



# AUGMENTED REALITY TIC-TAC-TOE

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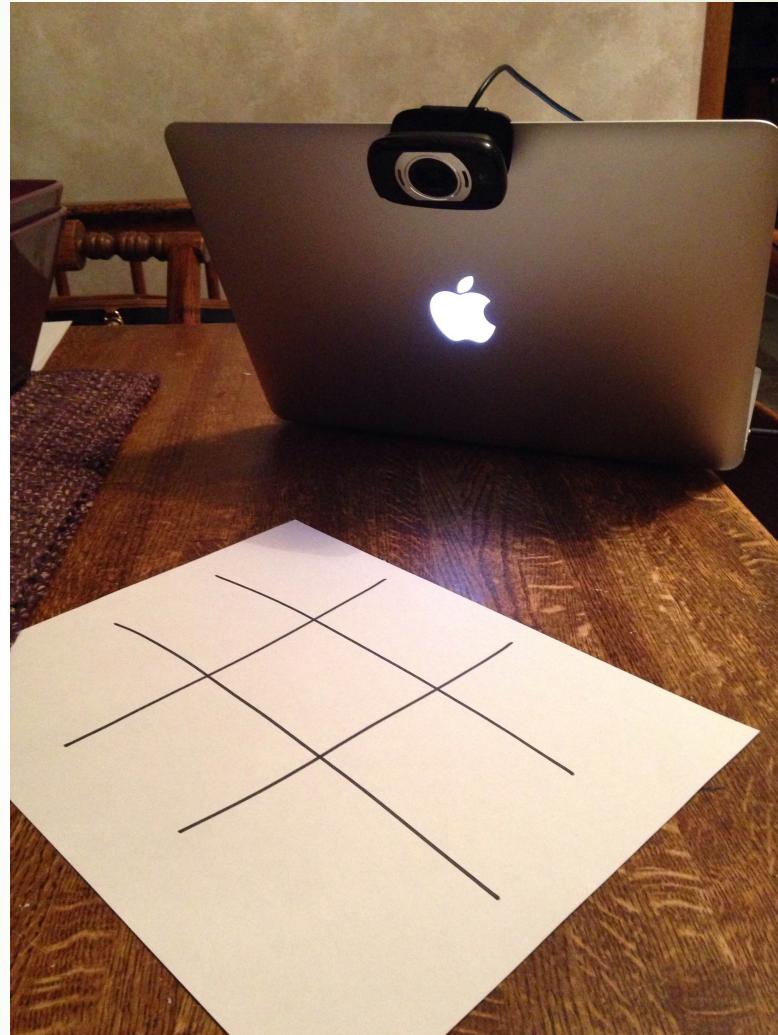
# ABSTRACT

- ▶ This project aims on implementing augmented reality for a Tic-Tac-Toe game.
- ▶ The aim of this game is to provide the facility to play tic-tac-toe on paper with the computer.
- ▶ The game starts when the human draws an X on a 3x3 open grid and focuses it on the camera which is connected to the computer.
- ▶ The computer detects the X and shows its move on the computer screen.

