

实验报告：Reversi、Peace 和 Gomoku（示例） 游戏系统

执行 Java 程式

```
java -cp bin App
```

项目说明

本项目在原先的多游戏系统基础上新增了 Gomoku（五子棋）游戏，实现了以下功能拓展：

- 支持 Peace、Reversi、Gomoku 多种游戏。
- 游玩各个游戏时可以进行自由切换，并同时管理多个棋盘。
- 新增 `InputUtils` 针对 Gomoku 的输入校验逻辑，以及 `Gomoku.java` 内的专用胜负判断。
- 其他功能与 Lab 4 相同，仍然支持玩家创建新游戏、放置棋子、跳过（如适用）、退出等交互操作。

新增内容说明

1. Gomoku.java

- 实现了五子棋的核心逻辑，包括棋子放置、胜负判断（连续五子）。
- 使用 `isLine` 方法判断是否形成五子连线。

2. InputUtils.java

- 更新输入校验逻辑，支持 Gomoku 游戏的输入解析。
- 确保输入合法性并提示玩家重新输入。

3. GameManager.java

- 支持动态创建 Gomoku 游戏实例。
- 管理多个游戏的切换逻辑。

4. GameView.java

- 更新棋盘显示逻辑，支持 Gomoku 游戏的棋盘展示。
- 在游戏结束时显示胜负结果。

设计思路与关键代码

1. 胜负判断逻辑

通过方向数组遍历八个方向，检查是否有连续五个相同棋子：

```
// filepath: /src/Gomoku.java
public void isLine(int col, int row, Piece piece) {
```

```
for (int[] direction : directions) {
    int count = 1;
    int dx = direction[0];
    int dy = direction[1];

    for (int i = 1; i < 5; i++) {
        int newCol = col + dx * i;
        int newRow = row + dy * i;

        if (newCol < 0 || newCol >= Board.SIZE || newRow < 0 || newRow
        >= Board.SIZE) {
            break;
        }

        if (board.getWhatPiece(newCol, newRow) == piece) {
            count++;
        } else {
            break;
        }
    }

    if (count >= 5) {
        haveLine = true;
        break;
    }
}
}
```

2. 输入校验逻辑

解析用户输入并验证合法性：

```
// filepath: /src/InputUtils.java
public static int[] parseInput(String input) throws
IllegalArgumentException {
    Matcher matcher = INPUT_PATTERN.matcher(input);
    if (!matcher.find()) {
        throw new IllegalArgumentException("Invalid input format");
    }

    int row = Integer.parseInt(matcher.group(1)) - 1;
    int col = Character.toLowerCase(matcher.group(2).charAt(0)) - 'a';

    return new int[] { row, col };
}
```

3. 多游戏管理

动态创建新游戏并切换：

```
// filepath: /src/GameManager.java
public static void start(Scanner scanner) {
    games.add(new Gomoku(players[0], players[1], scanner));
    games.get(2).setGameID(2);
    GameView.printBoard(games.get(2), games.get(2).getBoard(), players[0],
    players[0], players[1]);
}
```

运行过程截图

1. 開始遊戲

	A	B	C	D	E	F	G	H
1
2
3
4	.	.	.	●	○	.	.	.
5	.	.	.	○	●	.	.	.
6
7
8

Current Game: 1
Player [Tom] ○
Player [Jerry]

Game List
1. Peace
2. Reversi
3. Gomoku

Player Tom, please enter your move (1-8,a-h) / game number (1-3) / new game (peace / reversi / gomoku) / quit the game (quit) :

2. 跳轉到初始化了的 Gomoku

	A	B	C	D	E	F	G	H
1
2
3
4
5
6
7
8

Current Game: 3
Player [Tom] ○
Player [Jerry]
Current Round : 1

Game List
1. Peace
2. Reversi
3. Gomoku

Player Tom, please enter your move (1-8,a-h) / game number (1-3) / new game (peace / reversi / gomoku) / quit the game (quit) :

3. 連成一線

	A	B	C	D	E	F	G	H
1	○	○	●
2	●	●	●	○	○	.	.	.
3	○	○	○	●
4	●	●	○	.	○	●	.	○

Current Game: 3
Player [Tom] ○

Game List
1. Peace
2. Reversi

```
5 ● ○ ● . ● . . ●      Player [Jerry]      3.  Gomoku
6 ○ ● ○ . . . . .      Current Round : 16
7 ● ○ . . . . .
8 ○ ● . . . . .
Player Tom, please enter your move (1-8,a-h) / game number (1-3) / new
game (peace / reversi / gomoku) / quit the game (quit) : 5d
```

