Sudoku Solver
Yixin Wang
Department of Computer Science, Stanford University

Overview

An Android app that can solve a Sudoku puzzle using only the device camera and display the solution in real-time.

Implementation

Capture image from camera → Binarize with adaptive thresholding → Extract largest connected component (CC) → Warp perspective using 4 corners of largest CC

Overlay solution values at cell centers and undo warp perspective → Solve Sudoku using backtracing → Digit recognition by finding template of least square error → Digit extraction using largest CC within cell

Estimate grid cell centers using structuring elements

Grid Cell Center Estimation

Uses two structuring elements (SEs). Response at (x,y) is the sum of the pixel values within the orange boxes when the SE is centered at (x,y).

The initial cell center estimate (green dot) will be based on an even 9x9 division of the bounding box of the grid.

Find the maximum response of SE A within a fixed vertical range (blue line) of the current estimate. The cell center estimate will move to the point of max response.

Now starting from this cell center estimate, we will do the same thing but transposed.

Find the maximum response of SE B within a fixed horizontal range (blue line) of the current estimate.

The cell center estimate will move to the point of max response.

Final cell center estimate.

Results