INTRODUCTION AND GOALS

• BORED PEOPLE SOMETIMES OPEN THE PUZZLE SECTION OF A NEWSPAPER
• TRY TO SOLVE THE SUDOKU PUZZLES IN THERE
• MAY FAIL – COULD GET FRUSTRATING
• WHAT IF YOU COULD GET A HINT?
• GOAL – EXTRACT THE PUZZLE FROM THE PAPER
APPROACH AND METHOD

• ALIGN THE PUZZLE WITH THE SCREEN
• DIVIDE THE PUZZLE INTO 9X9 SQUARES
• TREAT EACH SQUARE SEPARATELY
PREPROCESSING

- READ AN IMAGE
PREPROCESSING

• READ AN IMAGE
• CONVERT TO GRAYSCALE
PREPROCESSING

- READ AN IMAGE
- CONVERT TO GRAYSCALE
- INCREASE CONTRAST
PREPROCESSING

- READ AN IMAGE
- CONVERT TO GRAYSCALE
- INCREASE CONTRAST
- THRESHOLD
PREPROCESSING

- READ AN IMAGE
- CONVERT TO GRAYSCALE
- INCREASE CONTRAST
- THRESHOLD
- INVERSE
PREPROCESSING

• READ AN IMAGE
• CONVERT TO GRAYSCALE
• INCREASE CONTRAST
• THRESHOLD
• INVERSE
• REMOVE SMALL OBJECTS
FINDING THE CORNERS OF THE PUZZLE

• FIND THE CLOSEST PIXEL TO THE CORNERS OF THE IMAGE BY MINIMIZING VERTICAL + HORIZONTAL DISTANCE
• CALCULATE THE HOMOGRAPHY MATRIX TO TRANSFORM THE IMAGE TO SCREEN COORDINATES
CALCULATING AND APPLYING AN HOMOGRAPHY

- Calculate the homography matrix to transform the image to screen coordinates
- Crop
EXTRACTING AND IDENTIFYING THE NUMBERS

• DIVIDE IMAGE INTO 9X9 SQUARES AND IDENTIFY EACH SQUARE SEPARATELY USING OCR
EXTRACTING AND IDENTIFYING THE NUMBERS

- Divide image into 9x9 squares and identify each square separately using OCR.
PROBLEMS

• IMAGE WITH NON-UNIFORM LIGHTING
• DIFFERENT FONTS FOR DIFFERENT PUZZLES
• SIMILARITY OF DIGITS (FOR EXAMPLE 5 AND 6)
CONCLUSIONS

• RESULTS NOT BAD – CAN ALWAYS IMPROVE
• MIGHT BE USEFUL FOR THE BORED