Software Design

Interactive Programming

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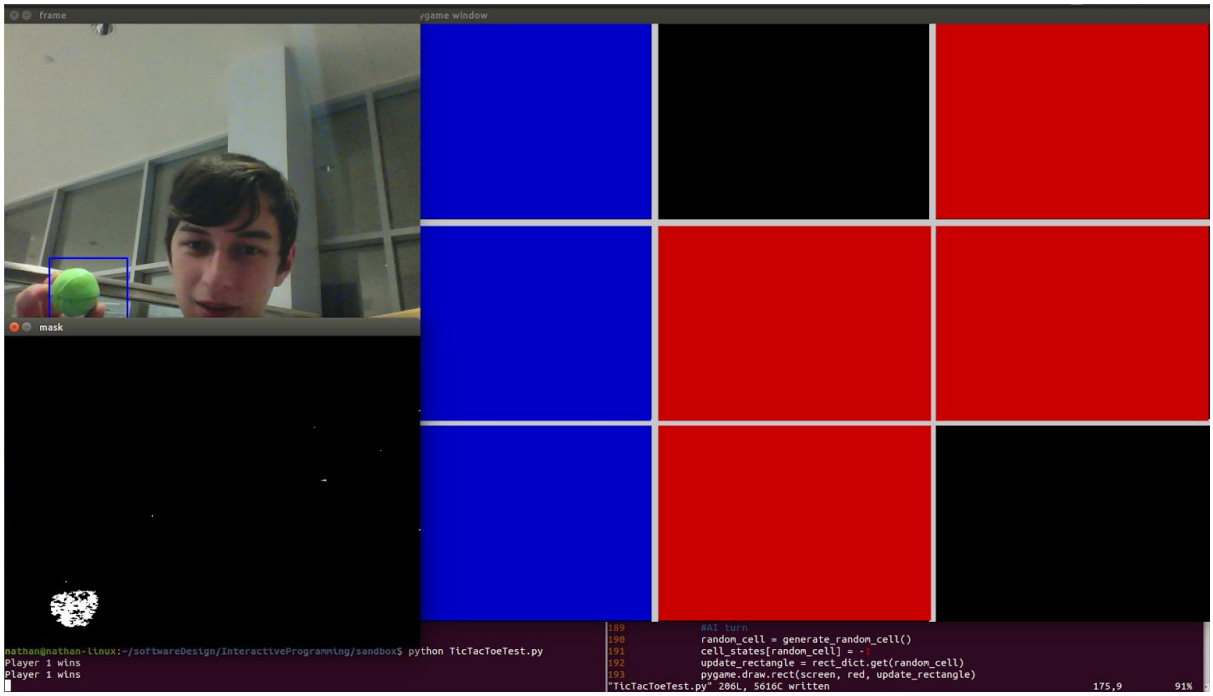
Project Overview

Tic Tac Toe involving webcam interaction and computer AI.

Results

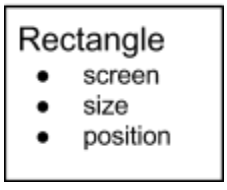
We created a version of Tic Tac Toe that is played using a webcam. The game is slightly different than regular Tic Tac Toe as the computer has the option of choosing squares on top of your squares. The computer can also be dumb and place squares on his squares. This is a feature, not a bug.



Implementation

Creating Tic Tac Toe was a relatively simple task that did not include any custom classes. We implemented the game using Pygame rectangles and dictionaries to store the game state. This is possible because the game has nine cells which only have three possible states. We also utilized openCV to allow the user to control the game using a webcam.

UML Class list



Algorithms:

Meanshift. In this program we utilize a mode seeking algorithm called meanshift. At a higher level view, meanshift allows us to locate maxima of density. It is special because it will “look” around the previous area of maximum density. This allows us to compute the location of the green ball without much computational effort. Before we used meanshift, we tracked the ball using two nested for loops for both vertical position

and horizontal position. This previous algorithm took around a third of a second which is far to slow for motion tracking.

Reflection

We feel that our project goals were not overly ambitious, yet still challenging. Our main goal was to have a playable game that involved tracking with OpenCV. This goal gave us some structure to create our final product. The project ran smoothly because we were able to develop the tracking and game portions of the program in parallel.

Files were only worked on by a single person at a time. This was to prevent git merge conflicts. John did most of the game. Nathan did the most of the computer vision. At the end of the project, both John and Nathan compiled the programs into a single script.