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Development of Algorithm of Traditional Kei-Yen Game

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Abstract

Manipuri traditional game *Kei-Yen*, which originates from the ancient Meitei mythological story, is a mind game between two players of different mindsets, one has the mindset of killing (*Kei*), whereas the other (*Yen*) has the mindset of protecting itself and block the moves of *Kei*. We propose and develop an algorithm of this game by incorporating various possible logical tactics and strategies for a possible computer software of this game. Since this game involves various logical mind games, playing this game can improve our way of thinking, strategies, tricks and other skills related to mind game. In this play there is not the case of draw which means one has to win over the other at the end of the game. This game could become one of most interesting indoor national or international game.

Keywords

Kei-Yen, Traditional Game, Algorithm Development

1. Introduction

One of the most interesting Manipuri traditional indoor games, which is known as *Manipuri Chess*, is *Kei-Yen* (*Tiger-Rooter*) [1]. Historically, this indigenous game is originated from the "*Meitei mythological*" story [2]. This Manipuri traditional name *Kei* means *Tiger*, and *Yen* means *Rooter* or *Cock*. It is a mind game like Chess game between two players on a board drawn in a specific logical manner [3], but the way it is played is very different from the Chess game. The origin of the game goes far back to ancient Manipuri and can be played throughout the year. It is a simple but very logical battle or war game between groups of *Kei* and *Yen* which can improve our mind thinking skills and logical plotting. Originally, it was played with difference sticks by representing both *Kei* and *Yen* on a board or ground drawn with specific logical lines along which the individual *Kei*s and *Yen*s can go along to kill its opponent. The game can be played by both men and women. There have been many tricks on how to play Kei-Yen. In Kei-Yen, the match will never draw; one of the players must be a winner either Kei player or Yen player.

Kei-Yen is a two-player strategy mind board game played on a Kei-Yen Board. One player has 25 pieces of Yen and the opponent player has 2 pieces of Kei. Before start of the game there could be a toss or decision defining which player will play *Kei* and the other *Yen*. *Kei* will start the game at the beginning. Then both the players will move turn wise. *Kei* player will attempt to kill all the pieces of *Yen* and *Yen* player will attempt to block the way of *Kei*. *Kei* will win the match if it kills all the *Yen*s, whereas, *Yen* player will win the match if it could able to block the *Kei* moves.

2. Game Logic and Algorithm

We describe the details of the *Kei-Yen* board and all possible strategic moves of both *Kei* and *Yen* as in the following.

1) Kei-Yen Board

Kei-Yen board two dimensional square board which has 5 × 5 (25) positions to move for both *Kei* and *Yen*. One player has two *Kei* pieces (small wooden sticks as in **Figure 1**) and the opponent has 25 *Yen* pieces which is also a wooden sticks smaller in size as compared to *Kei* to distinguish from *Kei*. Both *Kei* and *Yen* pieces can have same move for strategy but *Kei* has extra move for eating *Yen*. Only dark places along the lines on the board (as shown in **Figure 1(a)**) can be moved by both the players. *Kei* will keep on moving two dark places, which are middle of either right most and left most side or top most and bottom most side of the *Kei-Yen* board. However, *Yen* will keep on moving four dark places. Yen have four separate groups to place on board; they are second dark placed of left most and top most, right most and top most, left most and bottom most and right most and bottom most as shown in **Figure 1(b)**.

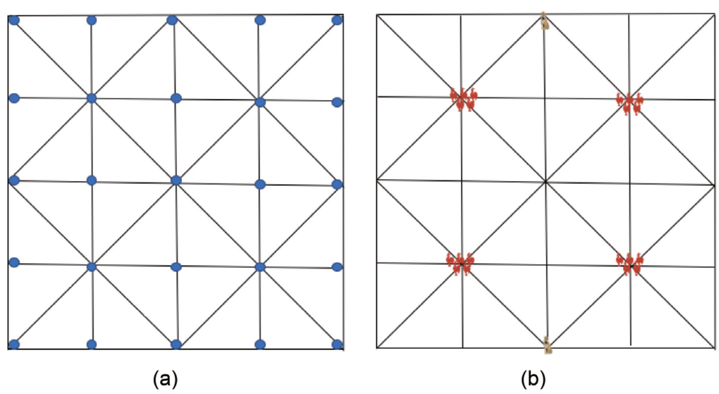

Figure 1. Schematic diagram of *Kei-Yen* board: (a) *Kei-Yen* board; (b) opening phase of the *Kei-Yen* game.

