

Virtual Tic-Tac-Toe

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Abstract

This is my application for the Computer Vision class CSE 190 in the Spring 2011 quarter. I plan to make a tic-tac-toe game using Microsoft Kinect that the user(s) play by using their hands to make 'X's and 'O's in the air and based on the location of the 'X' or 'O' relative to their head determines where it goes in the board, which is displayed back to the user on a computer monitor. I intend to use c++ for the coding.

1 Qualifications

- Fall 2010: Worked in the Database lab on the Forward Framework project, information can be found at http://www.cidrdb.org/cidr2011/Papers/CIDR11_Paper8.pdf
- Spring 2010: CSE 151, worked on the GroZi project, received an A+ in the class.
- Multiple computer science internships at various companies
- 3.87 Major GPA

2 Project Overview

Using Microsoft Kinect I am planning on creating a Virtual Tic-Tac-Toe game, where the user(s) play by making 'X's and 'O's in the air using their hands. To create an 'X' the user would cross his hands, it won't matter the angle at which the 'X' is held at, as long as the user's hands are crossed in a way that there are 2 points and 2 continuing edges (fingers and forearms), it should count. To create an 'O' the user would make two mirrored 'C' shapes with their hands and then hold them together and up in the air to create the 'O'. Then based on the depth and location data received from Kinect the program will place the 'X's and 'O's in a representative location in a game board, with the center being around the user's head. So, to place an 'X' in the top right hand position of the board, the user would need to cross his hands, and then hold them above and to the right of his head. To place an 'O' in the center of the board the user would need to make an 'O' shape and hold it front of his face. For the game to detect that the user wants to insert a 'X' or 'O' into the location, the user will have to hold it in that location for a short amount of time, probably around 2-3 seconds. If the 'X' or 'O' is moved too much in that amount of time then the counter would restart, and the user would continue to need to hold it there.

3 Milestones

- April 11th: Be able to correctly interpret and parse data received from Kinect. Be able to display all data that is

received back to the user (aka show the user a video of themselves).

- April 25th: Be able to detect when a user creates an 'X' and an 'O' with their hands. Display back to the user a video of themselves with the 'X' or 'O' highlighted. Have different highlight colors for 'X's and 'O's, and nothing is highlighted if no 'X' or 'O' is detected.

- May 9th: Be able to track 'X's and 'O's and keep them tracked when the user moves their hands around. Only detect one 'X' or 'O' at a time, if multiple areas appear to be an 'X' or an 'O' only display the one that is most likely to be correct. Start creation of virtual board game and placing the 'X's and 'O's in the virtual board based on where the user places their hands.

- May 23rd: Be finished with the majority of the project. Users should be able to play tic-tac-toe against a friend, or against themselves. Rough draft of final report is due.

- June 6th: Finish up any remaining minor things with the project. Possibly add the ability to play tic-tac-toe on 4x4, 5x5, and possibly even bigger boards. Final report due.

4 Questions

- 1) What advantages does using Kinect have over a normal web-cam for simple games such as virtual tic-tac-toe?
- 2) Will it be practical in the near future to use a device similar to Kinect as a standard medium to interact with a computer?
- 3) Will Kinect's real uses be outside the realm of gaming?
- 4) What does the invention of Kinect, its ability to be mass produced and its cheap cost mean for the future of computer vision?

5 Software to use and build upon

<http://www.ros.org/wiki/kinect>

<http://www.ros.org/wiki/kinect/Tutorials/Getting%20Started>

<http://www.openframeworks.cc/forum/viewtopic.php?f=14&t=4947&sid=3d8de4d5b15a0a55842f72d6f36dc45d>

<https://github.com/OpenKinect/libfreenect/>

<http://opencv.willowgarage.com/wiki/> (if done in c++)

<http://www.openframeworks.cc/> (if done in c++)

<http://www.mathworks.com/products/matlab/> (if done in Matlab, will probably use c++ though)

<http://acberg.com/kinect/> (if done in Matlab, will probably use c++ though)

6 Related research

Note: I was unable to find direct research papers closely related to what I am trying to do (perhaps because Kinect is so new, or maybe my googleing skills are not up to par). So instead of papers here are some research projects that are related to what I am trying to do. Most of them deal with keeping track of hands.

<http://www.csail.mit.edu/node/1362>

<http://kenmooredesign.blogspot.com/>

<http://vimeo.com/16985224>