

IMPLEMENTATION OF FINITE STATE MACHINE (FSM) IN ARABIC LANGUAGE EDUCATION 3D GAME

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Abstract: Arabic is the language used in the Koran, Hadith, and various sources of Islamic Knowledge. Therefore, mastering Arabic is very important in studying Islam. However, there are many obstacles to learning Arabic due to the complexity of its structure and limited media to facilitate learning. Therefore, media is needed to facilitate learning Arabic by taking advantage of current technological advances, including the Artificial Intelligence (AI) game. This study is based on the fundamental question that how to use computer game technology for learning Arabic, as well as how the effectiveness of the Finite State Machine (FSM) method to improve the quality of the learning games. The results of the implementation and testing show that the FSM method runs according to the plan and make the game more natural and attractive. This can be observed when playing the game. The player character animation can change based on the if-then variable met. If benar ≥ 3 & uang = 1000, the game character changes to a Muslim shirt player animation. Thus, according to the conditions met, it can be said that the FSM method is suitable to be applied to the player character animation controller in this game.

Keywords: *Arabic; Game; Education; Artificial Intelligence; Finite State Machine.*

A. INTRODUCTION

Arabic is a unique language, which rich in rules, structures, and vocabulary. Additionally, Arabic is the oldest language in the world and has several virtues, namely the language of the Qur'an, the language of the inhabitants of heaven, the language of the prophets, and others (Yusuf, 2007). Arabic is a challenge for people to master it since it is known for its complex grammar and rich vocabulary. Let alone ordinary people, students in Islamic boarding schools also experience difficulties in learning Arabic (Machmudah & Abdul Wahab Rosyidi, 2008).

There are many obstacles and difficulties in learning Arabic for the complexity of Arabic quite complicated and the limited media to make it easier to learn. Therefore, media is needed to facilitate learning Arabic by taking advantage of current technological advances. One of the technologies currently developing is the game. There are many benefits of games as an educational learning media, including learning Arabic in innovative and interactive manners since it combines text, images, audio, and animation in one unit (Arif, 2010).

In learning Arabic, students often take advantage of the Arabic language proficiency test or the Test of Arabic as a Foreign Language (TOAFL) to determine their ability to master Arabic. TOAFL is a test to test Arabic language skill from various aspects such as reading, listening, grammatical analysis of Arabic, and its structure. Naturally, it requires adequate Arabic language skills. If one does not have adequate skills, the ability to analyze and to do the test might not be optimal. Therefore, it is highly recommended to understand Arabic grammar and diligently practice thinking skills by reading Arabic texts before working on the TOAFL (Muhammad Barnawi, 2011).

The researcher expects this study to be used by players as an Arabic leaning medium with learning content referring to TOAFL questions. Thus, it might be easier to understand Arabic well which is the main objective of this study. At last, this study is an effort to get grace from Allah SWT by utilizing technology to make learning is more easily conveyed and enjoyable.

B. SYSTEM PLANNING

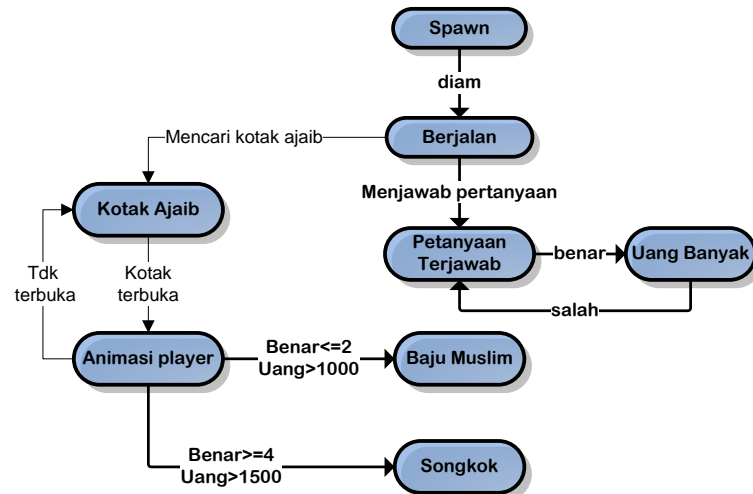


Figure B.1. (FSM game character flowchart)

Figure B.1. visualizes the flowchart of FSM game character from the Arabic Educational 3D game along with its rules. For example, if the player wants to get the player animation, the player is required to answer the question to collect true answers as many as possible to collect a lot of game money. After that, the player can look for a magic box that contains the player animation. After the player approaches the box, the system will calculate the condition that the player has met, if benar <=2 & uang > 1000 = Muslim clothes animation, and if benar >=4 & uang > 1500 = songkok player animation.

C. METHOD APPLICATION

The FSM method is a control system design methodology that describes the behavior or working principles of the system using the following three, State, Event, and Action. At one point in a significant period, the system might be in one of the active states. The system can switch or transition to other states if it gets certain input or events, either from external devices or components in the system itself. This transition states generally also accompanied by actions taken by the system when responding to the input that occurs. The actions taken can be in the form of simple actions or involve a series of relatively complex processes (Setiawan, 2006).