2) Opening phase of Kei-Yen

Kei, which acts as a predator, has the two pieces of larger sticks in number in the game of *Kei-Yen*, and is considered to be stronger than *Yen* [4]. The strategy of *Kei* is to attempt to kill the *Yen* sticks during the match. If one *Kei* cross-over one or group of *Yen*s along the lines drawn on the board it kills one *Yen* reducing the number of *Yen*s by one. Depending on the available steps, one *Kei* can eat one or more *Yen*s in one move. It wins the match if it kills all the *Yen*s in the match.

Yen acts as prey, and has twenty five pieces in the game of *Kei-Yen*. It is weaker than *Kei*, and can not able to kill *Kei*. It does hide and seek from *Kei* to protect itself from *Kei*. It attempts to block the way of *Kei*. The player *Yen* wins the match only when they block the ways of both the *Keis*.

3) Strategy and tactics in the game

Kei-Yen strategy consists of setting and achieving long-term positioning advantages of both the players during the game to win the match. The moves of the *Kei* should be done in such a way that in every moves followed by it should get opportunity to kill the *Yen*. However, for *Kei* the move should be in such a way that it could able to hide or protect itself from *Kei* and block the moves of the *Kei* in the next and consecutive move followed by. These two parts of the *Kei-Yen*, playing process cannot be completely separated, because strategic goals are mostly achieved through tactics, logical moves and long term strategy, while the tactical opportunities are based on the previous strategical moves in the play.

a) Fundamentals of tactics: In *Kei-Yen*, tactics in general concentrate on short-term actions or moves, and hence short-term tactics can be used to advance and manipulate next consecutive moves by a player. The possible depth of logical moves to win the match depends on the player's ability and strategic skill. In a particular position of either *Kei* or *Yen* with large number of possibilities on both sides, a deep calculation and logical strategy are more difficult and may not be practical, while in "*tactical*" positions with a limited number of forced variations, strong players can calculate long sequences of moves during the play. Further, simple one-move or two-move tactical actions, such as, threats, exchanges of moves, and double attacks, can be combined into more complicated combinations of move by each player, however, sequences of tactical maneuvers are often forced from the point of view of one or both players during the match.

b) Fundamentals of strategy: *Kei-Yen* strategy is concerned with evaluation of *Kei-Yen* positions by each player, and with setting up goals and long-term winning plans for the future moves in the play. During the evaluation process, players must take into account numerous factors, such as, the strategic move of the pieces on the board, control of the center and centralization, the pawn structure, predating or protecting logics, and the control of key opponent's move and sequences of attacks (for example, diagonal moves, lines of actions, and positions of attack or hide).

The most basic step in evaluating a position is to count the total number of steps of their own advantages of both players. Every strategy move used for this purpose is based on the previous experience and evaluation of opponent's move. Since *Kei* has only one step to move either to eat *Yen* or occupy position of higher opportunity, *Kei* player generally have to try to hold position which have a large number of possibility of eating *Yen* or move from that position in the next move. Because even though *Kei* does not have the fear to die, it should be careful about its being trapped by the *Yen*s in the next steps followed by in the match. The strategy of *Yen* is completely different from that of the *Kei*. The main strategy of *Yen* should be to hold positions where it is safest to survive and easy to get hold of *Kei* moves during the match, and they have to play in groups in a coordinating way. Hence, the move of each *Yen* should be correlated to the occupied positions by the other *Yen*s on the board. On the other hand, *Kei* will try to break the group activities of *Yen*s to individualize them so that they can attack easily to eat. It's very similar to predator-prey strategy model but here in this match both predator and prey have human intelligence.

4) Phases of the game

There are three different phases in *Kei-Yen* game. They are opening phase, middle game phase and end game phase. These phases of the game correspond to different stages of the match. Opening phase means starting position of the game; middle game phase indicates after 9 - 10 different moves of the game and end game phase correspond to the finishing stage of the game.

a) Opening phase: Opening phase of *Kei-Yen* game start with the groups of *Yen* as an initial move of game. Initially four groups of *Yen* are kept separately at four specific places (Figure 2(a)) of *Kei-Yen* board beginning. Each group has five *Yen*, and two *Kei* are kept separately as shown in Figure 2(b). At initial stage, *Kei* will be kept at the middle of either right most and left most side or top most and bottom most side of the *Kei-Yen* board. Groups of *Yen* will be kept as shown in Figure 2(a).