4. 遊戲結束，並且無法再輸入

```
  A B C D E F G H
1 ○ ○ ● . . . . .
2 ● ● ● ○ ○ . . .
3 ○ ○ ○ ● . . . .
4 ● ● ○ . ○ ● . ○
5 ● ○ ● ○ ● . . ●
6 ○ ● ○ . . . . .
7 ● ○ . . . . .
8 ○ ● . . . . .
Current Game: 3
Player [Tom]
Player [Jerry] ●
Current Round : 16
Game List
1.  Peace
2.  Reversi
3.  Gomoku
Game 3 is over now. Player [Tom] wins!
Please enter another board number to continue / new game (peace / reversi
/ gomoku) / quit the game (quit) : 7c
This position cannot be placed. Please try again.
```

5. 開啟新的棋盤

```
  A B C D E F G H
1 ○ ○ ● . . . . .
2 ● ● ● ○ ○ . . .
3 ○ ○ ○ ● . . . .
4 ● ● ○ . ○ ● . ○
5 ● ○ ● ○ ● . . ●
6 ○ ● ○ . . . . .
7 ● ○ . . . . .
8 ○ ● . . . . .
Current Game: 3
Player [Tom]
Player [Jerry] ●
Current Round : 16
Game List
1.  Peace
2.  Reversi
3.  Gomoku
Game 3 is over now. Player [Tom] wins!
Please enter another board number to continue / new game (peace / reversi
/ gomoku) / quit the game (quit) : 7c
This position cannot be placed. Please try again. Gomoku
```

6. 跳轉到新開的棋盤

```
  A B C D E F G H
1 ○ ○ ● . . . . .
2 ● ● ● ○ ○ . . .
3 ○ ○ ○ ● . . . .
4 ● ● ○ . ○ ● . ○
Current Game: 3
Player [Tom]
Game List
1.  Peace
2.  Reversi
```

```
5 ● ○ ● ○ ● . . ●      Player [Jerry] ●      3. Gomoku
6 ○ ● ○ . . . . .      Current Round : 16      4. Gomoku
7 ● ○ . . . . .
8 ○ ● . . . . .
Game 3 is over now. Player [Tom] wins!
Please enter another board number to continue / new game (peace / reversi
/ gomoku) / quit the game (quit) : 4
```

7. 沒有連成一線，棋盤將滿

```
  A B C D E F G H
1 ○ ○ ○ ○ ● ● ● ●
2 ● ● ● ● ○ ○ ○ ○
3 ○ ○ ○ ○ ● ● ● ●      Current Game: 4
4 ● ● ● ● ○ ○ ○ ○      Player [Tom]
5 ○ ○ ○ ○ ● ● ● ●      Player [Jerry] ●
6 ● ● ● ● ○ ○ ○ ○      Current Round : 32
7 ○ ○ ○ ○ ● ● ● .
8 ● ● ● ● ○ ○ ○ ○
Player Jerry, please enter your move (1-8,a-h) / game number (1-7) / new
game (peace / reversi / gomoku) / quit the game (quit) : 7h

Game List
1. Peace
2. Reversi
3. Gomoku
4. Gomoku
```

8. 平手並且跳轉回 3 號棋盤

```
  A B C D E F G H
1 ○ ○ ○ ○ ● ● ● ●
2 ● ● ● ● ○ ○ ○ ○
3 ○ ○ ○ ○ ● ● ● ●      Current Game: 4
4 ● ● ● ● ○ ○ ○ ○      Player [Tom] ○
5 ○ ○ ○ ○ ● ● ● ●      Player [Jerry]
6 ● ● ● ● ○ ○ ○ ○      Current Round : 33
7 ○ ○ ○ ○ ● ● ● ●
8 ● ● ● ● ○ ○ ○ ○
Game 6 is over now. It's a tie!
Please enter another board number to continue / new game (peace / reversi
/ gomoku) / quit the game (quit) : 3

Game List
1. Peace
2. Reversi
3. Gomoku
4. Gomoku
```

9. 返回 3 號棋盤

```
  A B C D E F G H
1 ○ ○ ● . . . . .
2 ● ● ● ○ ○ . . .
3 ○ ○ ○ ● . . . .
4 ● ● ○ . ○ ● . ○
5 ● ○ ● ○ ● . . ●
6 ○ ● ○ . . . . .

Current Game: 3
Player [Tom]
Player [Jerry] ●
Current Round : 16

Game List
1. Peace
2. Reversi
3. Gomoku
4. Gomoku
```

```
7 ● ○ . . . . .
```

```
8 ○ ● . . . . .
```

Game 3 is over now. Player [Tom] wins!

Please enter another board number to continue / new game (peace / reversi
/ gomoku) / quit the game (quit) :