Group 5

YOLO : Tic-Tac-Toe!

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1 Overview

YOLO stands for You Only Look Once, and it's mainly used for image processing and object detection AI models. This is the main reason we chose it for our project!

The task is to deploy a Tic-Tac-Toe game, but it will not be a traditional one. It will be played using the laptop camera on a 3x3 grid with YOLO and Pygame. The grid will look like a regular Tic-Tac-Toe grid, but the game detects hand gestures:

- When the player makes a "crossed fingers" gesture, the model detects it and places an X in the nearest box to the hand.
- When the player makes an "OK" gesture, the model places an O in the nearest box.

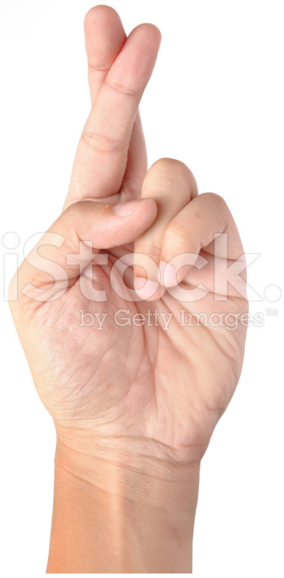

Figure 1: Crossed Fingers Gesture

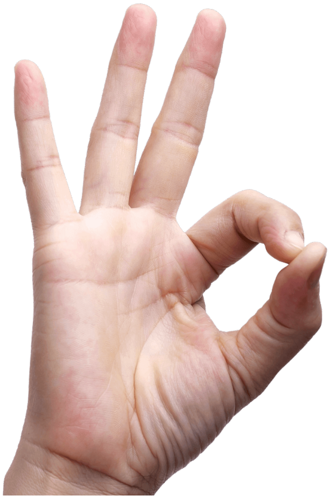

Figure 2: OK Hand Gesture

And that's how the game works!

2 Building Our Model

2.1 Data Collection

The task was split into three main tasks:

1. Train a model to detect hand signs.
2. Develop the game logic itself.
3. Integrate the system and test it.

We started with collecting data for the first task. Initially, we collected around 260 photos for training. However, after testing, we realized that this amount was insufficient. Therefore, we collected additional data with more hand positions to improve the model's ability to detect more challenging situations. In total, we collected 600 photos for the second prototype, which yielded better results.

2.2 Game Development

Following data collection, we focused on developing the game. Since YOLO is Python-dependent, Pygame was a suitable choice for the game development. We created a Python script to handle the game logic, which was then integrated with YOLO and our trained model.

2.3 Testing the Game

We tested the code and the integration of the model, and the results were promising. Below are some of the final results of the model:

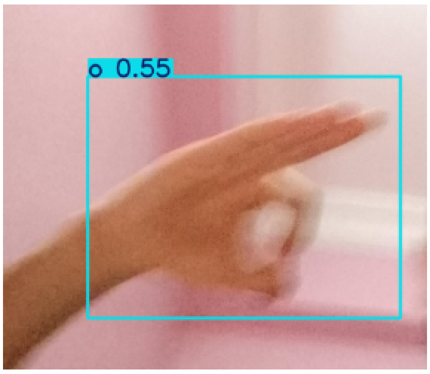

Figure 3

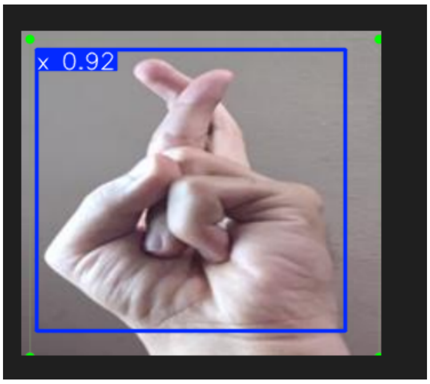

Figure 4

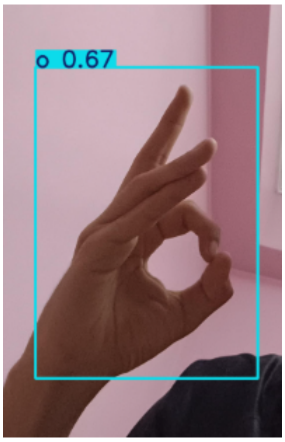

Figure 5

3 How to Play

1. First of all, you should include the game files in a directory of your choice.
2. After that, make sure you choose the model you want to try:
    - **Nano** for faster calculations and smoother game.
    - **Medium** for more accurate calculations but slower game.
3. After your decision, include the model in the same directory as the game files (‘main.py‘, ‘best.py‘, and ‘TicTacToe.py‘).
4. Now you are ready to start the game by running ‘main.py‘.
5. The game starts with O, followed by X. For the best experience, ensure you have good lighting and a clean background.
6. Now you are ready to play the game!

4 Conclusion

Finally, the model is working well after the testing. Thanks to the team members for their collaboration and hard work. The game directory is in branch 13.1 in the repository. Download it and enjoy! :)