GAME DEVELOPMENT OF TRADITIONAL DAMDAMAN DESKTOP BASED

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ABSTRACT

Damdaman is a traditional game in Indonesia. In this day and age children are less familiar with traditional games, due to lack of adult role to introduce this game, so that children - children of today are unfamiliar with this game, on the basis of these issues will be built a game that can help children to re playing this traditional game, the game Damdaman based desktop. This system design using the waterfall method, tool use is DFD (Data Flow Diagram), the tools used are Adobe Flash CS6. Artificial Intellegence is used Negascout algorithm and is built using structured data flow analysis. Negascout This method can be implemented on a board game, such as Damdaman, because Damdaman is a game with two people whose every move and his decision is limited, also can be calculated, and any information that is in the board game can be seen by any player with the rules of the game itself bound .

Keywords: Traditional Games, Damdaman, Negascout, DFD (Data Flow Diagram)

1. INTRODUCTION

Damdaman usually played by boys, although there are no restrictions for the girls because memainkankannya including competitive games, sharpen brain, nothing to lose and win. The game is played by two players. The goal is to spend the opponent pawn with the rules that have been agreed upon as the end of the game [1]. Damdaman played by two players, and arena Damdaman game played on a board that has been given the playing field, and as the pieces using stone or gravel with a predetermined amount.

Implementation Damdaman games on computer software is expected to facilitate the kids today play this game, because it has advantages not required to search for and prepare a rival game means that now is rare, because the means are presented in the form of digital games and one player can played by a computer that has been applied artificial Intellegence (AI) so that the computer is able to determine the selection of optimal measures to offset or at least provide barriers player to win the game.

This study aims to Damdaman traditional games can be played with the sophistication of today's technology, so that the children of today can still play this game because it now means a digital form of the original game was already rare.

2. THEORY AND ANALYSIS

2.1 The traditional game

The traditional game is a game type that exist in one particular area that is based on the culture or the culture of the area. Traditional games are usually played by people in a particular area with the traditional rules and concepts in earlier times [2]. Traditionally the game is less well known by children in today most parents are still very ancient know how to play this game especially remembering their childhood playing this traditional game.

Traditional games are cultural elements that can not be underestimated, because the traditional games give a great influence on psychological development, nature, and social life of the child in the future. Traditional game received a strong influence from the local culture, therefore changing the traditional game either change, addition or subtraction according to local conditions [1]. Thus, although traditional game name of the game is different between regions, but a commonality or similarity in how to play it.

One of the major influences of traditional games to players like logic intelligence Developing Child, children are required to complete the game in the correct order and determine the steps to be gone through. Some examples of his game among other Damdaman, Congklak, jumping rope or Sapintrong, and Sondah [1].

2.2 Damdaman

Damdaman is one of the traditional game of logic that is able to develop the intelligence of

children. Damdaman game originated from Java though in other areas there. The name of the game in a variety of communities in each region as Yogya familiar with macanan, then in this game Betawi people known as damdas, and is known for playing on the jawabarat Damdaman. With different designations in each region, then the rule used to be slightly different, due to the lack of clear rules written [2].

The majority of Javanese children, at least that was in the area of Yogyakarta, who lived in the era of the 1970's knew a traditional game called Macanan. the game is much-loved by the boys because bermasuk competitive game, sharpen the brain, nothing to lose and win. Although there are no restrictions for young girls to play, but mostly played by boys. Damdaman game has been known since before World War (PD) II. It's just for a while now so rarely played because displaced dolanan other modern, such as checkers and others [1].

Damdaman game played by two people, each player has 16 pieces are arranged in the main arena, while the main arena that used to be on the board or on paper cardboard that has been given the playing arena. Players must think how to develop strategies to prepare the pieces in order to move to the area to attack the opponent with the goal of spending pawn opponent with rules agreed by the end of the game. This game aims to train memory and the senses as well as to train accuracy and precision in determining the decision.