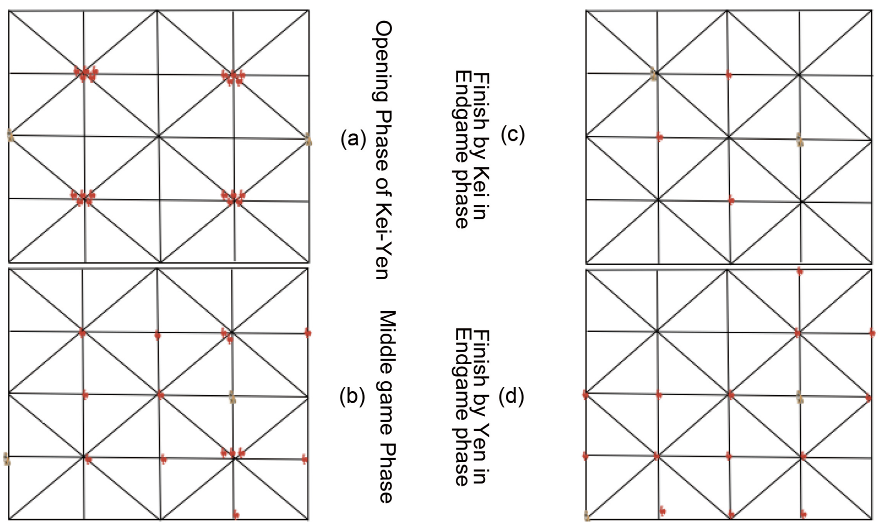

Figure 2. Schematic diagram depicting different phases of *Kei-Yen* game: (a) Opening phase of *Kei-Yen* game; (b) middle phase of the *Kei-Yen* game; (c) End game by *Kei*, and (d) End game by *Yen*.

b) Middle game Phase: In the *Kei-Yen* game, *Kei* will move first, followed by *Yen*'s move and so on as a turn wise move. *Kei* will attempt to kill all the *Yen* and *Yen* will attempt to block all the way of *Kei* to trap. Then all possible tactics are used by both players and they are allowed to use those tactics freely.

c) End game phase: There is one advantage of *Kei-Yen* game over other types of games, such as chess, that is one of the players should be winner either *Kei* player of *Yen* player [5]. The match will never draw in the game. There are two ways to finish the game. They are either (i) finish by *Kei*, or finish by *Yen*. In the finish by *Kei* end game, *Kei* will either finish by eating all the *Yen*s or reach a stage at which the remaining *Yen*s will have impossible to block all the way of *Kei* as shown in **Figure 2(c)**. However, in the finish by *Yen*, the *Yen*s, the attempt to block the ways of *Kei* in all the possible ways becomes successful, and reach a situation that the two *Kei*s could not able to move at all (**Figure 2(d)**). In this case *Yen* will win the game.

5) Arrange move

Arrange move means the moves which are shifted from the current position to the better position either by *Kei* or *Yen* pieces. In arrange moves, both *Kei* and *Yen* have some conditions for moving one position to another position. But *Kei* has extra move as compared to *Yen*.

a) Kei and Yen arrange move: In *Kei-Yen*, there are different motive for arranging both by the *Kei* or the *Yen*. *Kei* arrange to the better position for killing the *Yen*, however, *Yen* arrange to the better position for trying to block all the way of *Kei*. In this arrange move, we check the current position first, then try to keep the better position on their respective turns.

b) Condition check for arrangement move: The *Kei-Yen* game for condition check for arrangement move can be done by defining a two dimensional array $a(m,n); m,n = 0,1,2,3,4$, where, a defined by (m,n) gives us a position of either *Kei* or *Yen* on the *Kei-Yen* board (**Figure 3**). In *Kei-Yen* condition check for arrangement move, there are three conditions for both *Kei* and *Yen* to win over the other. They are i) same position check condition, ii) even-odd condition, and odd-even condition which will be discussed in the subsequent sections with respective algorithms and pseudo codes.

Before we discuss the properties of the possible moves, we should know idea about moves regarding extremely end position. We can divide two types at the extremely end current position cases for common position moves. Let us discuss the logical moves and their possible pseudo code as follows.

