Mobile Based Auto Grading Of Answersheets
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Introduction

Traditional auto grading
Disadvantages:
1. Scanners are expensive
2. Not affordable for small tutoring institutes and individual tutors

Mobile app based auto grading
Advantages:
1. No setup and maintenance cost
2. Can be used anytime anywhere by teachers / students.
3. Easy to use

Algorithm

Step 1: Key Points Detection
- Use SURF detector to detect all the key points of both images

Step 2: Key Points Extraction
- Use SURF extractor to calculate all the key point descriptors of both images

Step 3: Key Points Matcher
- Use FLANN matcher to match the key points in both images

Step 4: Transformation Matrix
- Use homography to find the transform between good matches from previous step

Step 5: Map centers of circles
- Use the transformation matrix for mapping reference center points

Step 6: Count pixels around mapped center points
- Use pixel threshold to determine if circle is filled or not

Step 7: Thresholding
- Use inverted binary image to count white pixels around center of each circle

Step 8: Compare Answers
- Answers available comparison

We took several photos with different rotation, tilt, brightness and background to check the accuracy. Results are shown in the images on the right. Each image has the template (left) and captured photo (right). Colored lines show the key point correspondence, and the green rectangle is the transformation of the template image projected on the captured photo.

If the image has no rotation and tilt then the accuracy is 100%. The same accuracy is maintained till +/- 30 degrees rotation and a small tilt: +/-90 or 180 degrees rotations do not affect the accuracy. If the rotation is +/-45 degrees or the tilt is very large then the accuracy is hampered with up to 15% results being inaccurate. The algorithm is robust against background changes.

Flow Chart

Experimental Results