2.2.1 Implementation Of The Game

In the traditional game except players are required to be able to play the game, players were required to determine the place of creative play. The following will explain the implementation Damdaman game [1].

a. *If there are two children, suppose players A and B, or more (in the group) who want to play Damdaman, then they immediately agreed to decide where to play. Do not forget each of the players also have to prepare the puppets in the form of gravel and the like. Each person in choosing the puppets are free, as long as one player with another player should not be the same. It means that if player A has chosen a scarecrow form kecik cape, then player B must use the gravel. Distinction scarecrow is only to facilitate the game in order not to be mistaken. Each player must find the puppets as many as 16 pieces.*

b. *After that they made a playground shaped as shown in figure 1*

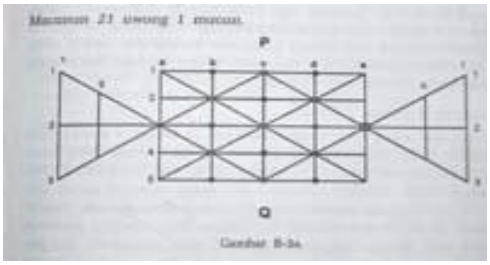


Figure 1 Board Game Damdaman [1]

c. *The first step, both players compose 16 pieces in the main arena, ranging from the local to the regional triangle box. So pawns arranged as shown in figure 2.*

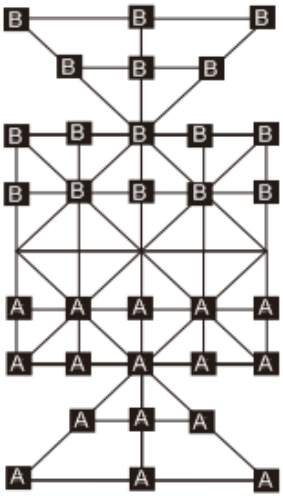


Figure 2 Structure Pawns In Game Damdaman

d. *After both players draw up a pawn, then the player makes a deal to determine the first Dalu play.*

e. *The game ends if one of the players and pawns produce one player.*

2.2.2 Step Pawns Games Damdaman

Damdaman pawn move on the game consists of two distinct steps, namely ordinary and step pawn move pawns king. in Figure 3 will be explained step ordinary pawn.

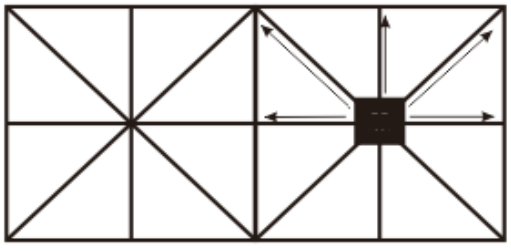


Figure 3 Step pawn Ordinary

Regular pawns move forward, left, right, tilted one step to the opponent. As for the king pawn can move more than one step, as figure 4 and figure 5.

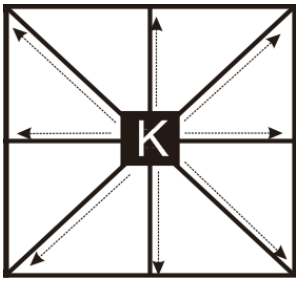


Figure 4 Step Pawns King One Step

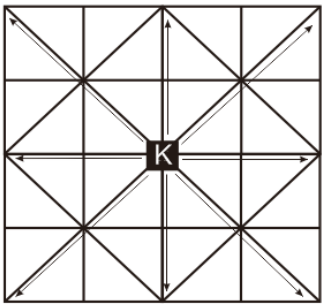


Figure 5 Step Two Step King Pawns

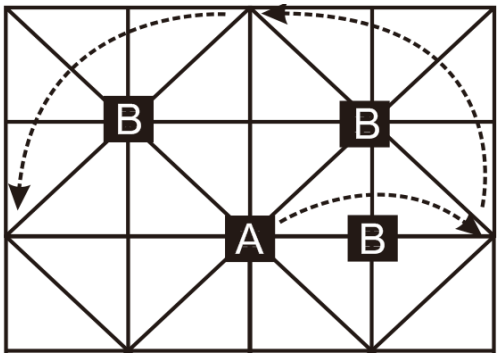


Figure 6 A pawn move pawn takes B

Opportunity opponents pawn pawns to take the board in accordance with the conditions, as illustrated in Figure 6. A pawn takes pawn B will then be passed pawns pawn A B, if there were bypassed on the track near the opponent pawn one step by step on the path A can mekan pawn pawn in the lane, and so on.

