

Web Technologies II

- Sudoku Solver with Image Processing

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Abstract

A sudoku solver using image processing. The project, accepts an image of a sudoku puzzle as input and outputs the solved sudoku puzzle. A webcam is used to capture the image of the sudoku puzzle as input.

System Specifications

- Web browser which can make use of webcam services.
- Device with a webcam
- MongoDB Environment to run project on localhost
- Flask framework to run backend code
- Libraries like bootstrap, Flask, OpenCV2 and jQuery
- Python 2.7 is to be installed

Modules

- Front-End Web Page

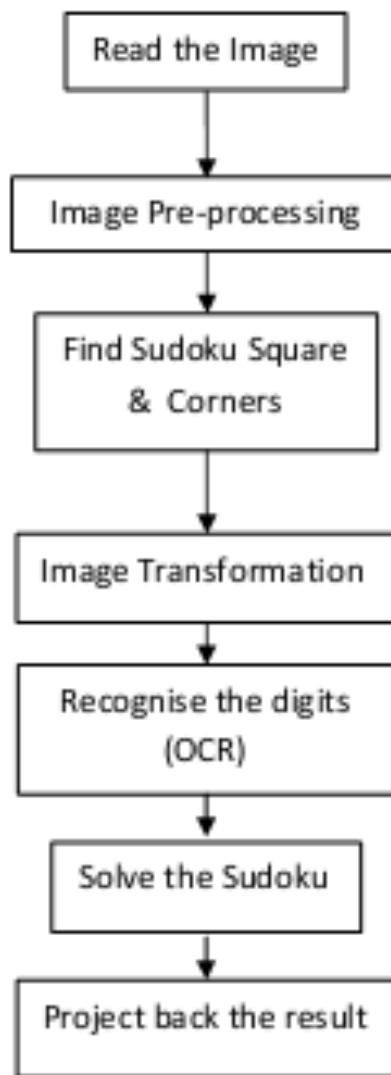
The webpage which displays the captured input image of the sudoku puzzle and also displays the output i.e the solved sudoku puzzle along with the view of the webcam.

- Scanner

This module contains multiple sub-modules. This module, reads the captured image, optimizes the image by preprocessing, transforms the image based on contours, recognizes the digits (OCR) and passes the output to the solver.

