FINAL REPORT

LOVELY PROFESSIONAL UNIVERSITY

(Python Project – CSM 216)

Btech. CSE – Data Science with Machine Learning

"Dot Connect Game"

Submitted By:

Name: **SHIVRAJ SINGH NATHAWAT**
Registration Number: **12305822**
Section: **K23UP**
Roll No.: **55**

Acknowledgment

I at this moment declare that the final report in the dissertation/dissertation proposal entitled "**DOT CONNECT GAME**" in partial fulfillment of the requirement for the award of Degree for Master of Technology in Computer Science and Engineering at Lovely Professional University, Phagwara, Punjab is an authentic work carried out under the supervision of my research supervisor Mr. Aman Kumar I have not submitted this work elsewhere for any degree or diploma.

I understand that the work presented herewith directly complies with Lovely Professional University's Policy on plagiarism, intellectual property rights, and the highest standards of moral and ethical conduct. Therefore, to the best of my knowledge, the content of this dissertation represents an authentic and honest research effort conducted, in its entirety, by me. I am fully responsible for the contents of my dissertation work.

Table of Contents

1. Introduction

The Dot Connect game is simple yet engaging. This increases the strategic thinking of players. Players are to link a set of points on a grid using straight lines in line with rules that govern the game. Although the basic concept is very simple, with each level, the difficulty rises, and then players have to use their brains to get past.

This game falls under a study of the principles of game design, with its focus on user interface interaction. Dot Connect enhances cognitive skills like pattern recognition, logical thinking, and spatial reasoning; therefore, it is fun and challenging to play for people of all ages and skill levels.

It was meant to be a game that is amusingly and challengingly intriguing with a sufficient amount of space for expansions or further gameplay in the future. This report deals with the design stage, technical implementation, and testing of the game, followed by major decisions and challenges. Dot Connect finally serves as an outstanding example of how simple game mechanics can provide educational, captivating experiences challenging your brain while at the same time remaining fun.

2. Objectives and Scope

Objectives:
- To develop an interactive dot-connecting game in Python using the Tkinter library.
- To implement progressive levels of difficulty.
- To provide visual feedback and enhance logical reasoning.

Scope:
- The game is suitable for casual entertainment and educational purposes.
- It supports multiple levels and tracks the highest level reached by the user.

3. Application Tools

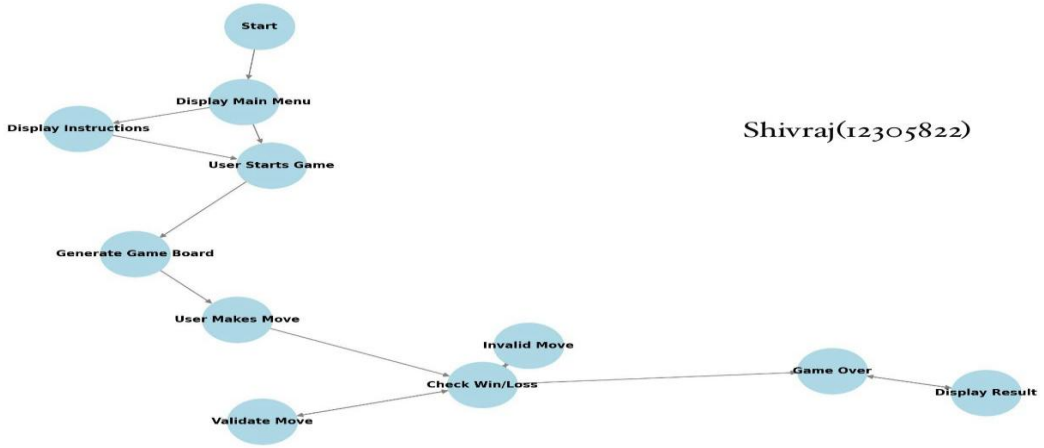
Programming Language: Python
Libraries/Packages Used:
- Tkinter (for GUI)
- PIL (for image handling)
- Requests (to fetch images from URLs)
- Random (for generating game logic)

4. Project Design

The application consists of two main windows:
- Main Window: Displays the welcome screen, game title, and the highest level achieved.
- Game Window: Features the dot-connecting canvas and game controls.

Key Components:
- Class: DotConnectGame (handles logic and GUI components).
- Methods: start_game(), create_dots(), on_click(), level_up(), etc.

5. Flowchart



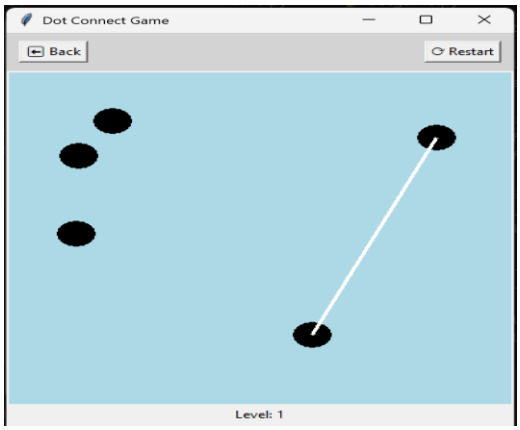
6. Project Implementation

The game starts with a welcome screen where the user can begin the game. Each level presents a series of dots to be connected in the correct sequence. Feedback is provided for correct and incorrect connections, and the user progresses to the next level upon successful completion.