2.2.3 Game Rules Damdaman

Rules of the game are used in each region are very diverse, as will be explained the rules of the game of jawabarat area [1].

a. *Pawns were divided into 2 ordinary pawn and king pawn.*

b. *At the beginning of the game, the pawn is a pawn regular status.*

c. *Ordinary pawn can become king pawn, pawn normal if the blood had managed to enter the triangle opponent.*

d. *Ordinary pawn move one step forward, left, right, and tilting the board in accordance with the conditions.*

e. *Step king pawn move more than one step in any direction, as long as the path is no pawn comrades.*

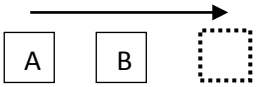


Figure 7 Steps to Eating pawn A

f. *How to take your opponent pawn is a pawn stepping past the opponent's pawns. And can take the pawn pawn pawn opponent opponent if there is a move the pieces.*

g. *The game ends when one player runs out of pawn.*

2.3 Graph

Graph is a data structure that consists of a collection of vertices (nodes) and lines (arcs) [3]. A current must begin and end with a knot. Illustration of a graph can be seen in Figure 8.

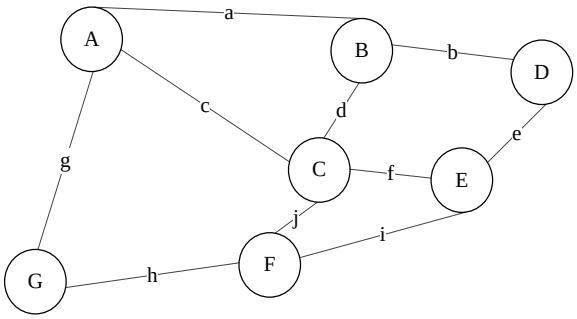


Figure 8 Example Graph

Because a line begins and ends a node then a line for example for a line given by a = [A,

B] in this case means that a line begins with node A and node B while diakhri with vertices that are connected by a line called the neighbor node A node that can be said neighboring node B.

On a graph there is a term called the path (Path). Path is a collection of lines and nodes are interconnected with each other by the end of the initial node and the specified node, for example, Z is a path from node A to node D, it can be stated that Z = (A, B, D). A path that has the initial node equal to the end node is called a closed path (Close Path) while lines formed from different vertices called jalursederhana (Simple Path) as well as the path from node A to node D.

2.4 Tree Games

Tree presented to the player game conditions - conditions that may be encountered in the game starts from the conditions now facing up to some of the conditions ahead. A game tree is a graphical representation of the example games. Tree game provides the player information, results, strategies, and action selection.

Game tree can be represented properly in the game is done in a turn (turn-based-game). Playing on the tree has a root that is a representation of the condition of the steps are not taken, the nodes on the tree presented circumstances that may be taken in the game, and the Arcs are presented step. Users on the game tree game played by two players alternately represented in a way. For the edges of the two presented the first level sweat steps - steps that can be taken by the first player, while the edges of the second level to the level of third-presenting the steps taken by both players, and so on. Leaf nodes in the tree to present the state of the game late in the game, the player Diana won, defeated or series. In the simple game, to reach the leaf node may be represented, but for a game as complicated as Damdaman, leaf nodes achieving very unlikely because branching on a very large game trees.

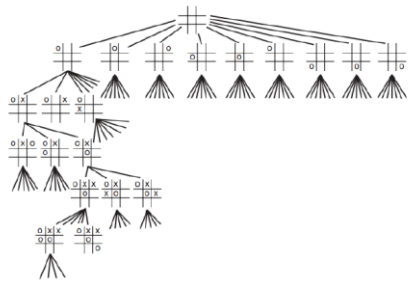


Figure 13 Examples of Tree Games Tic-Tac-Toe [4]

The following explanation TicTacToe game tree in Figure 13:

a. *There is a root which is the initial state where the player has not started playing yet and steps taken.*
b. *Edges connecting the first level (root) with the second level is the first step players and so on. So the game tree represents both players move alternately.*
c. *For nodes on the tree represent circumstances that may be taken by a player who will step up.*
d. *The first branching generated is 9, then for the next branching is 8, and so on until it reaches the final state (leaf nodes).*

2.5 Negascout

Negascout is one Minimax search method by assuming that the first step taken is the best way, while the rest is the worst step. But if it turns out there is a step better than the first step, there will be a process of Research or re-search process [5].

In narrowing the search window in order to get a search window with a width of zero. Negascout will cut almost all the branches of the tree, to make a very precise search. But unfortunately, he will cut off all the branches that are not useful along with useful. This does not apply if the algorithm starts with the correct result. A zero window can be seen as a test run. The test is done if the actual value equal to the value of the predictable [4].

Negascout algorithm is quite efficient, but the examination board position more than necessary. Cutting branches allows the algorithm to ignore part of the tree may not contain the best move. It produces two types of cuts are cutting alpha and beta cuts.