- Solver

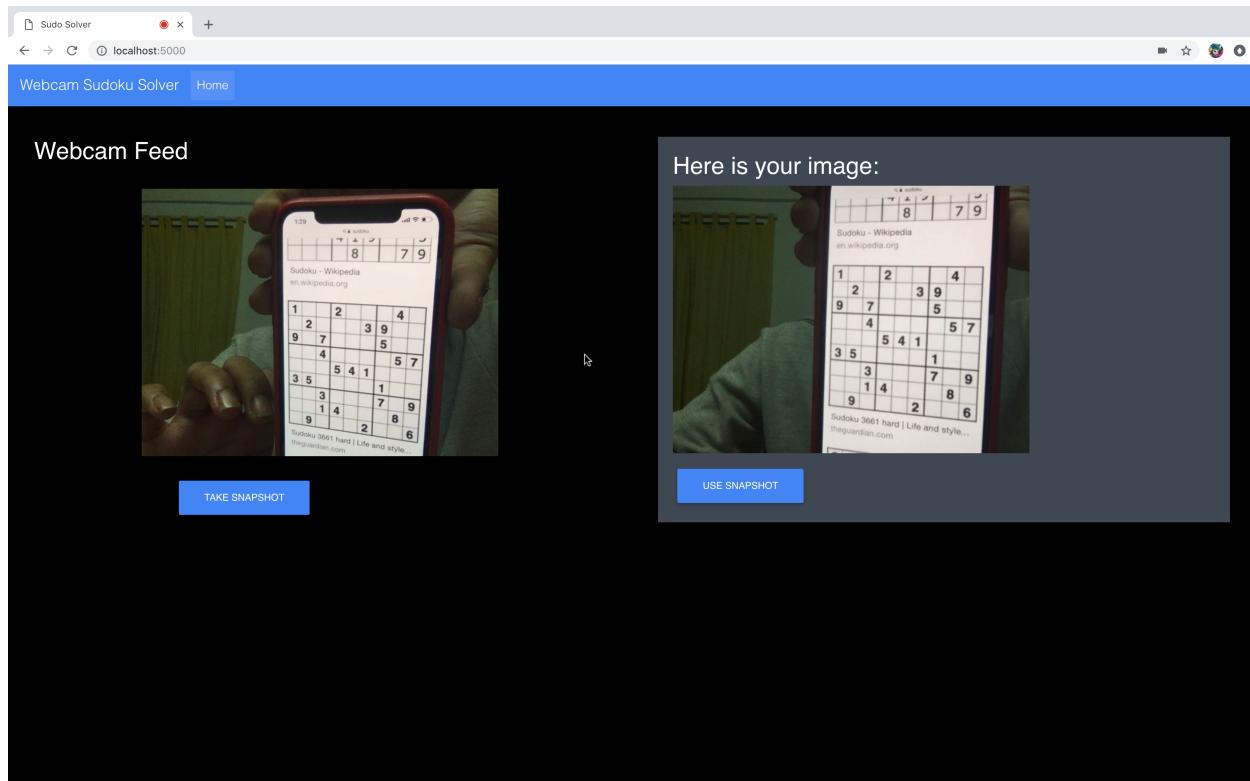
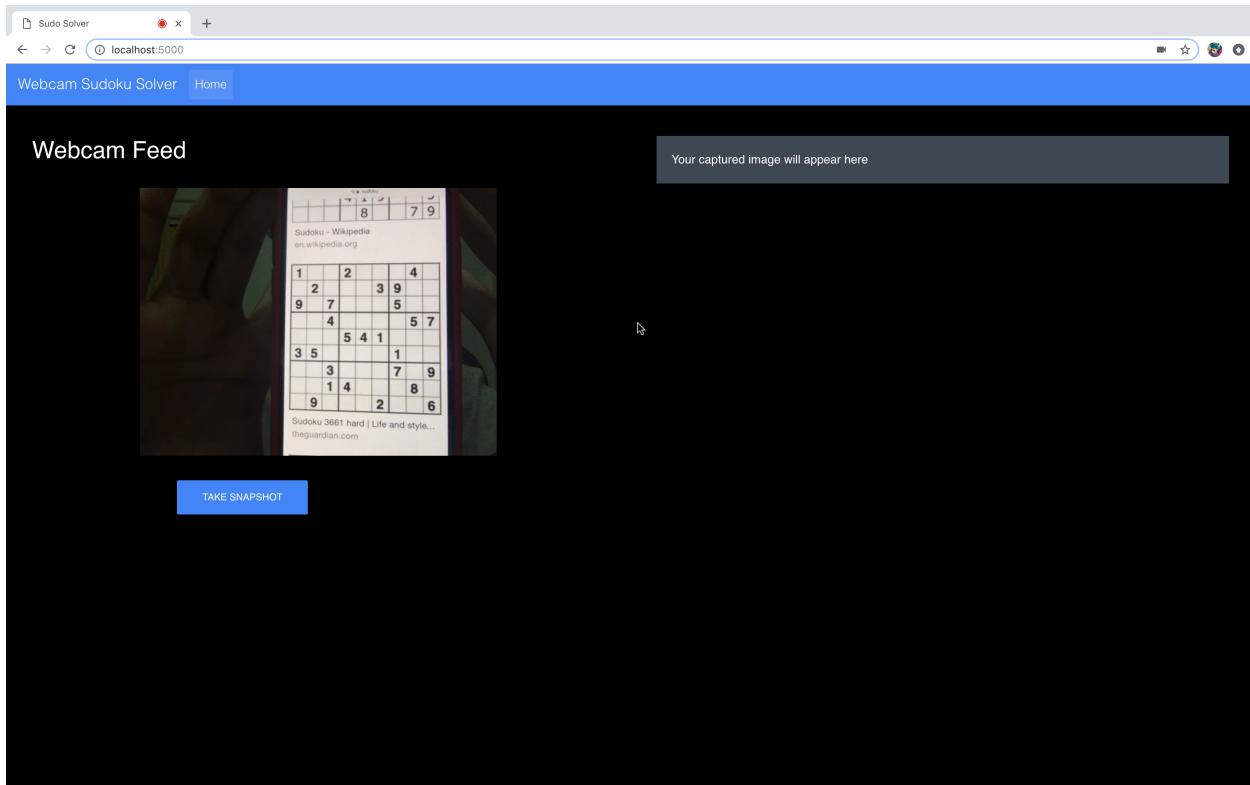
This is the module where the sudoku is solved using back-propagation and the results are sent back to the webpage to be displayed.