In this study, game development was developed using a 3D game studio. The following is the source code of the finite state machine (FSM) method if entered into the lite-c script:

```

if ((level_kelas==1) && (jumlahbenar<=2)
    && (jumlahbenar>0)) {
    uang=uang-500;
    reset(level1, SHOW);
    level_load("level1_baju_b1.wmb");
}
else if ((level_kelas==1)
    && (jumlahbenar>=4)) {
    uang=uang-1000;
    reset(level1, SHOW);
    level_load("level1_songkok_a1.wmb");
}

```

```

return;
}

```

D. GENERAL GAME APPEARANCE



Figure D.1. (Game menu interface)



Figure D.2. (Early game scene)



Figure D.3. (First stage game scene)



Figure D.4. (Second stage game scene)



Figure D.5. (Third stage game scene)

Figure D.1. is a game menu interface image that contains slide game instructions from the Al Fatih game. Figure D.2. is the interface when players enter the early part of the game. Figure D.3. is when the player enters the first stage; Figure D.4. is when the player enters the second stage, while Figure D.5. is when the player is in the third stage. At each stage, the questions displayed are different, both in number and level of difficulty. There are 12 questions in the first stage and 8 questions in the second stage. Meanwhile, the player meets his best friend in the third stage.

E. HYPOTHESIS

1. Testing Methods

Testing in this study was conducted by playing the game as much as 10 times for each level. The results obtained that each level had a different level of game difficulty and questions, as well as variations of the player animation. The following is the scene for questioning variations of the game character on the first and second stages:

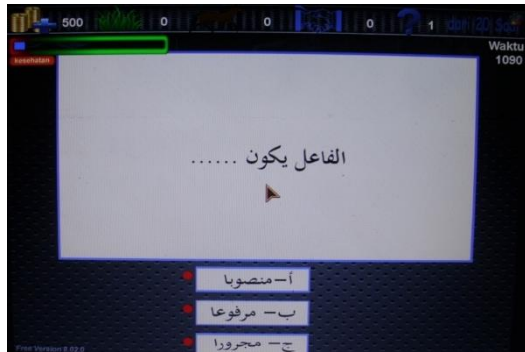


Figure E.1. (Scene of the question in the first stage)

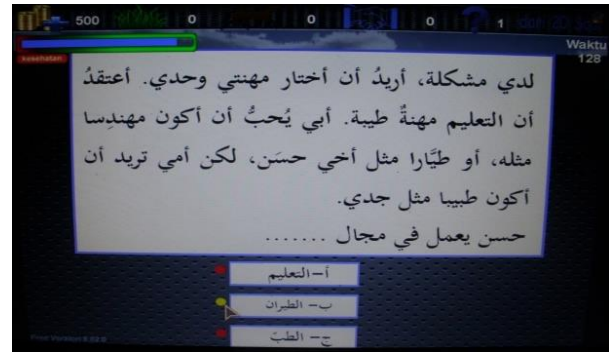


Figure E.2. (Scene of the question in the second stage)



Figure E.3. (Scene of the game character wearing Muslim clothes)



Figure E.4. (Scene of the game character in songkok)

Figures E.1. and E.2. present the difference in the difficulty level of the questions in the first and second stages. Meanwhile, Figure E.3. and E.4. show different variations of the game character at each level.

2. Method Application Try Out

In another tryout, the researcher tested the game on the use of the method at each level. The following table describes the test results for this game:

Table E.1. Game character Try Out

GAME CHARACTER	CONDITION	DESCRIPTION	
		CORRESPOND	NOT CORRESPOND
Average Player	-	✓	-
Songkok Player	Correct Answer <=2 && Money = 500	✓	-
Muslim Clothes Player	Correct Answer >=3 && Money = 1000	✓	-
Muslim Clothes and Songkok Player	Correct Answer >=4 && Money = 1500	✓	-

The table above describes that the player can get the game character if the player has met the required conditions. Thus, the system might automatically run the command that the player has met. In contrast, if the player has not met the conditions, the system might not execute the command.

F. CONCLUSION

This Al-Fatih Game runs with the addition of the finite state machine (FSM) method as a controller for the player character animation at each stage. However, there are still many shortcomings in this game. For example, this game is not supported by other platforms yet. It only

runs on the 3D game studio platform. In its development, it might be able to penetrate mobile devices with the latest operating systems such as Android, iOS, Windows Phone, Blackberry, or others.

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REFERENCES

- Arif, R. (2010). *Game Petualangan Berbasis Game Artificial Intelligence Untuk Pembelajaran Bahasa Arab*. Universitas Islam Negeri Maulana Malik Ibrahim Malang.
- Machmudah, U., & Abdul Wahab Rosyidi. (2008). *Active Learning dalam Pembelajaran Bahasa Arab*. Malang: UIN-Malang Press.
- Muhammad Barnawi. (2011). *Lulus TOAFL dengan Mudah dan Memuaskan*. Yogyakarta: DIVA Press.
- Setiawan, I. (2006). Perancangan Software Embedded System Berbasis FSM. *Jurnal Teknik Elektro*.
- Yusuf, A. H. (2007). *Pengantar Mudah Belajar Bahasa Arab*. Bandung: Pustaka Adhwa.