# SETUP

## ► Materials Required

- 1) A personal Computer
- 2) Webcam
- 3) White sheet of paper
- 4) Pen



# ALGORITHM





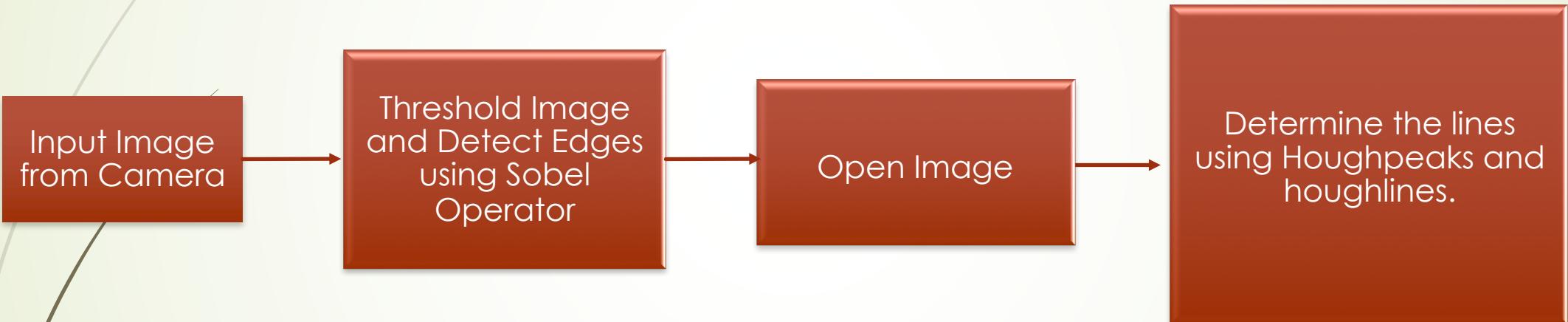
Detect the Grid

Implement Template Matching to Detect X

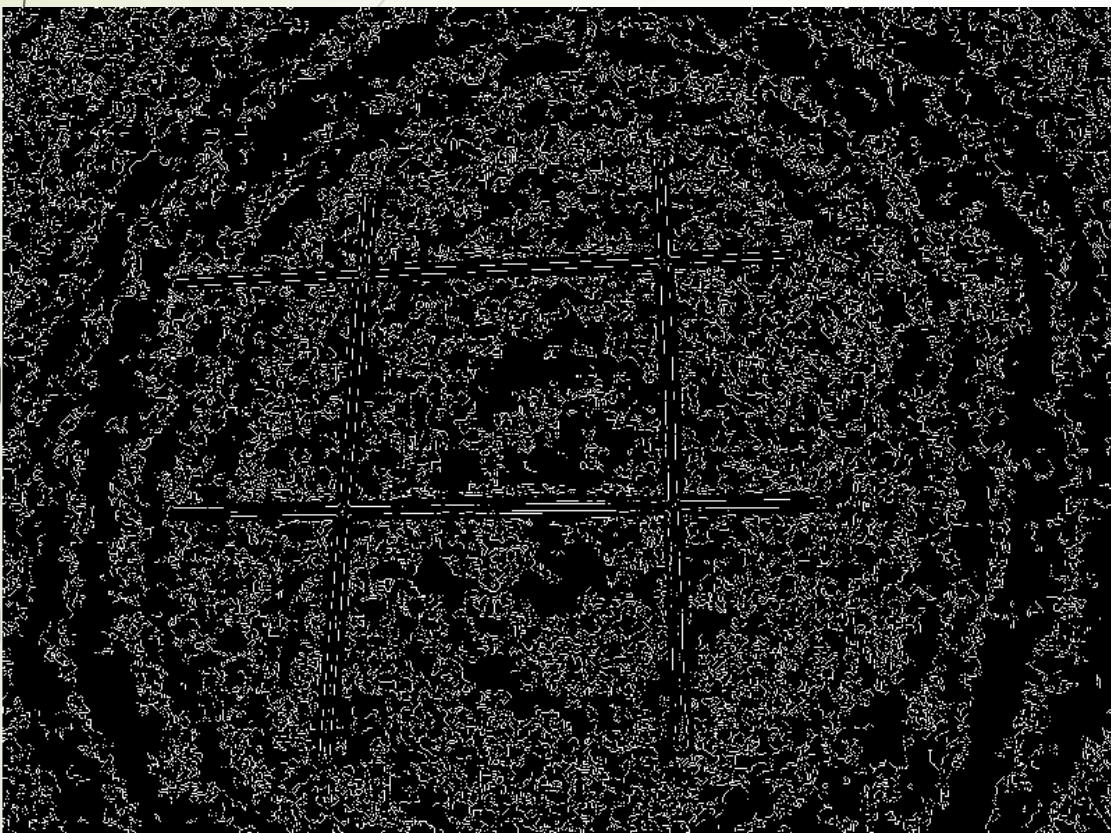
Implement Game Algorithm to Play AI's Move.