2.5.1 Cutting Alpha

Figure 19 shows the game tree before the cut is made. To more easily see how the values in the process, will be tested performed with the Minimax algorithm for this illustration.

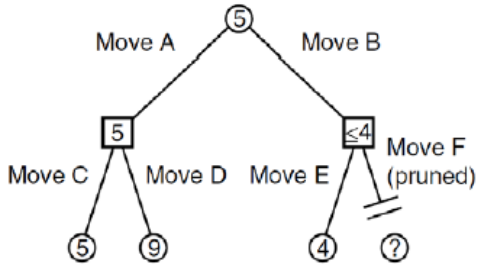


Figure 19 Tree Games with Alpha Cutting Process [4]

For the first process, as well as the Minimax algorithm. If the player chooses a move, then the opponent will membirakan response to step C, and gives the player a score of 5. Then the value rose at a rate of 5 min. If the player chooses action B then the opponent will step up to E, so that the player will get 4. After seeing the condition of such players will realize the value that is lower than the value obtained while at max level. So players will conclude this is a wrong move.

To cut this way, the search needs to be done is definitely the best value will be achieved. In fact, these values form a lower bound on the value to be achieved. So that the sequence of steps that can better be found in the search, but the lowest value will be impossible to obtain. This lower limit is called the alpha value by cutting and slaughtering called negligent.

2.5.2 Cutting Beta

Cutting beta works the same way. Beta value continues to track the value of the upper limit of the expected value. Beta value changed when it was discovered the steps imposed by the opponent.

At that position players know no greater value than the beta. If the sequence of steps is larger than the value of beta is found then this condition can be ignored, because the chance to get it smaller.

2.5.3 Cutting Beta Alpha

Same value - the value of alpha and beta provides a window of possibility measures. Ethics player ever chosen to do smaller steps than alpaha judged, and your opponent will not ever let anyone step greater than beta. Values ultimately must lie between alpha and beta. When the search began in the tree, the value - the value of alpha and beta updated. If the branches of the trees found outside value - this value, it will be cutting the branches.

2.5.4 Zero-Width Test

At no negascout algorithm called failsoft conditions, these conditions describe cutting alpha and beta are known. Basically just cutting alpha beta mengembalian both alpha and beta values tilapia as a value if it fails by failing because the value obtained is higher or lower than the maximum value while at the level of a particular search. With soft fail conditions can help to find a solution. With this condition allows to guess the initial value and megulangi search with a more reasonable window (Zero width test).

Basically Minimax search algorithm negascout combine with beta and alpha cutting dialing zero-width Test. Negascout not as wide as the Minimax search algorithm. Negascout using alpha and beta cuts for the trial.

Negascout work by performing a thorough examination at the first step in any board position. This is done on a wide search window, so that the algorithm does not fail. Successive steps were tested using a path based on the value of the first step, if successful, it will be repeated on the actual width of the window to look at the picture 20.

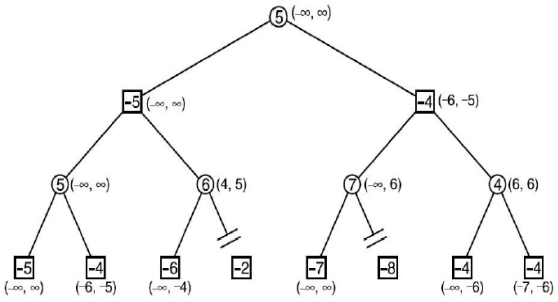


Figure 20 Tree Games with Negascout algorithm [4].

3.1 Analysis of gameplay Damdaman

Damdaman traditional game is the type of strategy games, this game is played by two players, the game is played on a board or cardboard that has been given Damdaman Games Arena, the arena while the game Damdaman can be seen in Figure 21.

