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SNAKE GAME USING HAND TRACKING RECOGNITION

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ABSTRACT

Snake game is a popular video game where the player finds a line which grows in length with the line itself being a primary obstacle. In this game chain of the points represents a snake and at a particular coordinate the image represents a food item. The food items are provided at the several co-ordinates of the screen randomly every second for the snake to eat. Every time the snake eats the food item its length will be increased along with the score. The goal of the game is to eat as many as the food item as possible as a player. The snake grows larger by consuming more and more food items. In this player can control the movement of the snake by using index finger of the hand using Computer Vision (AI). The snake moves as player start moving hand freely. When you have collected enough food items your progress goes onto the next level, where your snake gets longer and gets larger along with the score and if the snake hit by itself the game end.

I. INTRODUCTION

The popular and classic game which is enjoyable while playing and is my all-time favorite selected game is a Snake Game, which I've been playing since I was a kid, which is known presented through a modern touch of technology. The Snake Game Using Hand Tracking/Gesture Recognition is Game name where the tips of a particular hand of the human is detected and used to manipulate the movements of the snake which is detected through the web cam or the camera of the system. It is the concern of the user to avoid t the snake to intersect itself where the snake head touches the remining body of the snake and should no stop the hand movement while playing the game if it comes off then the game is over To director the user or the player about the game or the projection of the body of the snake I used a green colored round shape as a pointer for the head of the snake in the game and green color line surrounded by the red limitations. Hands are used for controlling the game-based interfaces for snake games as an alternative for using keys of the keyboard or touching a mouse. In this game has you continue playing you get more and more food items which the player has to eat white playing and keeps growing the body of the snake and the game is getting difficult to play the game.CV2 and CVZONE are the libraries used for the development of the game. This project is fragment of the field of hand recognition through the camera, which is booming in gaming industries and gaining more popularity because it allows users to gain best gaming experience while playing the game.

II. OBJECTIVES

- To develop and improve the user's gameplay or gaming experience of video gaming by giving user the functioning the video game using hand recognition
- To give user approachable and easy to use interface for playing recognition games.
- To fascinate gamers toward video gaming as there is lots of scope of in this field
- To avoid controller like keyboard, mouse or joysticks for playing the games as by using this technology they can make more realistic sensing games
- To build recognition or motion video games without necessity of exclusive gaming setup and added gaming controllers.
- To bring motion/ recognition sensing games at very economical cost for user where there will be no need of buying the expensive consoles for a normal PC or video games.
- To explore and study recognition / gesture technology.
- To discovery the limitations for technology and make it better for further implementation.

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III. METHODOLOGY

- **Installing PyCharm**

PyCharm IDE is python language based integrated Development Environment (IDE) it also provides smart code completion, code inspections, on-the-fly error highlighting and quick-fixes, along with automated code refactoring's and rich navigation capabilities it also provides software development, game development, C++ Tools, Data Tools.

- **Install Modules with IDE**

[cv2, numpy, cvzone, Hand Tracking Module, math]These are the packages that are need to be install for this project which supports the game with inbuilt resources these modules can be install through the PyCharm IDE where the it becomes easy to use and much more user friendly for coding and developing the project

- **Construct the Screen**

We use web cam to detect the hand as it is the screen for playing the game. When webcam is on it is shown in screen ratio of 1280*720 and this screen is the main screen for playing the game

- **Construct the Snake**

To create the snake, I'll start by setting up a few color variables to color the snake, food, and screen, among other things. Red, Green color combination is used of this snake game. Where a line surround by the red boundaries around the green line which represents snake in the game and there is large point at the starting of the line it represents the snake head

- **Increase the Snake's Size**

When the snake eats a food item it a get a point and also increase in size of the body of the snake where the maximum length of the snake is predefined and there will be increase in size according to allowed length

- **Game Points**

The game point is obtained through food items where the snake eats a food item and scores one point and it continues until the game is over

IV. FUNCTIONAL REQUIREMENTS

Functional requirements of our project explain the functionalities that must be provided by each module of our project. The following are the functional requirements for our application as listed below,

- Game User

The system user or the player who will be playing game should be aware of the game rules and must know how to use the IDE for playing the game.

