

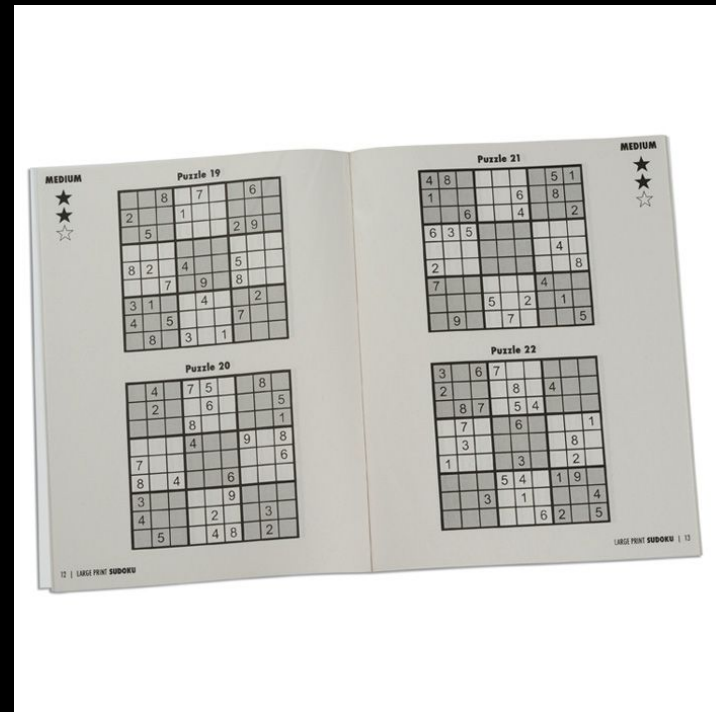
SUDOKU PUZZLE SOLVER

Computer Vision

Daniel Martinez

Overview

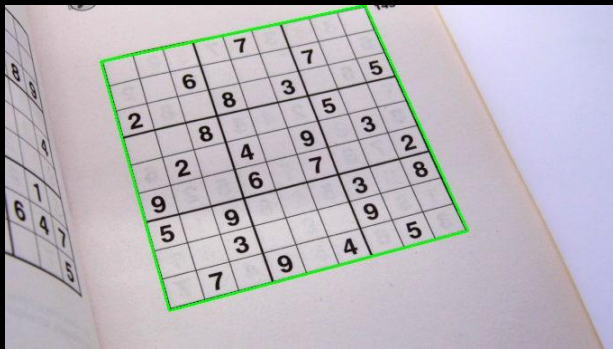
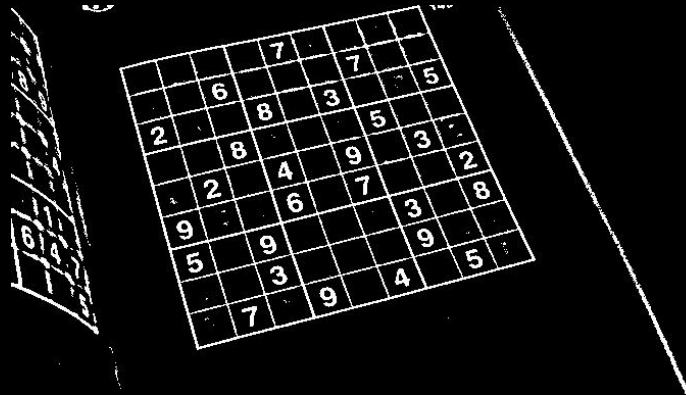
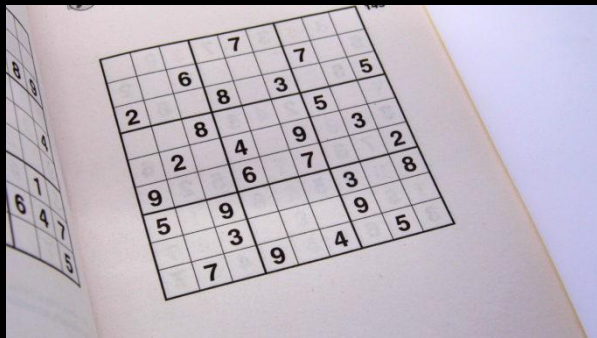
- Problem Statement
- System Pipeline
- Results and Performance
- Challenges/Improvements
- Demo



Problem Statement

- Automates solving Sudoku from a real-world image
- Combines computer vision, OCR, and logic solving
- Tests how machines interpret and act on visual data
- Techniques apply to broader tasks like document analysis or robotics