Properties of move C_1: When $a(m,n)$ is at the even-even extremely end position where $m \neq n$, $m \neq n+4$ and $m+4 \neq n$, $a(m,n)$ has five possible moves.

Pseudo code of C_1 logic:

- $a(m-1,n), a(m-1,n-1), a(m,n-1), a(m+1,n-1), a(m+1,n+1)$ means m = 2 & n = 4 or
- $a(m,n+1), a(m,n-1), a(m+1,n-1), a(m+1,n), a(m+1,n+1)$ means m = 0 & n = 2 or

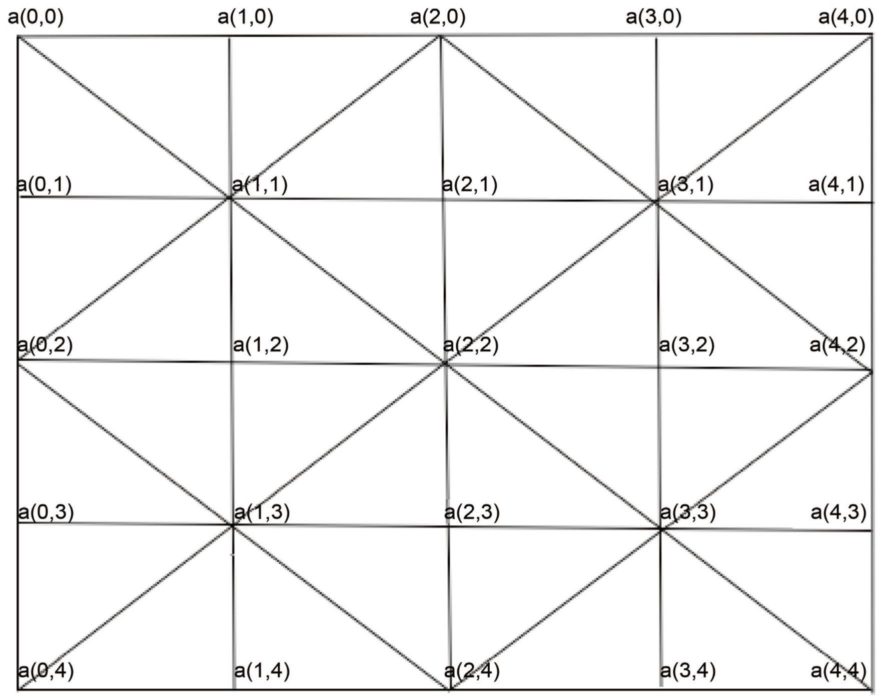

Figure 3. Schematic diagram showing positions array on *Kei-Yen* traditional game board.

- $a(m-1,n+1), a(m-1,n), a(m+1,n), a(m+1,n+1), a(m,n+1)$ means $m = 2$ & $n = 0$ or
- $a(m-1,n+1), a(m-1,n), a(m-1,n-1), a(m,n-1), a(m+1,n+1)$ means $m = 4$ & $n = 2$

Properties of move C_2: When $a(m,n)$ is at the even-odd or odd-even or even-even extremely end positions where m = even number and n = odd number or vice-versa or $m = n$ = even number respectively, then each *Kei* or *Yen* has three possible moves.

Pseudo code of C_2 logic:

- $a(m,n+1), a(m,n-1), a(m+1,n)$ means $m = 0$ & $n = 1$ or 3 or
- $a(m-1,n), a(m+1,n), a(m,n+1)$ means $m = 1$ or 3 & $n = 0$ or
- $a(m-1,n), a(m,n-1), a(m+1,n)$ means $m = 1$ or 3 & $n = 4$ or
- $a(m-1,n), a(m-1,n-1), a(m,n-1)$ means $m = 4$ & $n = 1$ or 3 or
- $a(m,n+1), a(m+1,n), a(m+1,n+1)$ means $m = 0$ & $n = 0$ or
- $a(m-1,n), a(m-1,n-1), a(m,n-1)$ means $m = 4$ & $n = 4$.

Properties of move C_3: When $a(m,n)$ is a position at main diagonal position but not at extremely end point, then the current position has eight possible moves, which means $m = 1$ or 2 or 3 & $n = 1$ or 2 or 3 respectively, $m = 1$ and $n = 3$ or $m = 3$ and $n = 1$.