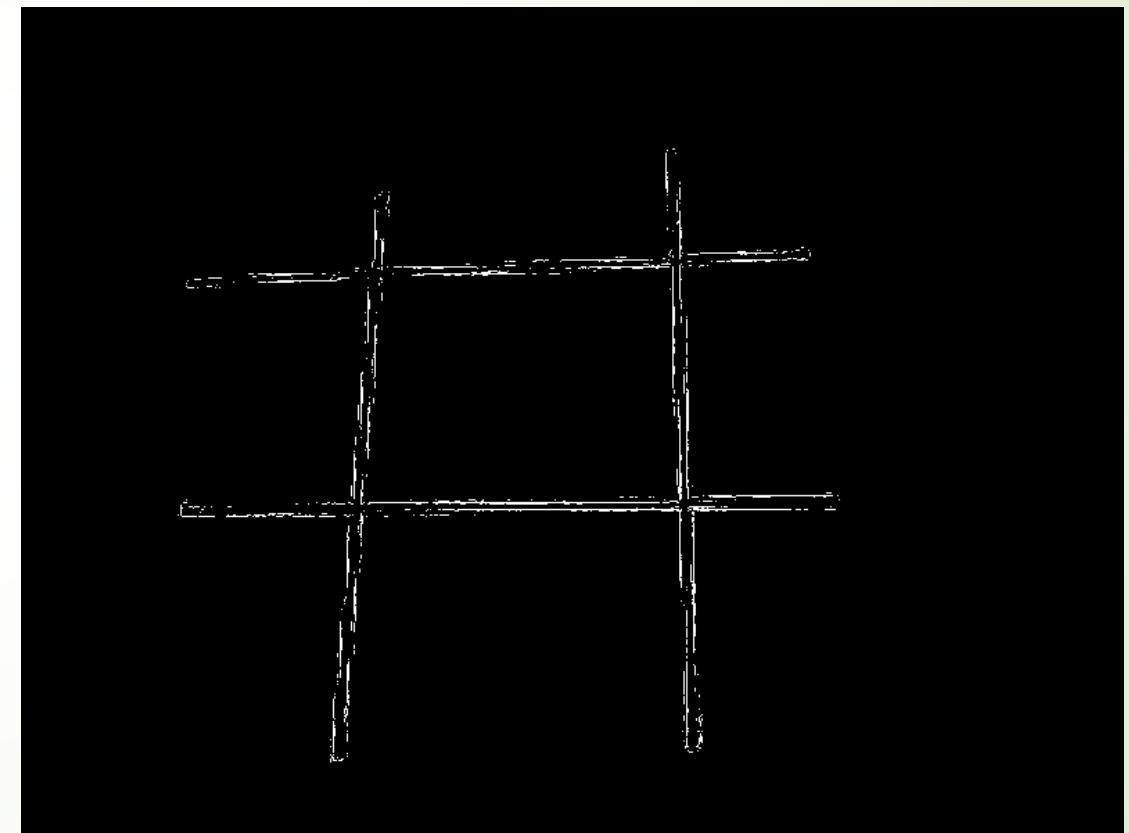
# Detecting the Grid



# EDGE DETECTION



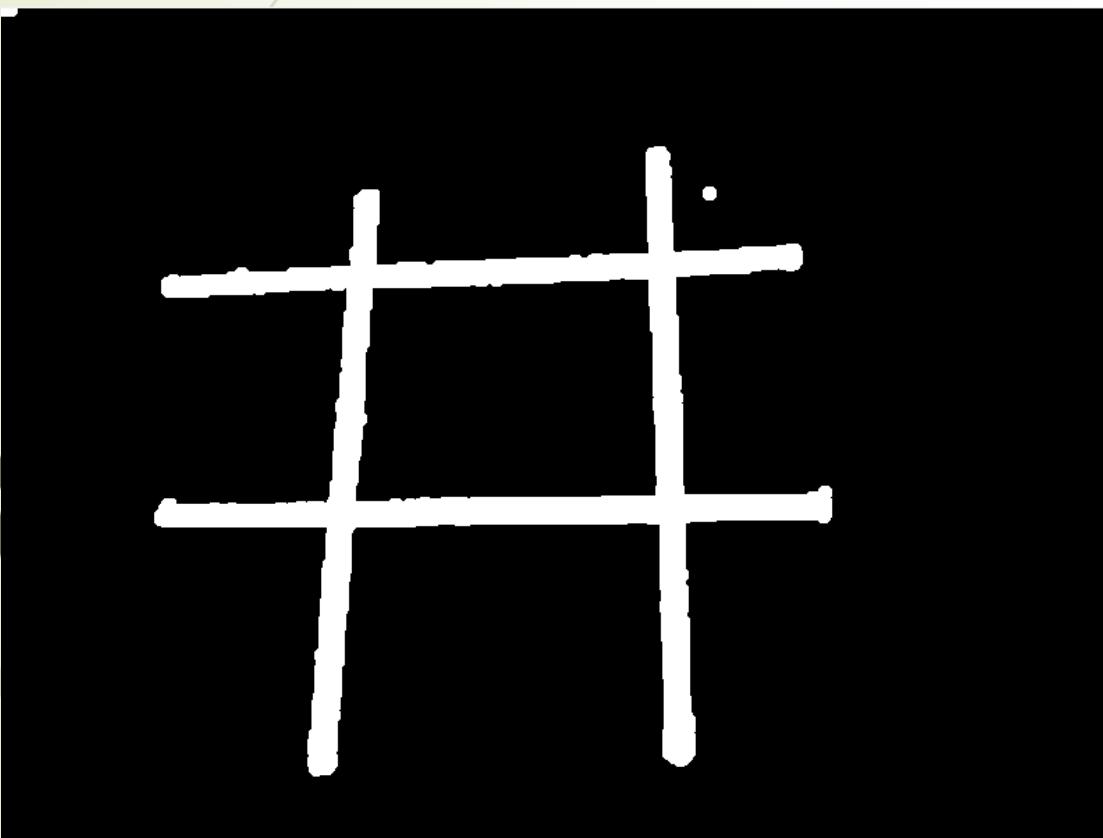
Canny Operator



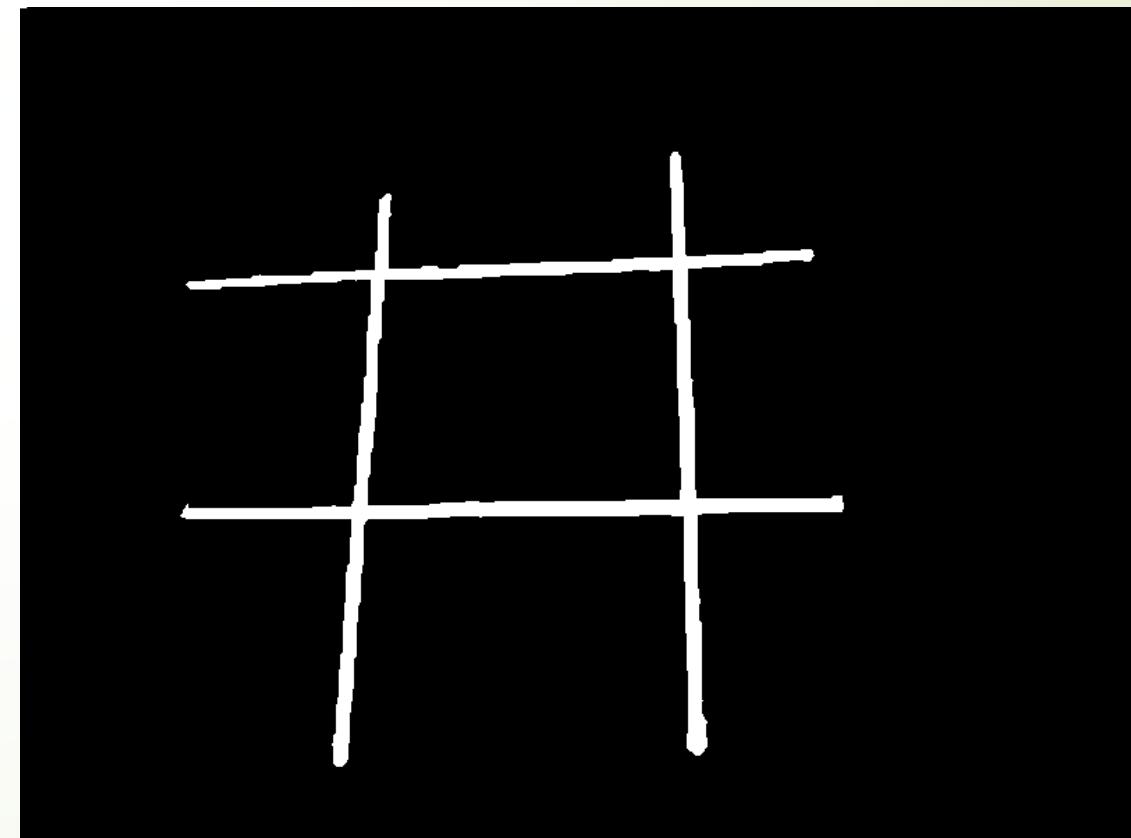
Sobel Operator



DILATION

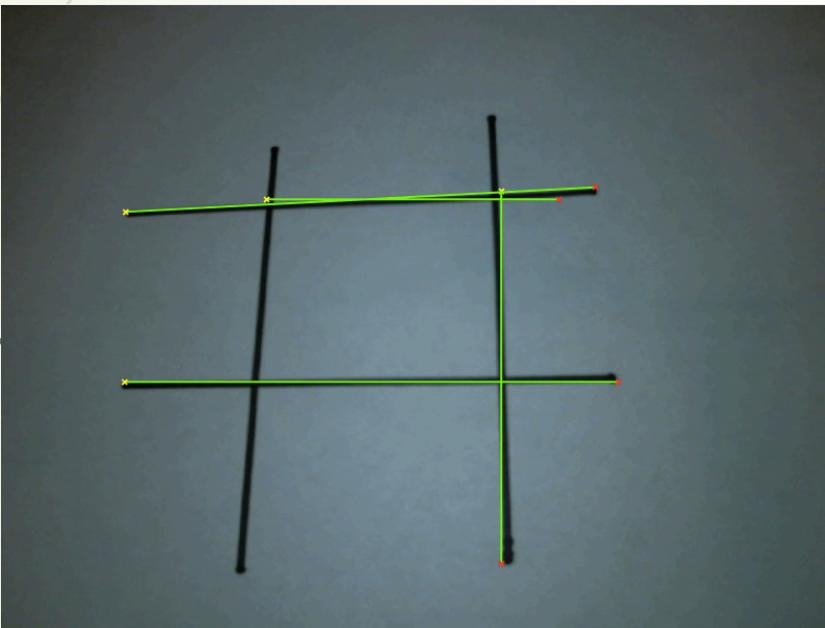


EROSION