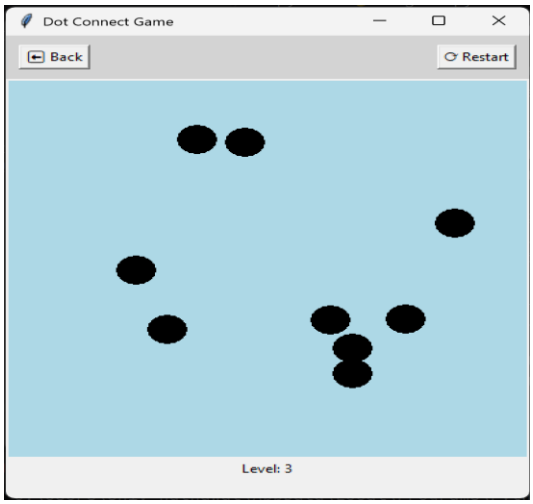
Screenshots:

- Welcome Screen

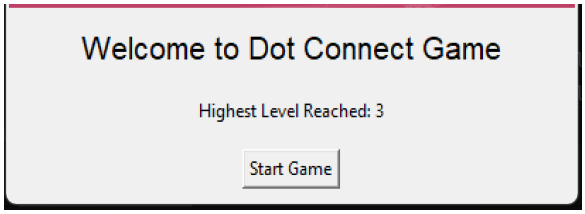
- Game Screen



- Level Completion Message



- Score



7. Testing and Validation

Table 1: Game Flow and Interaction

Test Case ID	Test Description	Input	Expected Output	Actual Output	Status
UT01	Validate game window appearance	Open the game window	Game window appears with background and controls	Game window appears correctly	Passed
UT02	Validate dot creation	Start game at level 1	5 dots created at random positions	Dots created correctly	Passed
UT03	Validate dot selection	Click on a dot	Correct dot is selected and line is drawn	Dot selection and line drawing work	Passed
UT04	Validate wrong dot selection	Click on a wrong dot	Error message displayed	Error message shown correctly	Passed
UT05	Validate line drawing	Click on correct sequence of dots	White line drawn between dots	Line drawn as expected	Passed

Table 2: Game Level Progression

Test Case ID	Test Description	Input	Expected Output	Actual Output	Status
UT06	Validate level progression	Complete a level	Game progresses to the next level	Level progresses as expected	Passed
UT07	Validate maximum level completion	Complete all levels	Game ends with a 'Well done' message	Game ends correctly with message	Passed
UT08	Validate highest level tracking	Complete a level beyond highest level reached	Highest level updated	Highest level updates correctly	Passed

Table 3: Edge Case and UI Testing

Test Case ID	Test Description	Input	Expected Output	Actual Output	Status
UT09	Validate image load from URL	Open the game	Image from the URL loads and displays correctly	Image loads correctly	Passed
UT10	Validate restart functionality	Press restart button	Game restarts at level 1	Game restarts as expected	Passed

8. Conclusion

To wrap up, it is evident that Dot Connect game has been a great fun as well as a logical and strategic exercise for players. It was however, not entirely a walk in the park, as we were also exposed to a few fundamental aspects of game creation such as UI design, algorithm implementation, and scaling of difficulty levels, while

developing the game. There is an aspect of critical thinking, pattern recognition and decision making in the game which are important functionalities of the brain.

Looking back at the process, we see some aspects that can be improved in the presentation such as an optimization of user experience and the game mechanics to make the challenge and enjoyment more interesting for all audiences. Apart from showing the effectiveness of the ideas of interactive entertainment in education and the development of cognitive abilities, the project raised the questions of further development and enhancement of the ideas such as more levels and multiplayer modes with different themes.

To conclude, the game can be commended for its development into a successful prototype; and may look forward to prospects that would see further development.

9. References

1. **Python Tkinter Documentation**: The official Python documentation provides a comprehensive overview of Tkinter, including its widgets, geometry management, event handling, and styling.

2. **Pillow (PIL) Documentation**:
Pillow is a powerful library for image manipulation in Python. Its documentation covers image processing, file formats, and integration with GUI frameworks like Tkinter.

3. **Stack Overflow Discussions on GUI Development**:
A vast collection of user-driven discussions and solutions related to Python GUI development challenges. Search tags like python-tkinter or python-gui.

4. **PyQt5 Official Documentation**:
PyQt5 is another popular library for creating cross-platform GUIs in Python. The documentation provides detailed guides on using its features and tools.

5. **Kivy Framework Documentation**:
Kivy is an open-source library for developing multitouch applications. It includes extensive information about widgets, layouts, and deployment for mobile and desktop.

6. **WxPython Documentation**:
WxPython is a library for creating native-looking GUIs in Python. The documentation includes examples and API details for creating robust applications.

7. **TutorialsPoint - Python GUI Programming**:
This guide offers an introduction to GUI programming in Python, covering Tkinter, widgets, and layout managers.

8. **Real Python - GUI Programming Tutorials**:
Real Python provides detailed tutorials on using Tkinter, PyQt, and other frameworks for building Python GUIs.

9. **GeeksforGeeks - Python GUI Tutorials**:
A beginner-friendly resource for Python GUI development using Tkinter, with examples for common widgets and applications.

10. **Python GUI Development Cookbook (Book)**:
A practical guidebook for advanced GUI development techniques, covering frameworks like Tkinter and PyQt.