- User input

The user input for this project are the human hands where the tip of the index finger of particular hands are detected and the game is run through that process

- User interface

The UI is very minimalist and is easy to use for the user for the best experience of the game play and the score displaying

- Gameplay character

The main character of this game is Snake and it is the object that the user has to play within the screen provided to play for the user

- Scoreboard

Score is displayed after the game is over when user makes mistake in the game the game ends with a message and displays the game score of the player

V. DRAWBACKS OF EXISTING SYSTEM

In the existing system some of these have only the gesture control where the system can detect only the direction of the fingers of the hands and the snake moves in towards the direction of the hands without tracking the path of the snake. Some of these have pre-defined data set for the system where the system detects the

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hands based upon the data set given to the system and the movement of the snake is decided. And some of these are cursor based which are functioned through mouse, joy stick or touch-pad for playing the game which

VI. PROPOSED SYSTEM

In the system we are using the hand recognition technology where t the game starts as soon as the system detects the finger tip of the particular hand and the snake movement is depended on the movement of the hands where there is no delay for on screen display of the game and after the game is over there is a separate on-screen display shoeing of the score of the user and the displaying the message of Game Over

Web-Cam or the laptop front camera is a mainly used device for this project where whole game runs through open webcam where there is window showing the user face where the user must show his hand Infront of the camera and detect the tips of the particular finger

Fig-1: Player setup with system

VII. SYSTEM DESIGN

System design is used to create the system in accordance with how the project is functioning, It focus on preparing the modules and the specification which are needed for the system and also how those modules are interconnected and how the data are shared from one to another to produce the system efficiently.

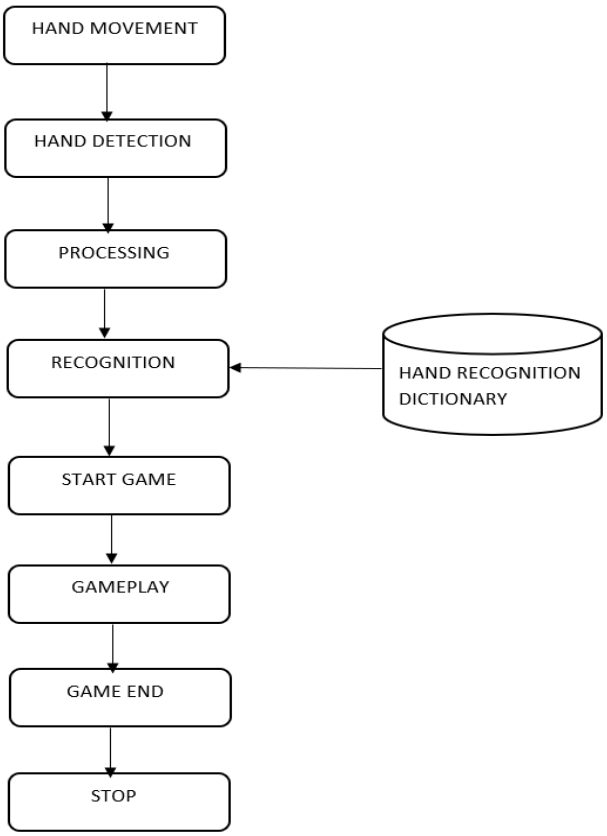

Fig-2: Flowchart Diagram for Snake Game

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The above figure (2) is the Flowchart diagram where it shows how the program starts and how the process of execution takes place, which modules comes to execute during the run time and shows how hand recognition takes place and how to start the game play and exit or end the game