The Intelligence

Image processing using OpenCV python library. Image is captured using the webcam services of the device and the sudoku puzzle is extracted from the Image. The image is converted to a gray scale and image smoothening and noise reduction is done on the image. Brightness and contrast adjustment and adaptive thresholding is done on the image. The grid recognition is done using contour mapping and the numbers are extracted (OCR - Optical Character Recognition).

Screenshots



Sudo Solver ● ○ +

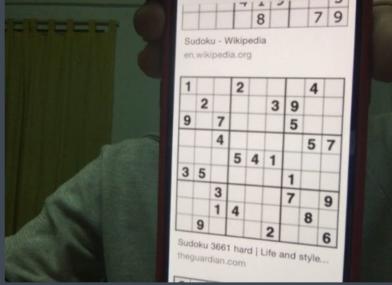
localhost:5000

Webcam Feed



TAKE SNAPSHOT

Here is your image:



USE SNAPSHOT

If your sudoku was read right click solve

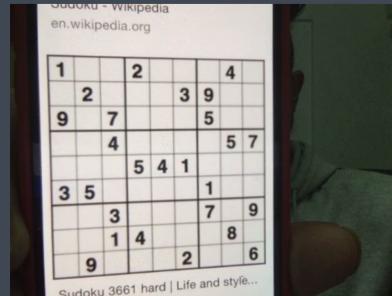
1	2	3	4					
2			3	9				
9	1			5				
	4				5	7		
		5	4	1				
3	5			1				
	3				7	9		
	1	4				8		
9			2			6		

Solve

Sudo Solver ● ○ +

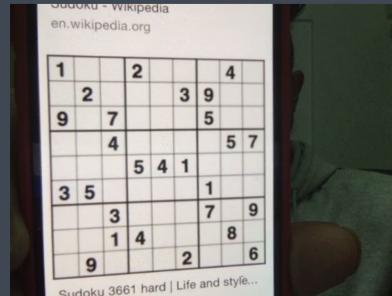
localhost:5000

Webcam Feed



TAKE SNAPSHOT

Here is your image:



USE SNAPSHOT

If your sudoku was read right click solve

1	3	5	2	9	7	6	4	8
4	2	6	8	5	3	9	7	1
9	8	7	6	1	4	5	3	2
8	1	4	9	3	6	2	5	7
7	6	2	5	4	1	8	9	3
3	5	9	7	2	8	1	6	4
6	4	3	1	8	5	7	2	9
2	7	1	4	6	9	3	8	5
5	9	8	3	7	2	4	1	6

Solve

Your solved Sudoku

1	3	5	2	9	7	6	4	8
4	2	6	8	5	3	9	7	1
9	8	7	6	1	4	5	3	2
8	1	4	9	3	6	2	5	7
7	6	2	5	4	1	8	9	3
3	5	9	7	2	8	1	6	4
6	4	3	1	8	5	7	2	9
2	7	1	4	6	9	3	8	5
5	9	8	3	7	2	4	1	6