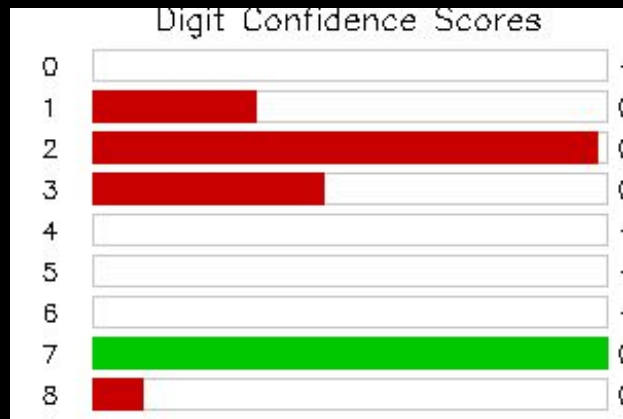
System Pipeline



System Pipeline



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| | | 6 | | | | 7 | | |
| 2 | | | 8 | | 3 | | | 5 |
| | | 8 | | | | 5 | | |
| | 2 | | 4 | | 9 | | 3 | |
| 9 | | | 5 | | 7 | | | 2 |
| 5 | | 9 | | | | 3 | | 8 |
| | | 3 | | | | 9 | | |
| | 7 | | 9 | | 4 | | 5 | |

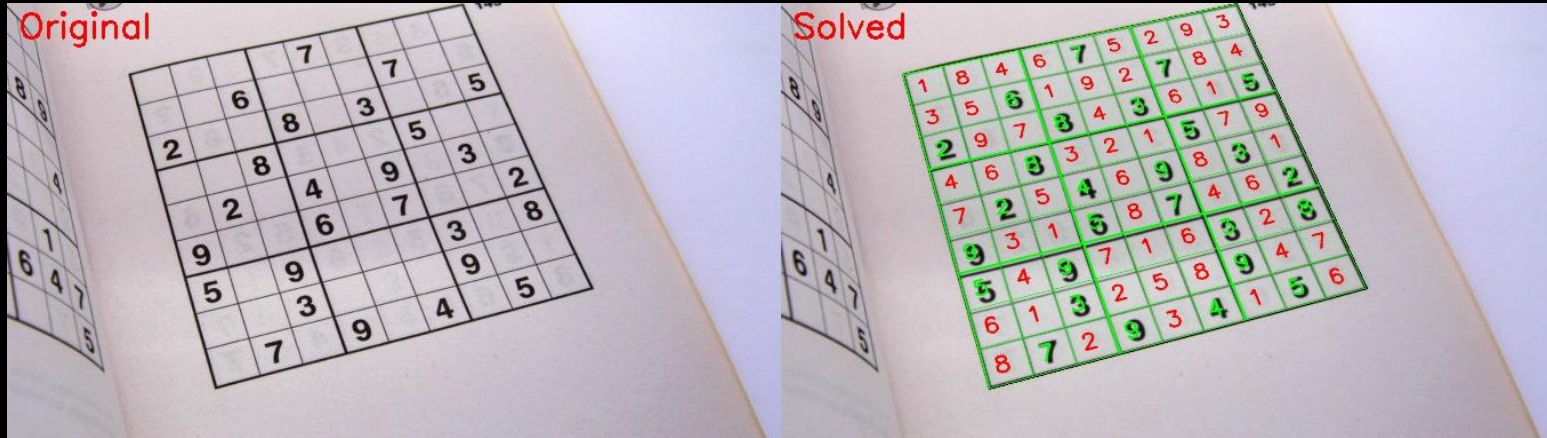


Results/ Performance

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

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

Results/Performance



Challenged and improvements

- Misclassified digits due to lighting or shape
- Grid extraction fails on skewed images
- Model training limited by data variety
- Improve CNN with more real Sudoku samples

Demo

Brother lunch, and
that you've been wrong
re him, be it to move out
at your kids or change
aspect of his life you all
and on uninvited. It's his

explain that, with the
ing ball, it wasn't his life
it was your children. Say
to hear that he gets that
en.

ely, this assumes
will agree not only to
but also examine even
s dubious choices — a
umming. You can only try
in earnest, and if trying
n you can only wait.

Carolyn at
washpost.com or chat with
me at 9 a.m. each Friday at
ashingtompost.com.

home

to get things done ahead of
er house isn't messy, nor is
a for being overly tidy.
In good mental and
health. We're fresh out

| | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| X | S | N | D | A | U | M | I | F | W | Q | H | R |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| T | V | C | Y | P | L | E | O | J | K | Z | B | G |

SUDOKU

Conceptis Sudoku

By Dave Green

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

Difficulty Level ★★★★★

INSTRUCTIONS

Put in the grid so every row, every column and
every 3x3 box contains the digits 1 through 9.

| | | | | | | | | |
|---|---|---|---|--|---|---|---|---|
| | 5 | | 3 | | 2 | 4 | | |
| 2 | 4 | 9 | | | 6 | | 3 | |
| | 3 | 6 | 4 | | | 8 | 2 | 5 |
| | 8 | | | | | 9 | | |
| 9 | | | 6 | | 8 | 5 | | 3 |
| | | 5 | | | | | 8 | |
| 5 | 7 | 2 | | | 4 | 6 | 9 | |
| | | | 2 | | | 7 | 5 | |
| | | 8 | 7 | | 5 | 3 | 4 | |

Questions?

