

Historical Game of Majapahit Kingdom based on Tactical Role-playing Game

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Keywords: Cut-out Animation, History, Majapahit, Role-playing Game, Tactical Role-playing Game, Turn based Strategy, Video Game.

Abstract: Majapahit was a kingdom centered in East Java, which once stood around year 1293 to 1500 C. Majapahit kingdom was the last Hindu-Buddhist kingdom that controlled Nusantara and is regarded as one of the greatest kingdom in Indonesia. The lack of modern entertainment content about the history of Majapahit kingdom made historical subject become less attractive. Therefore, we need a modern entertainment as one option to learn about the fascinating history of the kingdom of Majapahit. In this study the authors designed a video game about history of Majapahit kingdom with the genre of tactical role-playing game. Tactical role-playing game is a sub genre of role playing game by using system of turn-based strategy in every battle. In tactical role-playing game, players will take turns with the opponent and can only take action in their turn and each character will have an attribute and level as in role-playing game video game. This study used the A* algorithm to determine the movement direction of the unit and cut-out techniques in the making of animation. This study demonstrated that video games can be used as a media to learn about history.

1 INTRODUCTION

Majapahit was a kingdom centered in East Java, which once stood around year 1293 to 1500 C. Majapahit kingdom was the last Hindu-Buddhist kingdom that controlled Nusantara and is regarded as one of the greatest kingdom in Indonesia. According to the Negarakertagama book Majapahit powers lied in Java, Sumatra, Malay Peninsula, Kalimantan, and east Indonesia, though the territory is still debated by historians. The history of Majapahit has been learned in school and can be easily found in the elementary and junior high textbook.

These days, teens and youth are more familiar with foreign legends and histories. Film such as Disney's Hercules, Samurai Jack, Clash of the Titans, and video games such as God of War and Age of Mythology introduce legends, history and foreign content into a global content that attract teenagers to play. This could be happened because the content packaging is considered as modern, attractive and appropriate for the target age (Sukarno and Setiawan, 2014).

Game is one of the many ways for someone to look for entertainment, because it has a high attraction, fun and almost everyone likes game. Game is not

only used as an entertainment, but also can be used as a story telling, and sometimes game also can be mixed with educational elements to train someone.

Along with the development of technology, game also change. The traditional games that once played directly now has been turned into modern games. These modern games are generally in digital form, or known as Video Game.

Video game has a lot of genres, one of the genre is tactical role-playing game. Tactical role-playing game is a sub genre of role-playing game by using system of turn-based strategy in every battle. In this study the authors designed a video game about history of Majapahit kingdom with the genre of tactical role-playing game. Section II will describe the problem identification in this study. Section III will describe some previous studies that have been done to make a video game. Section IV will describe the proposed method. The results of the study are discussed in Section V. Section VI contains summary of the research, and also the suggestions for any future research.

2 PROBLEM IDENTIFICATION

Majapahit is one of the largest kingdoms in Indonesia. History of Majapahit has been studied since elementary and junior high school, but the lack of modern entertainment based from Majapahit kingdom made it become less attractive. Therefore, we need a modern entertainment such as video games as one of the options for learning about the history of Majapahit Kingdom.

3 PREVIOUS RESEARCH

Several studies have been done to make a tactical role-playing video game. One of them is *The Making of Video Game Tactical RPG Legend of Fantasia*. In this study, tactical role-playing game is made for PC platform with some features such as choosing a profession and attributes to each character, strengthening the weapon to improve the weapon's status, and weapons making (Christanto, 2014).

The Second study is *The Making of Turn Based Strategy Role-Playing Game Using Unity Game Engine*. In this study the author made a turn based strategy game using the Unity game engine (Sanjaya et al., 2015).

The third study is *Designing Illustrative Motion Graphic About Majapahit for Teenagers*. In this study the author made a motion graphics to tell the history of Majapahit kingdom (Sukarno and Setiawan, 2014).

4 METHODOLOGY

This study consists of several steps that begins with collecting data about Majapahit kingdom, which will be used as the text of the story. Next is collecting assets that will be used in video games, the collection of assets is divided into three steps, first search for assets in the Unity Asset Store, then the character design, and make the animation of the characters using the cut-out technique. Next is the programming of video games in the Game Engine, the game engine used is Unity 3D.

