

## Research Article

# An Animation System on the Basis of the Multiplicity of a Kabuki Work and its Background Story: Kyōganoko Musume Dōjōji and the Legend of Dōjōji

Jumpei Ono<sup>1</sup>, Shunta Kudo<sup>2</sup>, Takashi Ogata<sup>3</sup><sup>1</sup>Faculty of Software and Information Technology, Aomori University, 2-3-1 Kohbata, Aomori, Aomori, 030-0943, Japan<sup>2</sup>Faculty of Software and Information Science, Iwate Prefectural University, 152-52 Sugo, Takizawa, Iwate, 020-0693, Japan<sup>3</sup>Faculty of informatics, Yamato University, 2-5-1, Katayama-cho, Suita, Osaka, 564-0082, Japan

## ARTICLE INFO

## Article History

Received 02 December 2021

Accepted 22 July 2024

## Keywords

2D animation

3D animation

Kabuki

Kyōganoko Musume Dōjōji

The legend of Dōjōji

## ABSTRACT

We have continued a series of study on Kyōganoko Musume Dōjōji. The study has various topics, including the development of an animation mechanism according to the stage performance structure of Kyōganoko Musume Dōjōji. Kyōganoko Musume Dōjōji as a kabuki dance partially uses the story of the legend of Dōjōji. Kyōganoko Musume Dōjōji partially uses the story of the legend of Dōjōji. We have also investigated the mutual relationships between these narrative works and attempted the design and development of a system reflecting the above relationships. This paper presents an animation mechanism using these previous researches. In particular, this system flexibly relates the structural flow of the stage performance of Kyōganoko Musume Dōjōji to scenes in the legend of Dōjōji.

© 2022 The Author. Published by Sugisaka Masanori at ALife Robotics Corporation Ltd.

This is an open access article distributed under the CC BY-NC 4.0 license

[\(http://creativecommons.org/licenses/by-nc/4.0/\)](http://creativecommons.org/licenses/by-nc/4.0/).

## 1. Introduction

We deal with “京鹿子娘道成寺[Kyōganoko Musume Dōjōji,(The Maiden at Dojoji Temple)\*]” (we use the word of “Musume Dōjōji” in the following part in this paper) and the legend of Dōjōji (we use “the Legend” in the following part). The former, *Musume Dōjōji*, is a kabuki dance work using the latter, the Legend, which is a classic Japanese story. Although the Legend is a relatively long story, *Musume Dōjōji* is constructed based on the partial use of the Legend.

Based on Watanabe’s analysis of dance, song, and stage in *Musume Dōjōji* [1], we showed the generative process of *Musume Dōjōji* and analyzed the stage

performance structure of the work [2]. We also developed a two-dimensional (2D) animation mechanism using a table through analyzing the *Musume Dōjōji*’s stage performance structure [3], [4]. Simultaneously, we surveyed scenes from *Konjaku Monogatari* for a presentation focusing on the Legend [5]. We defined each scene of *Musume Dōjōji* and the Legend as positive or negative. Moreover, according to the above results, we developed a three-dimensional (3D) animation and related it with the 2D animation mechanism [6], [7].

The objective of this study is to present an animation system linking the two animation mechanisms based on the above studies [3], [4], [5], [6], [7], and to create 3D animation(s) to represent the Legend.†

\* Kabuuki Play Guide by Shochiku Co., Ltd:  
[https://enmokudb.kabuki.ne.jp/repertoire\\_en/the-maiden-at-dojoji-temple%EF%BC%88kyoganoko-musume-dojoji%EF%BC%89/](https://enmokudb.kabuki.ne.jp/repertoire_en/the-maiden-at-dojoji-temple%EF%BC%88kyoganoko-musume-dojoji%EF%BC%89/)

An instance of a performance by Nishikawa Kan:  
<https://www.youtube.com/watch?v=4tX28alybrQ>

Corresponding author’s E-mail: [j.ono@aomori-u.ac.jp](mailto:j.ono@aomori-u.ac.jp), [g031q055@s.iwate-pu.ac.jp](mailto:g031q055@s.iwate-pu.ac.jp), [ogata.takashi@yamato-u.ac.jp](mailto:ogata.takashi@yamato-u.ac.jp)

† In addition, this paper is included in a project of narrative generation study of kabuki. In the project, we intend to investigate the original narratological technologies, i.e. theories, techniques, and methodologies for narrative generation through the stage performance, scenarios, historical documents, and essays [22], [23]. [We have

## 2. Background: Musume Dōjōji and the Legend

This study’s background is a group of works based on a tradition known as the Legend. This section describes the Legend and *Musume Dōjōji*.