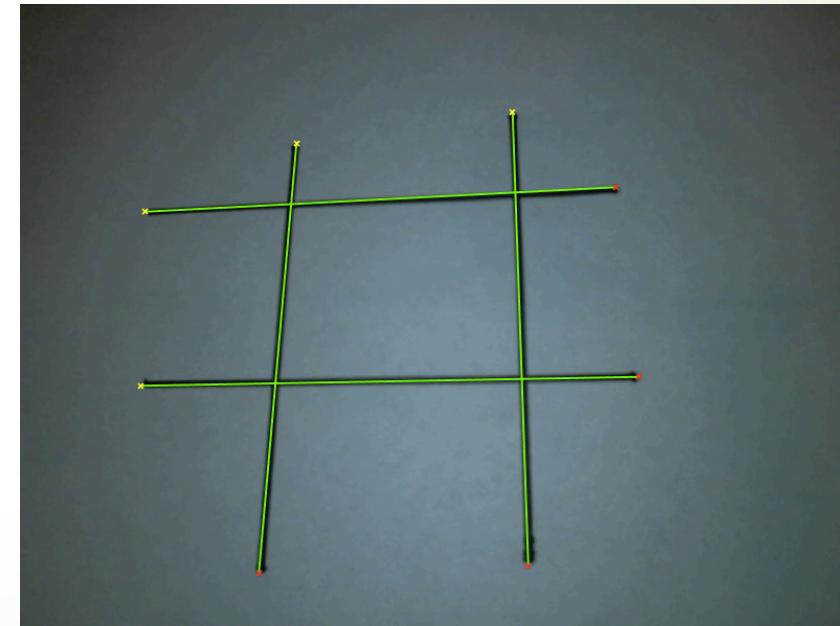


# HOUGHLINES

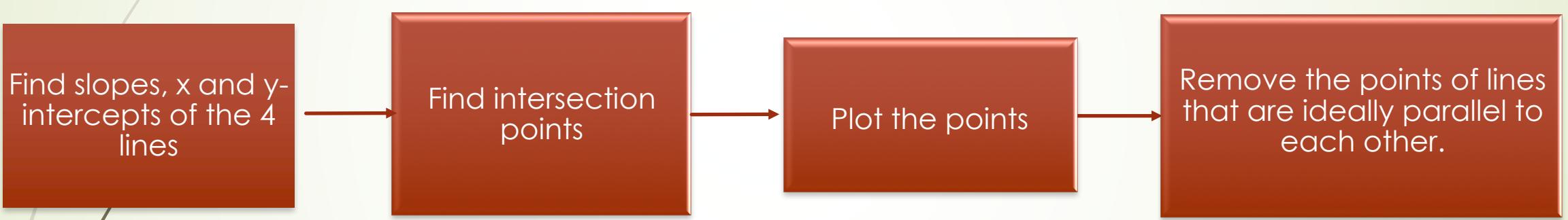
BEFORE OPENING



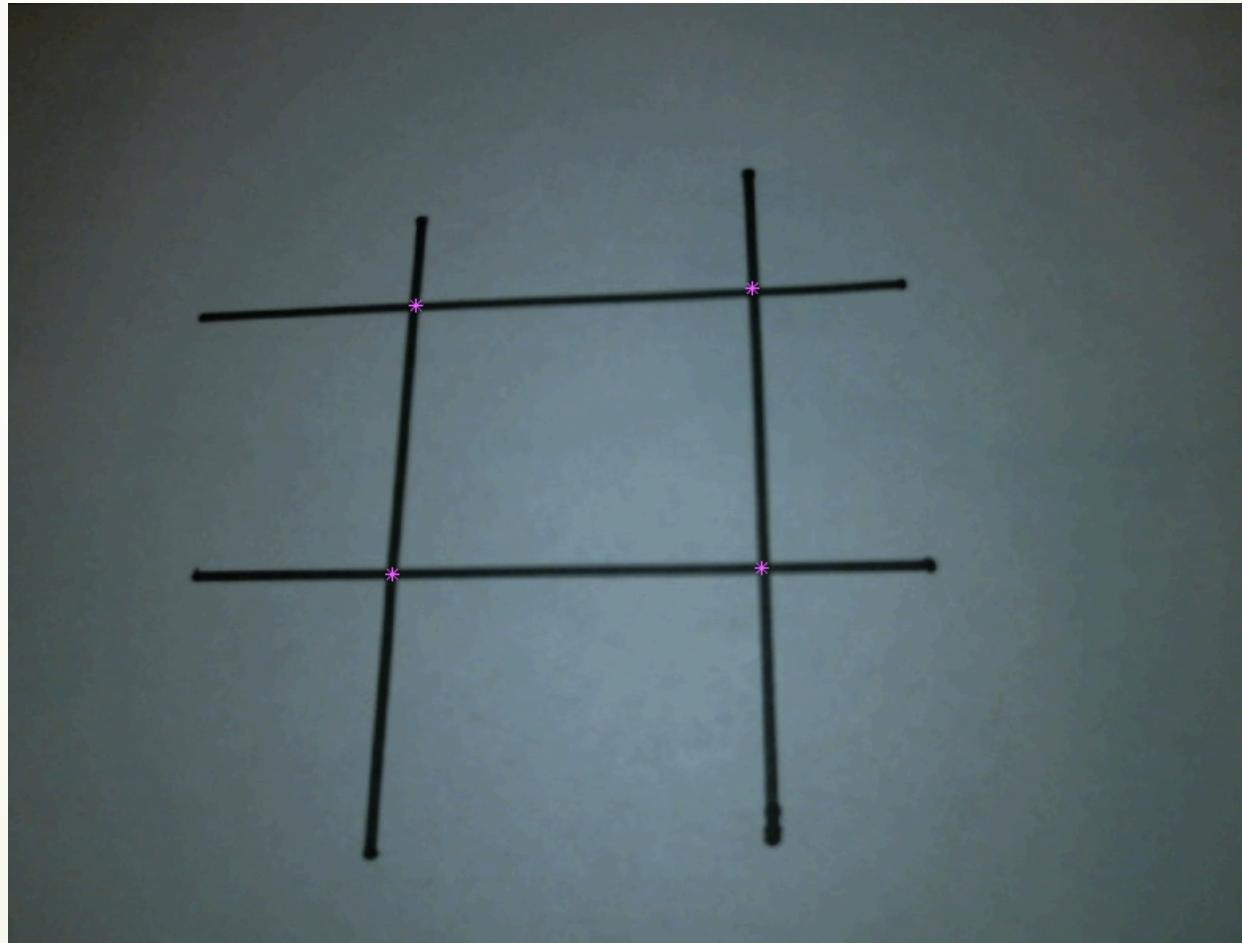
AFTER OPENING



# Identifying the Intersection Points



# Intersection Points





Detect the Grid

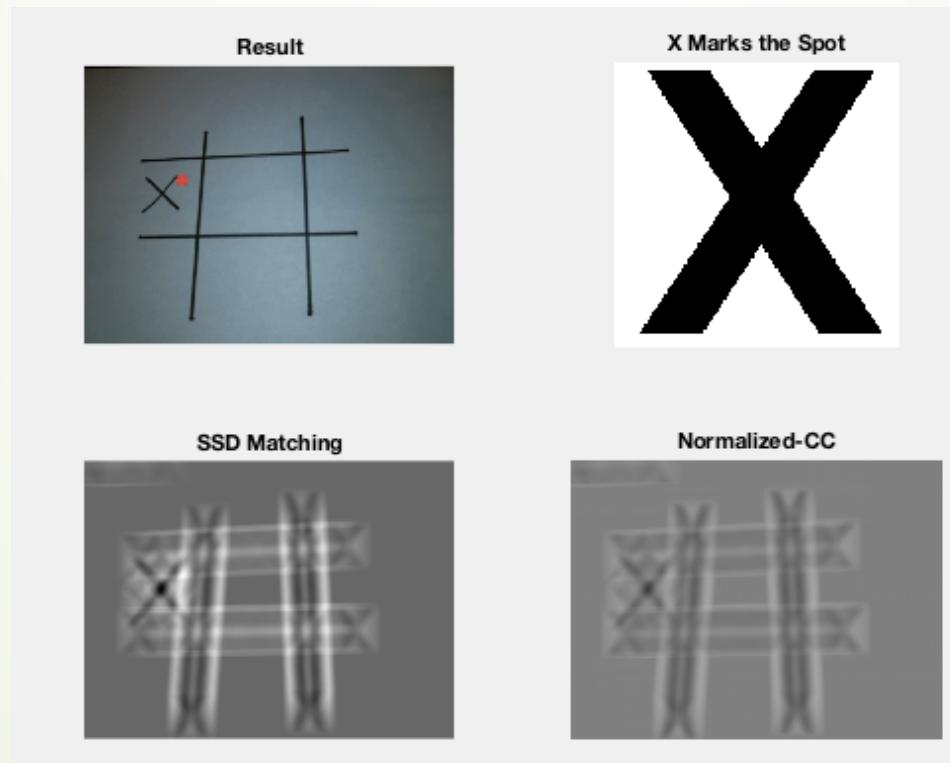