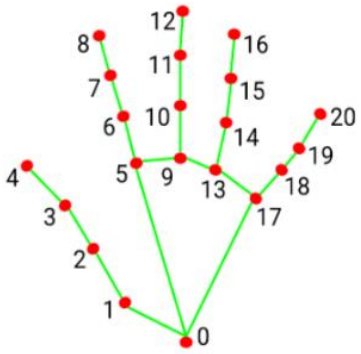
VIII. IMPLEMENTATION

- **OPENCV**

The Open-Source Computer Vision (OpenCV) programming function library was created by Intel with real-time computer vision as its primary focus. It works on various platforms. Real-time image processing is its core area of focus. OpenCV is adaptable to some particular systems, such as digital signal processors, thanks to the C interface that was originally designed for the library. To promote adoption by a larger audience, wrappers have been created for languages including C#, Python, Ruby, and Java

- **Detection**

This phase plays very important role in functioning of the game where it retrieves the information from the live camera and detects particular point of the hand where the game starts. This detection of the particular hand is achieved through hand detection module which is used for detection of hands using computer vision (OpenCV) which helps the detection of hands through live videos which is achieved using webcam.



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

Fig-3: Hand Detection points

- **Hand Movement**

In this project we keep track of finger tips of the particular hands so for the free flow of the hands there is no restriction for the hand's direction. When the system detects the hands, it particularly mentions hands if it is right or left hands. If our both hands are revealed towards the webcam the system detects only one hand at a time

- **Food Item Display**

In this game the snake has to eat a particular food item for scoring a point, but these food items are allocated at different coordinates of the screen where these appear randomly on the screen every time when snake eats a food item it gets one point and also gets large in size.

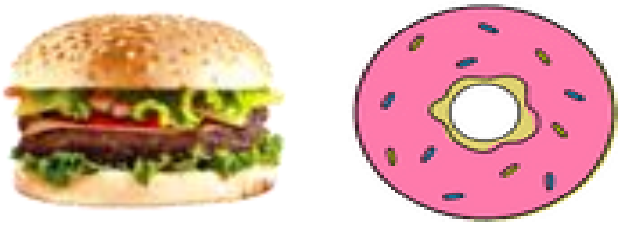


Fig-4: Food Items.

- **Snake Projection**

The main module after the hand detection is the "snake" in a snake game, in this project after the detection of the hands and as soon as hand movement starts there will be a green line surround by the red boundaries around the green line is the snake in the game.

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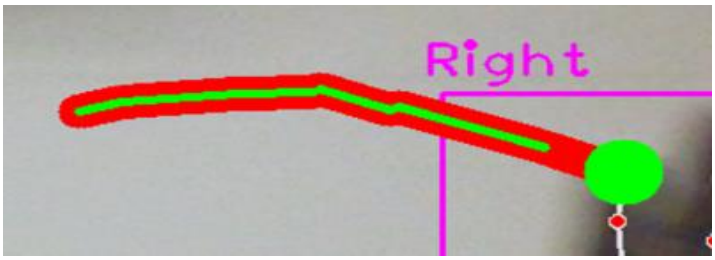

Fig-5: Snake Projection

- **Game Score**

The game score is decided by the number of food item consumed by the snake where a particular food item represents one point and for every cycle the score will be added to the existing score and it will be displayed at left upper side corner of the screen

Fig-6: Game Score

IX. CONCLUSION

The open-source computer vision (OpenCV) based hand tracking control is developed in the Python language. The project is able to control the snake in the game using hand tracking modules which the users have to detect the hand for playing a game. This game will perform by using hand tracking method where all the points of a particular hands are detected by the system. The system has the potential of detection of two hands where it gives chance to a particular hand it may be right or left depends on which hand is detected first. The accuracy of the hand tracking recognition is on to the point, it also recognition the hand perfectly whether it is right or left. Open CV mostly gives chance of innovation towards real-time vision applications and takes advantage of Multimedia Extension and Streaming SIMD Extensions (SSE) instructions learning techniques to determine accident rates and factors. In future we can implement this technology in various gamming fields where we can improve this technology by adding many more features not only in gamming industries, we can also build a computer system which is totally based on hand tracking technology.

X. REFERENCE

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