### 2.1. History

The Legend of has been passed down in a variety of forms, such as scrolls and dramas, for over 1,000 years. We have called this legend the story of “Anchin and Kiyohime” based on the names of a hero and heroine. Kiyohime is a girl who lives in the Kumano region in Japan and she loves Anchin who is a young monk. However, Anchin betrays Kiyohime and is killed by Kiyohime inside a big bell of Dōjōji at Kumano. Although the Legend describes this story in detail, *Musume Dōjōji* symbolically represents the above story using only a few scenes of the Legend.

The scrolls of the Legend includes the following examples: “紀伊國牟婁郡の悪女[Kii no Kuni Murogouri no Akujo (*An Evil Woman in Muro, Kii Province*)]” in “本朝法華驗記[Honchō Hokke Genki (*Miraculous Tales of the Lotus Sutra from Japan*)]” [8], “紀伊国道成寺僧写法花救蛇語 [Kii no Kuni Dōjōji no Sō Hōge wo Utsushi te Hebi wo Sukuu Hanashi (*A Monk of Dōjōji Temple in Kii Province Brings Salvation to Two Snakes by Copying the Lotus Sutra*)]” in “今昔物語集 [Konjaku Monogatari-shū (*Japanese Tales from Times Past*)]” [9].

We find various different developments in scenes in the variations. For instance, there are variations when the heroine turns into a snake and when she cries sadness. “道成寺縁起[Dōjōji Engi (*Illustrated Legend of Dōjōji*)]” [10], a picture scroll from the Muromachi period, also includes the Legend. *Dōjōji Engi* is different from the above works. In addition, in this narrative, woman’s perspective is adopted ([11] for more details).

### 2.2. Correspondence Relationship between Musume Dōjōji and the Legend

Fig.1 illustrates the correspondence of the Legend with *Musume Dōjōji*. For instance, in the final part of *Musume*

*Dōjōji*, Hanako moves up a bell and transforms into a snake. This scene corresponds to a scene in the Legend. In the scene, Kiyohime killed by burning Anchin to death [5]. Although *Musume Dōjōji* is a type of adaption of a simplified narrative structure in *Nō Dōjōji*, it basically adopts only the scene of “鐘入り [Kaneiri]” and other small fragmental parts. In particular, the background information of the Legend is fragmentally retained in *Musume Dōjōji*.

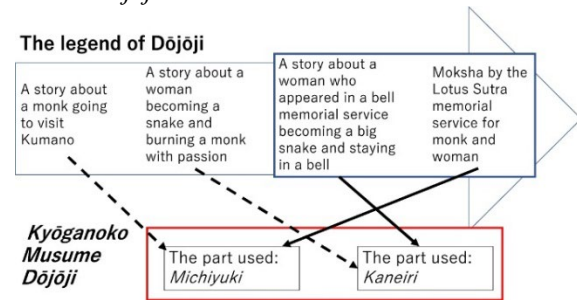


Fig. 1 Parts of the Legend used in *Musume Dōjōji* (Fig. 1 in [7])

## 3. Two Animation Systems

We have developed an animation mechanism based on the Legend and an animation mechanism based on *Musume Dōjōji*. This section describes both these systems. In each animation system, each scene is evaluated on negative or positive. This evaluation is related to the combined system described in Section 4.

### 3.1. 2D Animation Based on Musume Dōjōji

We developed 2D animations for 11 scenes in *Musume Dōjōji* [4]. The sequence of the 11 scenes is as follows (“手踊り [Teodori]” is performed twice). Each scene’s name shows a dance or a song, which is performed in each scene: “道行 [Michiyuki],” “乱拍子 [Ranbyōshi],” “中啓の舞 [Chūkei no Mai],” “手踊り [Teodori],” “鞠唄 [Mariuta],” “花傘踊り [Hanagasa-odori],” “くどき [Kudoki],” “山づくし [Yama-zukushi],” “手踊り [Teodori],” “鈴太鼓 [Suzu-daiko],” and “鐘入り [Kaneiri].”<sup>‡</sup>

showed that kabuki has diverse and interesting characteristics beyond Western narrative methodologies [24], [14]. For example, in kabuki, actors on the stage are dramatic characters of a kabuki work. At the same time, they are required to be respective existences as actors. In such case, audiences enjoy the multiplicity of actors and dramatic characters on the stage. This is a different tradition from the norm of Western dramatic narratives. We comprehensively seized the characteristics of kabuki as multiple narrative structures including the above example. Moreover, this project aims to reflect the results in system modeling and application system development. The study proposed in this paper is also located in a part of the above research project.