Pseudo code of C_3 logic:

- $a(m,n+1)$, $a(m-1,n+1)$, $a(m-1,n+1)$, $a(m,n-1)$, $a(m+1,n-1)$, $a(m+1,n)$, $a(m+1,n+1)$, $a(m,n+1)$

Properties of move C_4: When $a(m,n)$ is not position at the main diagonal position as well as not at extremely end point, then the current position has four possible moves, which means $m = 1$ & $n = 1$ or 3, $m = 3$ and $n = 1$ or 3 and $n = 1$.

Pseudo code of C_4 logic:

- $a(m-1,n)$, $a(m,n+1)$, $a(m+1,n)$, $a(m,n+1)$

Now we consider various check for arrangement move as in the following.

Property of move B_1: In this property, there are three sub-properties. They are Property 0f move A_1 (Same Position Check Condition), Property of move A_2 (Even-Odd Check Condition) and Property of move A_3 (Odd-Even Check Condition) as shown details are next pages. This property of move B_1 is mainly used by *Kei* for their arranging moved.

2.1. Same Position Check Condition

In this move condition, we have $m = n =$ even number or odd number or same number.

Property of move A_1:

For $a(m,n)$ move, where, m and n are either both even numbers or both odd numbers or same numbers and $m \geq 0$ & $n \leq 4$, then the current position can move 3 to 8 maximum positions. They are, $a(m-1,n+1)$, $a(m-1,n)$, $a(m-1,n-1)$, $a(m,n-1)$, $a(m+1,n-1)$, $a(m+1,n)$, $a(m+1,n+1)$, $a(m,n+1)$. The *Kei* or *Yen* has not limitation for moving from the current position to another position when the current adjacent position has space for move.

Pseudo code of A_1 logic:

For $a(m,n)$, if n is even number or odd number or $m = n$ or same number, then,

- When $a(m,n)$ is at the same number means either $m = n =$ even number or $m = n =$ odd number but not at extremely end position, then $a(m,n)$ has eight possible moves using *Property to move C_3*.
- When $a(m,n)$ is at the extremely end corner position and even number position, means both $m = n+4$ or $m+4 = n$ or $m = n$ where $m = n =$ even number, then $a(m,n)$ has three possible moves using *Property to move C_2*.
- When $a(m,n)$ is at the extremely end position and even number position but not at extremely end corner position, means both $m = n+2$ or $m+2 = n$, where $m = n =$ even number, then $a(m,n)$ has five possible moves using *Property to move C_1*.

Example: If the current piece position is $a(2,2)$ means $m = 2$ & $n = 2$ (same position), then either *Kei* or *Yen* can move using *Properties to move C_3 i.e.*, $a(1,3)$ using $a(m-1,n+1)$; $a(1,2)$ using $a(m-1,n)$; $a(1,1)$ using $a(m-1,n-1)$; $a(2,3)$ using $a(m,n+1)$; $a(3,1)$ using $a(m+1,n-1)$; $a(3,2)$ using $a(m+1,n)$; $a(3,3)$ using $a(m+1,n+1)$; $a(2,3)$ using $a(m,n+1)$.

2.2. Even-Odd Check Condition

In Even-Odd condition, the values of "*m*" is even number and "*n*" is odd number where (m,n) is the position of *Kei* or *Yen*. This case means *m* = even number and *n* = odd number.

Property to move A_2:

The current position $a(m,n)$, where *m* = even number and *n* = odd number $m \geq 0, n \leq 4$. Then the pieces can move 3 to 4 maximum positions. They are $a(m-1,n+1)$, $a(m,n-1)$, $a(m+1,n)$, $a(m,n+1)$ with *m* = 2 and *n* = 1 or 3 or $a(m,n-1)$, $a(m+1,n+1)$, $a(m,n+1)$ with *m* = 0 and *n* = 1 or 3 or $a(m-1,n)$, $a(m,n-1)$, $a(m,n+1)$ with *m* = 4 and *n* = 1 or 3.

Pseudo code of A_2 logic:

For $a(m,n)$, if *m* = even number and *n* = odd number, then

- When $a(m,n)$ is not at the extremely end current position means *m* = 2 and *n* = 1 or 3 then $a(m,n)$ has four possible moves using *Property to move* C_4.
- When $a(m,n)$ is at the extremely end current position means either *m* = 0 or 4 and *n* = 1 or 3 respectively or vice-versa, then $a(m,n)$ has three possible moves using *Property to move* C_2.

