UCD Michael Smurfit
Graduate Business School

BINGO 75!

Group 21

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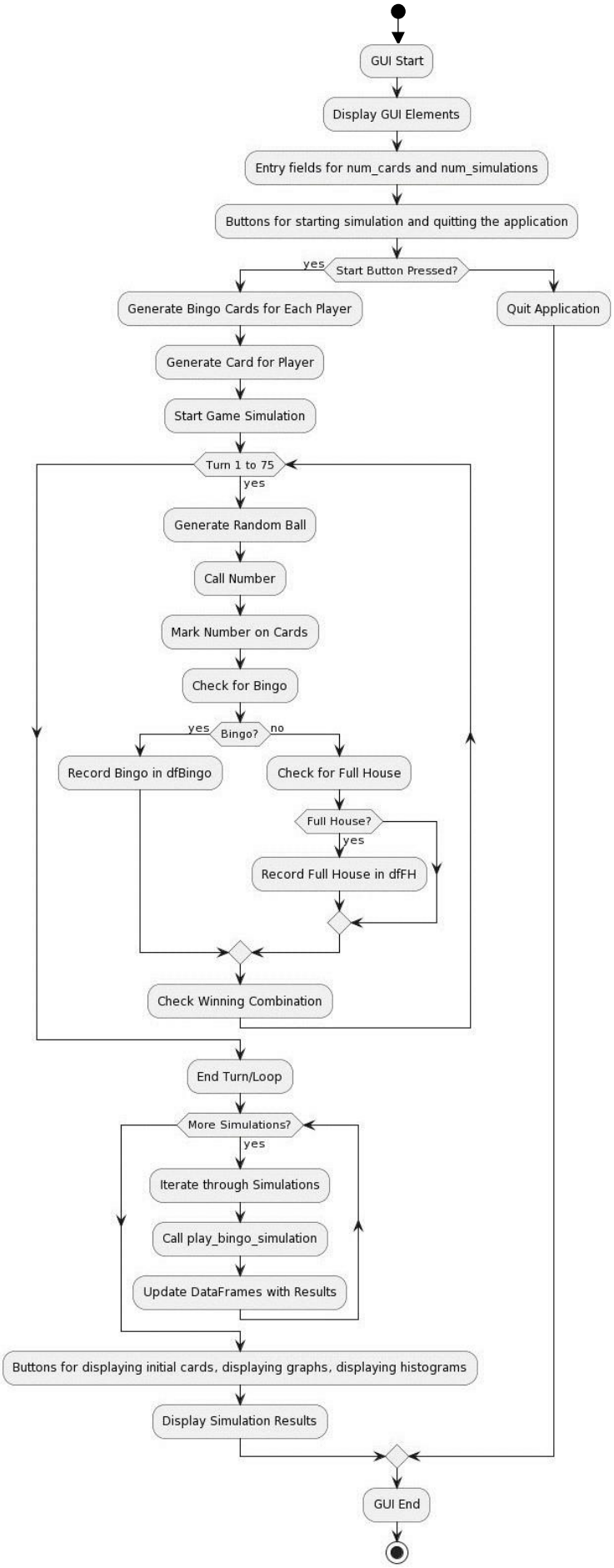
Individual Contribution

Name	Contribution
Ambarish Tirumalai (23201747)	Standard deviation plot, backend code bingo code
Jeyaram Muthukrishnan	Histogram plot, backend end bingo code
Shirish Senthil Kumar (23201809)	Display initial cards, GUI integration, and backend Bingo code
Leena Mary Varghese (23200412)	UML, User Manual, and backend bingo code

UML DIAGRAM


GUI Start
Display GUI Elements
Entry fields for num_cards and num_simulations
Buttons for starting simulation and quitting the application
yes
Start Button Pressed?
Quit Application
Generate Bingo Cards for Each Player
Generate Card for Player
Start Game Simulation
Turn 1 to 75
yes
Generate Random Ball
Call Number
Mark Number on Cards
Check for Bingo
yes
Bingo?
no
Record Bingo in dfBingo
Check for Full House
Full House?
yes
Record Full House in dfFH
Check Winning Combination
End Turn/Loop
More Simulations?
yes
Iterate through Simulations
Call play_bingo_simulation
Update DataFrames with Results
Buttons for displaying initial cards, displaying graphs, displaying histograms
Display Simulation Results
GUI End

Bingo Simulation User Manual

1. Introduction

Welcome to the Bingo Simulation application! This program allows you to simulate Bingo games, track the progress, and visualize the results. This user manual will guide you through using the application effectively.

2. Installation and Setup

Before running the Bingo Simulation, make sure you have the required libraries installed:

- pandas – Used to create, manage, and analyse DataFrames for Bingo and Full House simulation data, as well as to streamline the reading and writing of CSV files, enhancing the efficiency of data storage and retrieval.
- Matplotlib - Used to visually represent simulation outcomes by creating histograms and line plots, illustrating the distribution of first Bingo hits and the cumulative progress of Bingo and Full House wins.
- Tkinter - Used to create a graphical user interface (GUI) for the Bingo Simulation, providing interactive elements such as buttons, labels, and entry fields.
- NumPy - Used for numerical operations and array manipulations in the backend code, providing efficient handling of data arrays.
- Turtle - Turtle is employed for graphics, specifically to generate a visual fireworks animation upon completing the simulation.

To set up your environment:

1. Ensure you have Python installed on your system.
2. Install the required libraries using pip:

```
pip install pandas
pip install matplotlib
pip install tkinter
pip install turtle
pip install numpy
```

3. Launching the Application

Double-click on the GUI.py file, run it from the command line terminal, or use a Python IDE such as Visual Studio, PyCharm, etc., to launch the program. To start the Bingo Simulation program, run the provided GUI code. The main window will appear.

Note: Please keep the backend Bingo code “Bingo.py” in the same directory.

4. Running Simulations

- Enter the number of Bingo cards per simulation in the "Number of Bingo Cards per Simulation" field. Note: Please enter a positive integer number between “3 – 60”.
- Enter the number of simulations you want to run in the "Number of Simulations" field. Note: Please enter a positive integer number between “1-110”.
- Click the "Start Simulation" button to begin the simulations.

5. Simulation Progress

During the simulation:

- The program generates Bingo cards based on your input.
- It tracks the progress of each simulation, including Bingo and Full House wins.

6. Viewing Results

After simulations are complete:

- You can view the initial Bingo cards generated in a separate window by clicking the "Display Initial Cards" button. To view the initial Bingo cards in a CSV format, it is present in the file “generated_cards.csv” in the directory.
- To see a graph of Bingo vs. Turn, click the "Display Bingo vs. Turn Graph" button.
- To view a histogram of the first Bingo hits, click the "Display Histogram" button. To view the first bingo hit of each player in a CSV format, it is present in the file “first_bingo_turns.csv” in the directory.

7. Interpreting Results

- The "Bingo vs. Turn" graph shows the cumulative number of Bingo wins and Full House wins as the game progresses. It also consists of the standard deviation, upper and lower bound of both bingo and full house wins.
- The histogram displays the distribution of the turn numbers when the first Bingo was hit in each simulation.

8. Quitting the Application

To exit the application, click the "Quit" button in the main window.