Rubik's Cube Reconstruction from Images

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The Rubik's Cube is a 3-D mechanical puzzle invented by Erno Rubik in 1974. In a classic Rubik's Cube, each of the six faces is covered by nine stickers, each of one of six solid colurs. A pivot mechanism enables each face to turn independently, thus mixing up the colours. There are approximately forty-three quintillion possible permutations of the Rubik's cube, so solving the Rubik's Cube can be a daunting task. Therefore, it would be helpful to have a program that can read in the state of the Rubik's Cube and suggest an algorithm for solving it.

In order to limit the scope of the project, we will focus on the image processing aspect to produce an algorithm that can automatically identify the current state of the Rubik's cube from several images of different sides of the cube. The state will be stored perhaps using a $3 \times 3 \times 6$ matrix, which can then be used in conjunction with a Rubik's Cube solving algorithm to suggest a series of moves that the user can follow in order to return the Rubik's Cube to its original state.

The project will be done in MATLAB, and we will not be using a DROID camera phone.

References:

- http://www.ia.pw.edu.pl/~wkasprza/PAP/ICCVG06.pdf
- http://www.stanford.edu/~leyanlo/Beginner_Solution_files/beginner.pdf
- http://downloads.deusm.com/designnews/402-RuCuS_Autonomous_Rubik_s_Cube_Solving_Robot_using_NI_Hardware_and_Software_Products.pdf