Implement Template Matching to Detect X

Implement Game Algorithm to Play AI's Move.



# Template Matching

- Calculate the matching score between template and the input image i.e. local quadratic sum of the image and the template.
- User combines these images to get the template matching.





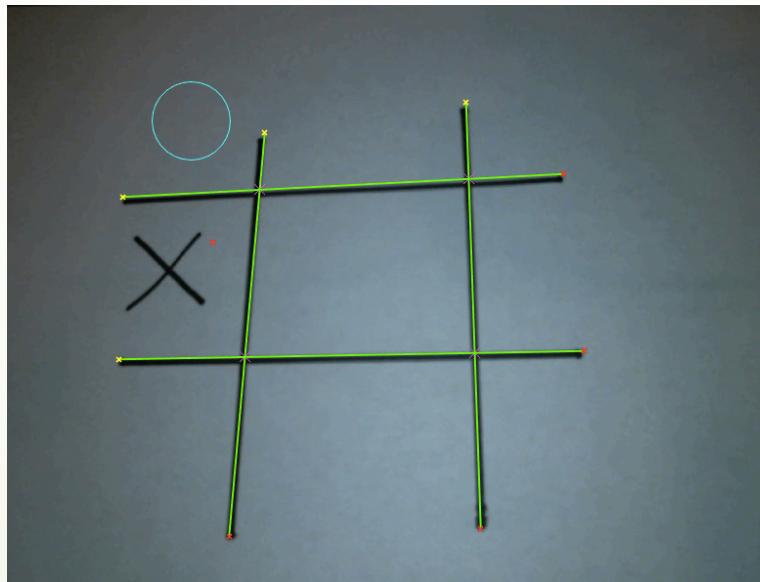
Detect the Grid

Implement Template Matching to Detect X

Implement Game Algorithm to Play AI's Move.



# Detecting Quadrants and Implementing Game Algorithm



# References

- ▶ Dieter Schmalstieg, Tobias Hollerer. Trends in mobile Augmented Reality. 2012 IEEE Conference 12 April 2012.
- ▶ Fast/Robust Template Matching  
(<https://www.mathworks.com/matlabcentral/fileexchange/24925-fast-robust-template-matching>)
- ▶ MATLAB WEBSITE [www.mathworks.com](http://www.mathworks.com)



# Questions?





**THANK YOU!**