4.1 Story

In Majapahit video game, the story will be made based on the book of *Kitab Sejarah Terlengkap Majapahit* by Teguh Panji in 2015 (Muljana, 2005) and *Menuju Puncak Kemegahan; Sejarah Kerajaan Majapahit* by Slamet Muljana in 2011 (Panji, 2015). The

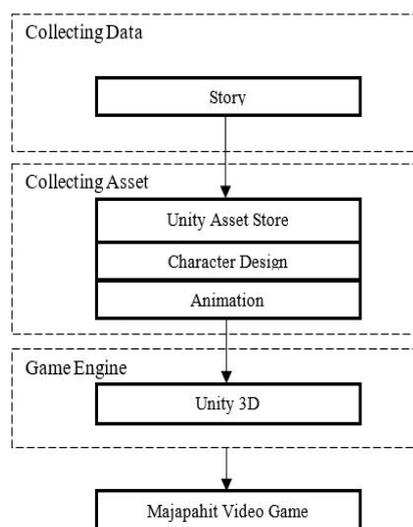


Figure 1: General Architecture.

story begins on the rebellion of Jayakatwang to Kertanegara the king of Singasari kingdom, and the fight of Raden Wijaya in defeating Jayakatwang and form a new empire called Majapahit.

4.2 Collecting Asset

Asset is a file that will be used in creating video game. At this stage there is three steps which is character design, character animation, and search on the unity asset store. Unity asset store is an existing feature in Unity 3D that contains a lot of assets both free and paid.

4.2.1 Character Design

Here are the design of the main characters in Majapahit video game.

1. Raden Wijaya
Raden Wijaya was the first king of the Majapahit kingdom and a nobleman from Singasari kingdom. He has a clever brain.



Figure 2: Raden Wijaya Illustration.

2. Jayakatwang
Jayakatwang was a descendant of Kertajaya, who was the last king of Kediri kingdom, and was a re-

gent of Gelang Gelang. He is evil and has a clever brain.



Figure 3: Jayakatwang Illustration.

3. Lembu Sora

Lembu Sora was the commander of Singasari kingdom, and a loyal follower of Raden Wijaya. He has a big body and an expert in sword play.



Figure 4: Lembu Sora Illustration.

4. Ranggalawe

Ranggalawe was the son of Arya Wiraraja and a loyal follower of Raden Wijaya. He is brave and dare to take a risk.



Figure 5: Ranggalawe Illustration.



(a) Background 1



(b) Background 2



(c) Picture when Background 2 and 1 is combined

Figure 6: Background Animation.

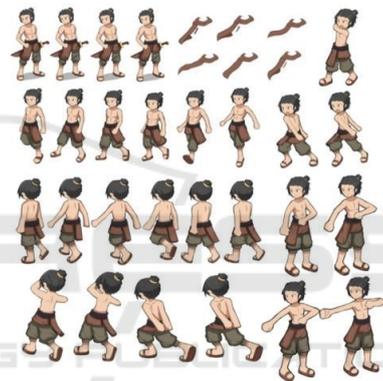


Figure 7: Character Animation.

4.2.2 Animation

The next step is making the character animation with cut-out animation technique, which is cut the picture into several pieces. All animations created by drawing one by one using PaintTool SAI application and then the images are driven by using Adobe After Effect application. For more details it can be seen in Figure 6 and Figure 7.

4.3 Game Engine

This stage will be doing a programming system with Unity 3D using C# language, to create the game system. The game will be divided into several parts, such as cut scene, battle, save and level up. The battle part will be performed on tile, which is like the chess

board, where the player's movement is not free and limited and the player will be play alternately with the opponent, until the battle is over. Each characters have an action that can be performed in each turns, the action include:

- Move, for moving the unit to the selected tile which is still inside the movement range.
- Attack, for attacking the enemy unit which is still inside the attack range.
- Power Attack, for attacking the enemy with double damage unit by sacrifice 10% of health point.
- Defend, for defending and restore some health point.

For each movement will use the A* algorithm to determine the movement directions of the character in order to get directions with the least movement cost. Pseudocode for A* algorithm can be seen in Algorithm 1.

```

initialize the open list;
initialize the closed list;
put the starting node on the open list (you can leave
its f at zero);
while the open list is not empty do
    find the node with the least f on the open list, call
    it "q";
    pop q off the open list;
    generate q's 8 successors and set their parents
    to q;
    for each successor do
        if successor is the goal, stop the search
        successor.g = q.g + distance between
        successor and q;
        successor.h = distance from goal to
        successor;
        successor.f = successor.g + successor.h;

        if a node with the same position as
        successor is in the OPEN list
            which has a lower f than successor,
            skip this successor;
        if a node with the same position as
        successor is in the CLOSED list
            which has a lower f than successor,
            skip this successor;
        otherwise, add the node to the open list
    end
    push q on the closed list
end
end

```

Algorithm 1: A* Algorithm Pseudocode (Eranki, 2002).

5 RESULTS

5.1 Main Menu Scene

Main menu scene is the first scene appeared when the application is run. In the main menu, there will be 4 buttons such as New Game for start a new game, Load Game for load saved game, Credits to show the credits name and Exit to close the application. The main menu scene can be seen in Figure 8.