Odd-even check condition In odd-ven condition, *m* = odd number and *n* = even number.

Property to move A_3:

The piece at position $a(m,n)$, where *m* = odd numbers or *n* = even number with $m \geq 0, n \leq 4$ can move 3 to 4 maximum possible positions. They are 1) $a(m-1,n)$, $a(m,n-1)$, $a(m+1,n)$, $a(m,n+1)$ for *m* = 1 or 3 and *n* = 2 or 2) $a(m-1,n)$, $a(m+1,n)$, $a(m,n+1)$ for *m* = 1 or 3 and *n* = 0 or 3) $a(m-1,n)$, $a(m,n-1)$, $a(m+1,n)$ for *m* = 1 or 3 and *n* = 4.

Pseudo code of A_3 logic:

For $a(m,n)$, if *m* = odd number and *n* = even number, then

- When a(m,n) is not at the extremely end current position means *m* = 1 or 3 and *n* = 2 then a(m,n) has four possible moves using *Property to move* C_4.
- When $a(m,n)$ is at the extremely end current position means either *m* = 1 or 3 and *n* = 0 or 4 respectively or vice-versa, then a(m,n) has three possible moves using *Property to move* C_2.

2.3. Condition Check for Killing Move (*Kei* Move)

Condition check for killing move means the *Kei* move which is shifted from one position to another position for killing the *Yen*. In this move, some extra conditions moves can be applied as compared to *Yen* moved *i.e. Kei* can kill when the next adjacent position of *Yen* is empty from and as same lines with *Yen* and *Kei* should be there on *Kei*-*Yen* board. Means *Kei* and *Yen* are same rows or columns or diagonals according to the *Kei* is either even-odd check condition or same position check condition or odd-even check condition. In *Kei*-*Yen* condition check for killing move, there are three conditions for *Kei* like *Yen* which are discussed below.

2.4. Same Position Check Condition for Killing Moves

In same position check condition, the values of m and n are both even numbers or odd numbers or same numbers where m and n are the array of first and second position number of "a". It means m = n = even number or odd number or same number. **Property to move B_2:**

For $a(m,n)$ with m and n are either both even numbers or both odd numbers or same numbers with $m \geq 0, n \leq 4$, then the piece can move 2 to 8 maximum positions. They are 1) $a(m-2,n+2)$ 2) $a(m-2,n)$ 3) $a(m-2,n-2)$ 4) $a(m,n-2)$ 5) $a(m+2,n-2)$ 6) $a(m+2,n)$ 7) $a(m+2,n+2)$ 8) $a(m,n+2)$.

Pseudo code of B_2 logic:

For $a(m,n)$, if n is even number or odd number or m = n or same number, then,

- When $a(m,n)$ is at the same number means either $m=n=2$, then $a(m,n)$ has eight possible moves for eating Yen: $a(m-2,n+2)$, $a(m-2,n)$, $a(m-2,n-2)$, $a(m,n-2)$, $a(m+2,n-2)$, $a(m+2,n)$, $a(m+2,n+2)$, $a(m,n+2)$
- When $a(m,n)$ is at the same number means either $m=n=0$, then $a(m,n)$ has three possible moves for eating Yen: $a(m,n+2)$, $a(m+2,n+2)$, $a(m+2,n)$
- When $a(m,n)$ is at the same number means either $m=n=1$, then $a(m,n)$ has three possible moves for eating Yen: $a(m,n+2)$, $a(m+2,n+2)$, $a(m+2,n)$
- When $a(m,n)$ is at the same number means either $m=n=3$, then $a(m,n)$ has three possible moves for eating Yen: $a(m-2,n)$, $a(m-2,n-2)$, a(m, n − 2)
- When $a(m,n)$ is at the same number means either $m=n=4$, then a(m, n) has three possible moves for eating Yen: $a(m-2,n)$, $a(m-2,n-2)$, $a(m,n-2)$
- When $a(m,n)$ is at the even number where m = n = even number, $m \neq 2$, $n \neq 2$ and $m \neq n$, then $a(m,n)$ has three possible moves for eating Yen: 1. $a(m,n-2)$, $a(m-2,n-2)$, $a(m,n+2)$, where m = 0 and n = 4 2. $a(m,n+2)$, $a(m+2,n+2)$, $a(m+2,n)$, where m = 0 and n = 0 3. $a(m-2,n+2)$, $a(m-2,n)$, $a(m,n+2)$, where m = 4 and n = 0 4. $a(m-2,n)$, $a(m-2,n-2)$, $a(m,n-2)$, where m = 4 and n = 4

