Project Title: Sudoku Solver

Project Description: This project will aim to solve Sudoku puzzles through the use of computer vision. The user will be able to input a picture of their unsolved or partially solved Sudoku puzzle and the program will extract all of numbers already placed in the puzzle, solve the rest of the puzzle, and output an image with the remaining correct numbers overlaid on top of the original image. This will create a user-friendly way for puzzle-solvers to complete complex Sudoku puzzles without having to manually input numbers into an online solver or think too hard.

Intended Approach: In order to solve this problem, we will use a camera to take a photo of a Sudoku board. We will use Otsu's binarization to threshold the image to binary in order to handle abnormalities such as shadows in the image. We will then extract each Sudoku tile that has a sizable contour inside of it and recognize the digit using a trained neural net from the MNIST handwritten digit data set. Once we have identified all of the digits that are present on the board so far, we will run a graph search algorithm to find the solution to the puzzle. Once the solutions are found, we will place the solved puzzle on top of the original image using the pose of the puzzle extracted from the original image. If we have time, we intend to make this operate in real-time on a web or mobile application.

Data: The data that we will use for this project is printed out images of unsolved and partially solved Sudoku games.

Timeline:

Week	What We're Working On
10/28	Obtain input images, write morphological transformation code
11/4	Extract Sudoku tiles and identify digits with MNIST deep learning
11/11	Write graph search algorithm and write progress report
11/18	Overlay solved puzzle on original image
11/25	Finish solved puzzle overlay and create presentation and videos/stretch goals
12/2	Presentation and finish final report and videos