Figure 8: Main Menu Scene.

5.2 Dialogue Scene

Dialogue scene is used for story telling and to show the story dialogues. The dialogue scene can be seen in Figure 9.



Figure 9: Dialog Scene.

5.3 How to Play Scene

How to play scene interface is used to show the rules and how to play the game. The how to play scene can be seen in Figure 10.



Figure 10: How to Play Scene.

5.4 Battle Scene

Battle scene is used for the video game battle and there will be an interface to show the attribute and action for each units. The battle scene can be seen in Figure 11.



Figure 11: Battle Scene.

5.5 Save Menu

Save menu will be used for saving the video game data and can be loaded from load game in the main menu and battle scene. The save menu can be seen in Figure 12.



Figure 12: Save Menu.

5.6 Level Up Scene

Level up scene is used to show and increase the character's attribute. The level up scene can be seen in Figure 13.



Figure 13: Level Up Scene.

5.7 System Testing

System testing is done to test the components that have been designed and implemented into the system. This test aims to measure and determine whether any of the components of the system are functioning properly in accordance to the design stage. The method used to test the system is a black box method, testing is done to test whether an interface display users can run the game properly without seeing any coding. The tests will be carried out in accordance with the testing design shown in Table 1 below.

Table 1: System Testing Design.

No	System Component	Test Item
1	Main Menu	Button function test
2	Battle Menu	Button function test
3	Level Up Menu	Button function test
4	Save Menu	Button function test
5	Battle Integration	Battle system test

Table 2: Main Menu Test Result.

No	Test Target	Expected Result	Test Result	Status
1	Main Menu Test	Show menu buttons	Show menu buttons	Success
2	Difficulty Test	Show difficulty buttons	Show difficulty buttons	Success
3	Load Game Test	Show and load game from save slot	Show and load game from save slot	Success
4	Test Result	Show credits scene	Show credits scene	Success
5	Status	Exit from application	Exit from application	Success

Table 3: Battle Menu Test Result.

No	Test Target	Expected Result	Test Result	Status
1	Battle Menu Test	Show menu buttons	Show menu buttons	Success
2	Move Button Test	Show moveable tile and move unit to selected the tile	Show moveable tile and move unit to selected the tile	Success
3	Attack Button Test	Show attack range and attack selected enemy unit	Show attack range and attack selected enemy unit	Success
4	Defend Button Test	End unit turn and recover 10% unit Health Point	End unit turn and recover 10% unit Health Point	Success
5	End Button Test	End unit turn	End unit turn	Success

Table 4: Level Up Menu Test Result.

No	Test Target	Expected Result	Test Result	Status
1	Level Up Menu Interface Test	Show menu buttons	Show menu buttons	Success
2	"+" Button Test	Increase the selected attribute	Increase the selected attribute	Success
3	"-" Button Test	Decrease the selected attribute	Decrease the selected attribute	Success
4	">" Button Test	Change to the next character	Change to the next character	Success
5	"<" Button Test	Change to the previous character	Change to the previous character	Success
6	Start Button Test	Show next Scene	Show next Scene	Success

6 CONCLUSION

The conclusion obtained from study of video game history of Majapahit kingdom based on tactical role-

Table 5: Save Menu Test Result.

No	Test Target	Expected Result	Test Result	Status
1	Save Menu Interface Test	Show menu buttons	Show menu buttons	Success
2	Data Storage Test	Save data according the selected save slot	Save data according the selected save slot	Success

Table 6: Battle Integration Test Result.

No	Test Target	Expected Result	Test Result	Status
1	Game Over Test	Show Game Over Scene when all player units is defeated	Show Game Over Scene when all player units is defeated	Success
2	Change Turn Test	Change player turn with enemy turn	Change player turn with enemy turn	Success
3	Destroy Unit Test	Destroy unit when it has 0 Health Point	Destroy unit when it has 0 Health Point	Success
4	Enemy Unit Test	Enemy unit will search any nearby player units	Enemy unit will search any nearby player units	Success
5	Damage Test	Health point will decrease according the attacker damage	Health point will decrease according the attacker damage	Success
6	Next Scene Test	Change into Next Scene when all enemy unit defeated	Change into Next Scene when all enemy unit defeated	Success

playing game is that this video game can be used as an alternative to teach history. Majapahit kingdom information resources are limited and have many versions, which make the characters and the story in video game become less optimal. Making video game

requires a long process, so it should be done in a team to reduce the necessary time and to get an optimal result.

The further research can be developed with the increased variety and skill on a character attribute and an addition of the story so the story can be ended at the time of the fall of the Majapahit kingdom.

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