When $a(m,n)$ is at the even number where m = n + 2 = even number or $m+2=n$ and $m \neq n$, then $a(m,n)$ has five possible moves for eating Yen: 1. $a(m,n-2)$, $a(m+2,n-2)$, $a(m+2,n)$, $a(m+2,n+2)$, $a(m,n+2)$, where m = 0 and n = 2 2. $a(m-2,n)$, $a(m+2,n)$, $a(m+2,n+2)$, $a(m,n+2)$, $a(m-2,n+2)$, where m = 2 and n = 0 3. $a(m-2,n)$, $a(m-2,n-2)$, $a(m,n-2)$, $a(m,n+2)$, $a(m-2,n+2)$, where m = 4 and n = 2 4. $a(m-2,n)$, $a(m-2,n-2)$, $a(m,n+2)$, $a(m+2,n-2)$, $a(m+2,n)$, where m = 2 and n = 4.

When $a(m,n)$ is at the odd number where m = 1 n = 3 or vice-versa and $m \neq n$, then $a(m,n)$ has three possible moves for eating Yen: 1. $a(m,n-2)$, $a(m+2,n-2)$, $a(m+2,n)$, where m = 1 and n = 3 2. $a(m-2,n+2)$, $a(m-2,n)$, $a(m,n+2)$, where m = 3 and n = 1

Even-odd condition for killing moves In even-odd condition, the values of "m" is even number and "n" is odd number where m and n are the first and second position number of "a" respectively. It means m = even number and n = odd number.

Property to move B_3:

For $a(m,n)$ where m = even number and n = odd number and $m \geq 0, n \leq 4$ then the pieces can move 2 maximum positions. They are 1) $a(m,n-2)$, $a(m,n+2)$ means m = 0 or 2 and n = 1 or 3 or $m \neq 4$ 2) $a(m-2,n)$, $a(m,n-2)$ means m = 4 and n = 1 or 3 m = 4 and n = 1 or 3.

Pseudo code of B_3 logic:

For $a(m,n)$, if m = even number n = odd number, then

- When $a(m,n)$ is at the m = even number and n = odd number but $m \neq 4$, then $a(m,n)$ has two possible moves: $a(m,n-2)$, $a(m,n+2)$ means m = 0 or 2 and n = 1 or 3 or $m \neq 4$
- When $a(m,n)$ is at the m = even number and n = odd number where m = 4 and n = 1 or 3, then $a(m,n)$ has two possible moves: $a(m-2,n)$, $a(m,n-2)$ means m = 4 and n = 1 or 3 m = 4 and n = 1 or 3

2.5. Odd-Even Condition

In this case, the values of "m" is odd number and "n" is even number where m and n are the first and second position number of "a" respectively. It means m = odd number and n = even number.

Property to move B_4:

For $a(m,n)$ where m = odd numbers and n = even numbers $m \geq 0, n \leq 4$ then the Pieces can move 2 maximum positions. They are 1) $a(m+2,n+2)$, $a(m,n+2)$ means m = 1 and n = 0 or 2 or 4 2) $a(m-2,n)$, $a(m,n-2)$ means m = 3 and n = 0 or 2 or 4.

Pseudo code of B_4 logic:

For $a(m,n)$, if m = odd number and n even number, then

- When $a(m,n)$ is at the m = odd number and n = even number where m = 1 and n = 0 or 2 or 4 , then $a(m,n)$ has two possible moves: $a(m+2,n+2)$, $a(m,n+2)$ means m = 1 and n = 0 or 2 or 4.
- When $a(m,n)$ is at the m = odd number and n = even number where m = 3 and n = 0 or 2 or 4, then $a(m,n)$ has two possible moves: $a(m-2,n)$, $a(m,n-2)$ means m = 3 and n = 0 or 2 or 4.

The complete flow chart of the algorithm of the whole *Kei-Yen* game is shown in Figure 4.