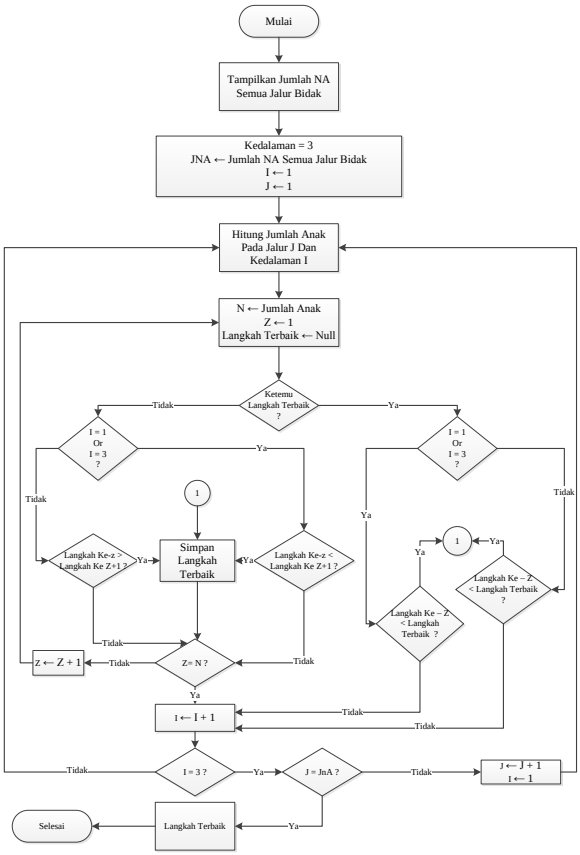


Figure 21 Arena games Damdaman

Description:

1. The Triangle area

a. Safe 1,2,3,4,5 and 6 is a triangular area of player 1.

b. Box 32,33, 34, 35, 36 and 37 is a triangular area of game 2.

2. Box area

a. Box 7-16 is a region 1 player box.

b. Box 22-31 is a region 2 player box.

As for the gameplay of the game Damdaman game can be described through the following flowchart.

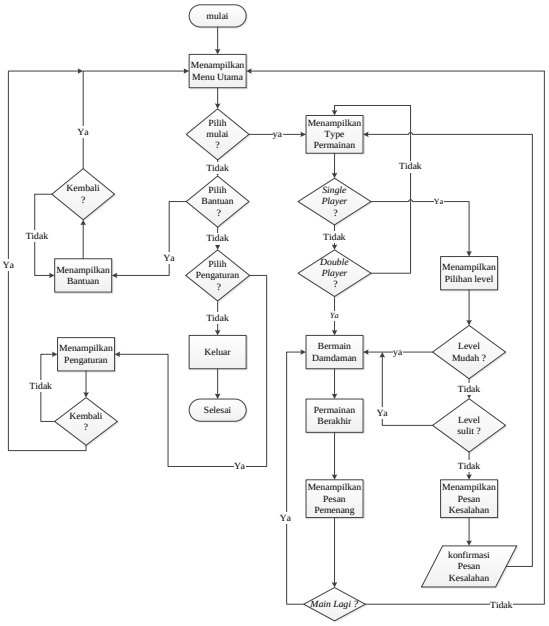


Figure 22 game play damdaman

3.2 Analysis of Games level

At Damdaman game consists of levels easy and hard levels.

Table 1 analyzes the level of play

Level	*Level Step*	*Prediction search*
Easy	*At the easy level NPC do a search with a maximum limit of 3 level search*	*any pawn move pawns produce 6 prediction steps, ranging from worst to best move step.*
difficult	*At the easy level NPC do a search with a maximum limit of 6 level search*	*any pawn move pawns produce 12 prediction steps, ranging from worst to best move step.*

Here can be seen the flow of the evaluation value calculation of every possible step is formed.

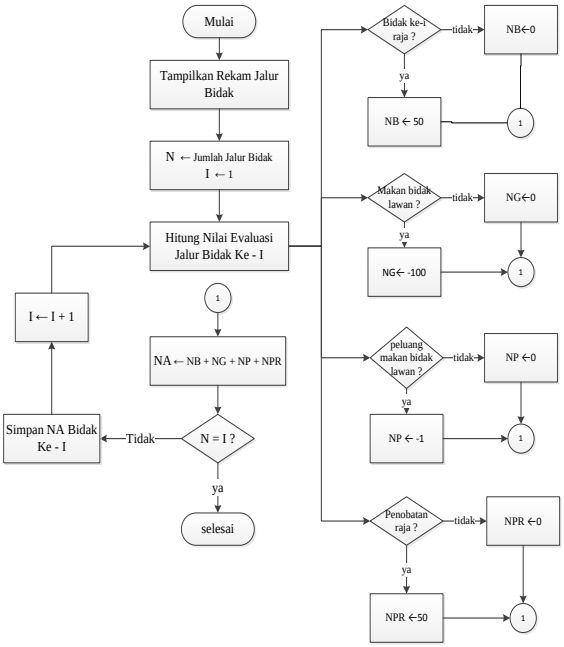


Figure 23 flow evaluation value calculation

The following steps can be seen best by Alur search algorithm negascout.

