracy and execution efficiency. It is not sensitive to hard scene topology or loose bounding box, and reliably treats multi-connected, multi-hole foregrounds. Another advantage is that the spatial smoothness term essential in conditional random fields (CRF) approaches is eliminated and hence no separate algorithm is needed for tuning a smoothness parameter.

3.1 ALGORITHM OVERVIEW

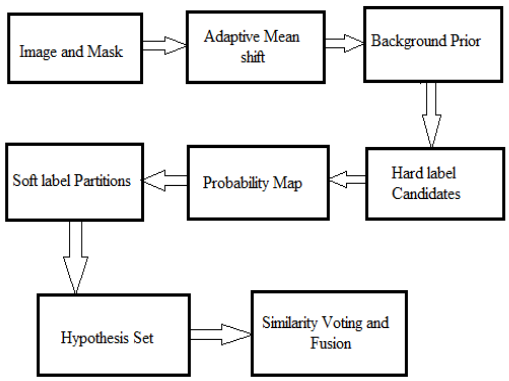


Fig.1. Algorithm used for Program

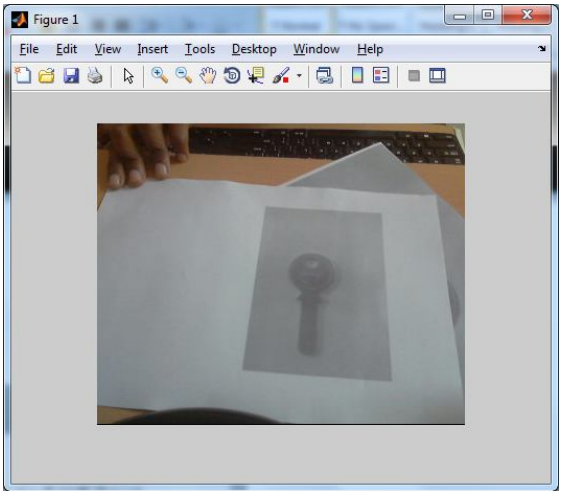
Fig. 1 shows the pipeline of our figure-ground segmentation algorithm. Algorithm consists of two main
Stages:

1) Hypothesis segmentation generation
2) Similarity voting & fusion.

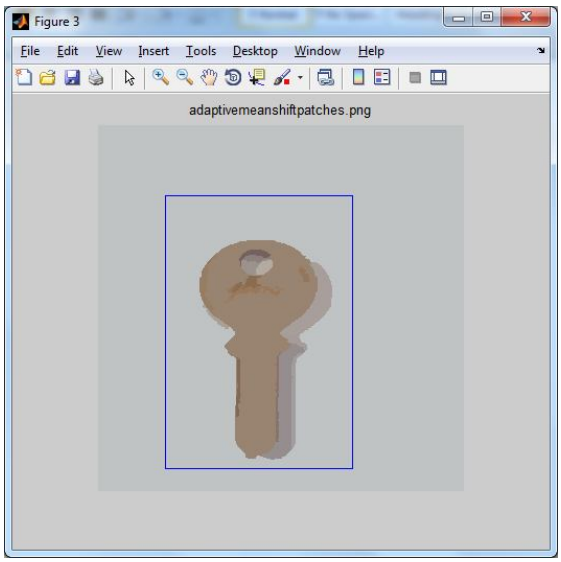
In the first stage, the box specified by user shows the initial background, and a large number of candidate segmentations are created, from which a set of good and best hypothesis segmentations are selected[2]. By using one of the hypotheses selected to define the new background prior, several hypothesis sets are generated using repetitions of the segmentation processes.
In the second stage, the best hypothesis set out of generated sets is automatically selected by intra-similarity comparison, and the corresponding hypotheses are fused to form the final segmentation.

4. RESULTS

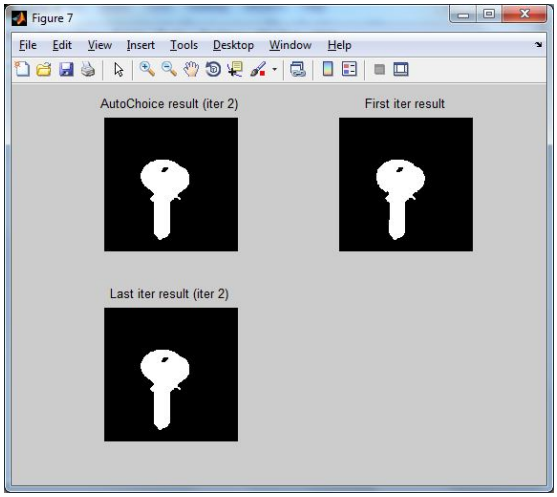
Following are screenshots of some the results obtained:
1. Image



2. Mean Shift Patches with bounding box



3. Result after 3rd Iteration



4. Dialog Box

CONCLUSIONS

Figure ground segmentation algorithm works well than other algorithm and processing speed is fast.

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