3. Conclusion

The Manipuri traditional game *Kei-Yen* is a very interesting mind game which

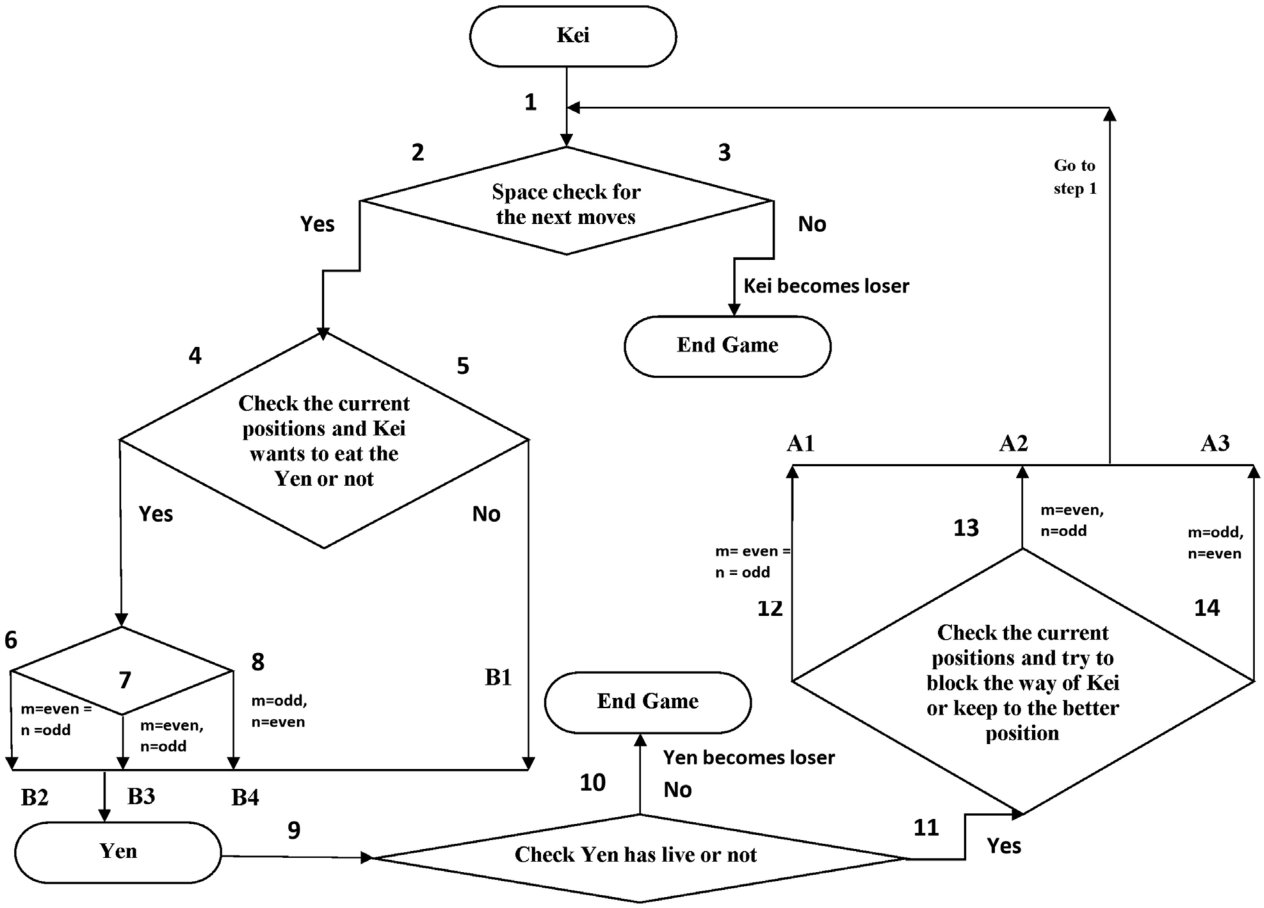

Figure 4. Flow chart for the *Kei-Yen* traditional game.

needs logical skills, tactics and strategy to win the game. The peculiar and interesting notion of this game is that both the players have different strategies and moves because mindsets of *Kei* and *Yen* are different because the mindset of *Kei* is to kill, whereas, the mindset of *Yen* is to protect itself and to block the *Kei* moves. Further, one of the player has to win in the match and there is no draw. The algorithm to develop a software for this interesting game is presented in this work. The game software could be an interesting one for interested players for practice.

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