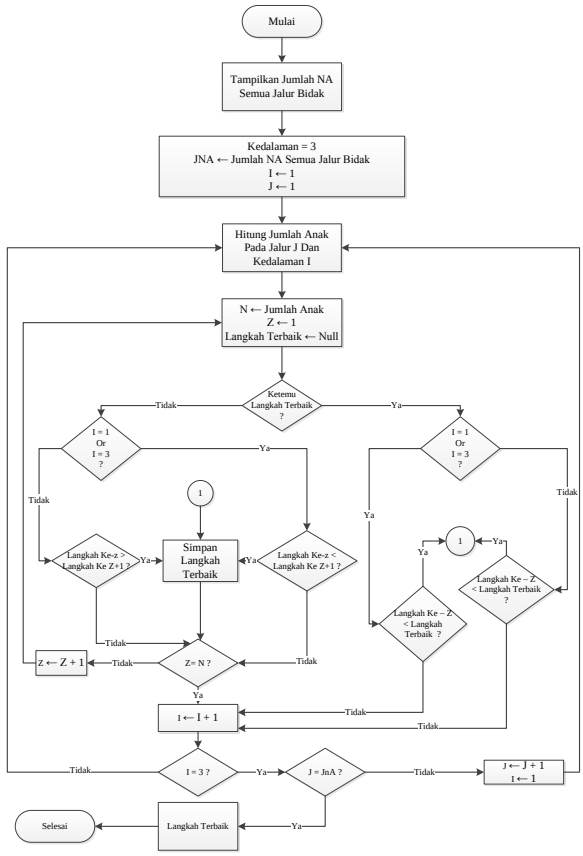


Figure 24 compares the value of evaluation negascout

3 IMPLEMENTATION

Completion of the development, Game Damdaman require some hardware specs for the game to function properly and the game runs smoothly. This game required specifications, namely:

a. 1.80 Ghz Dual Core Processor

b. 1GB of RAM

c. VGA 512 MB

d. 500 GB hard drive

e. Mouse and Keyboard

f. Minimal operating system Windows Xp

g. Intel HD graphics card

h. DirectX 11

i. Flash Player

Users can use this game has the following criteria:

a. *Minimum age 9 years and older because it does not contain elements of violence.*

b. *Users who are color blind will have no functional difficulties, but it will reduce the element of Bun*

c. *Do not require a high typing skills*

d. *Experience using similar games will allow a user.*

4 TESTING

Tests conducted on the application for ensure that the application can run correctly in accordance with the needs and goals expected .. The tests used in this game there are 2 (two), which is a technique of white box testing and black box testing.

The functions tested include menu buttons with the correct case and the case is wrong.

Tests were also performed on the search algorithm Negascout with white box techniques. Testing algorithm based on flowgraph Negascout, then calculated cyclomatic complexity, independent path, and graph matrix. From the results of testing conducted Negascout algorithm, it could be concluded that all existing nodes on each

independent path has worked, as well as the infinite repetition does not occur.

4.1 Questionnaires

Direct application testing is done on a user by using a questionnaire regarding satisfaction of the users who have built games. The assessment methods used test is a quantitative method based on the data from the user.

Questionnaires distributed using Simple Random Sampling technique in which members of the sample population was randomly without attention to the existing strata in the population.

Questionnaire was distributed to 30 people from the age of 9 years and over. The questionnaire consists of 5 statements using a scale of 1 to 3 (Likert scale).

Conclusion The questionnaire is as follows:

a. *Gameplay is easy to understand the game Damdaman respondents*
b. *Display the game is quite interesting Damdaman*
c. *Level of difficulty in the game is quite interesting Damdaman respondents to play the game Damdaman*
d. *This game can help respondents to recall Traditional Games Damdaman*
e. *Implementation of traditional games on digital gaming devices, facilitate respondents Damdaman to play the game again.*

5 CONCLUSIONS

Based on the results of the implementation Damdaman game, it can be concluded as follows:

a. *Damdaman game development can revive the traditional games Damdaman previously less known by today's children.*
b. *Damdaman facilitate game development children to play traditional games Damdaman, because it is more practical in its presentation and can be played single player.*

Suggestions for the development of this application is to make it better:

a. *The addition level of the game, so that the user is more challenging to play the game Damdaman.*
b. *Created online version of the game that could Damdaman more widely known.*

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