<sup>‡</sup> We simply show the construction of *Musume Dōjōji* according to ref. 12. In the scene of “Michiyuki,” Shirabyōshi Hanako, who is a heroine of this stage, arrives at the Dōjōji temple and asks trainee monks to

worship the temple bell. In addition, Dōjōji is a temple that really exists at Kishuu (current Wakayama prefecture) and a famous legend, “the legend of Dōjōji,” about the bell is inherited. Continuously, in the scene of “Ranbyōshi,” Hanako intensely dances with the costume of No. But, after the scene changes to solemn “Chūkei no Mai,” Hanako returns to her ordinary figure to show her pretty dance (scenes of “Teodori” and “Mariuta”). After a short scene of “Hanagasa-odori” where Hanako dances with big Hanagasas (red hats), the scene of “Kudoki” begins. She handles her towels with skill and attractively dances with mature figure. In the next “Yama-zukushi,” the atmosphere changes and Hanako shows a light dance with a kakko (drum sheath). Although, in the continuous “Teodori,” Hanako again returns to a slow dance, in the following scene of “Suzu-daiko,” she quickly acts on the stage playing suzus (small bells) and a taiko (drum). In these scenes of the last half, the timing that Hanako reveals her true figure of a ghost gradually

A scene is divided into several events based on a part of the lyrics in *Musume Dōjōji*. Each event has twenty types of stage components. Table 1, which deals with the above *Chūkei no Mai*, shows only five types of stage component that strongly relate with the study in this paper. Although this scene has 10 events, this table shows only three events as an example.

- “Time” indicates the elapsed time in the video [12].
- “Characters” are a character that dance in the stage.
- “Mind” shows representing character’s nature.
- “Performance” means the genres of dances.
- “Lyrics” shows phrases that the character sing.
- “Music genre and characteristics” means various features of the lyrics sung by Shirabyōshi Hanako.
- “Narrators/Singers” describe the number of narrators and singers.
- “Musicians” show the number of musical performers on the stage by the types of musical instruments.
- “Musical instrument” shows the types of instruments that musicians play.
- “Geza/Hyōshi-ita” indicates whether geza or hyōshi-ita are used in the scene. Geza means a room hidden from the audiences on the left side of the stage. Hyōshi-ita shows instruction for a player on the right side, accompanied by dramatic development.
- “Scene” means visual backgrounds on the stage.
- “Places on the stage” mean the spatial location where one or more dramatic characters are.
- “Costumes” show the colors of each costume of Hanako. By Watanabe [1], the basic atmosphere in each scene is decided through these colors.
- “Props” mean various objects that *Hanako* has in the dance.
- “Stage equipment” shows the stage sets for representing a location and objects.
- “The point in a dancer’s body” shows a part of Shirabyōshi Hanako’s body to be emphasized in each scene.

The 2D animations were developed based on “Lyrics” in Table 1. Fig. 2 shows all 2D animations in *Chūkei no Mai*. Fig. 3 shows a 2D animation of 6th event in *Chūkei no Mai*. The character at the center of the screen is Shirabyōshi Hanako. “Lyrics” is shown at right side of the screen.

Fig. 4 shows the architecture of the 2D animation mechanism. The user inputs the stage component(s) of *Musume Dōjōji*. The mechanism selects the 2D animation(s) corresponding to the user’s input from a 2D animation database. Selected 2D animation(s) represent on a screen by the 2D animation mechanism. The 2D animation database contains 2D animations correspond to the stage components of *Musume Dōjōji*. In the 2D animation database, a format of each animation is a text that order the illustration to be displayed on a screen and their placement. 2D animations are displayed on a screen based on the text data.

Table 1 Parts of the stage components and events of *Musume Dōjōji*

Component s	1	2	3
Time	23:03 ~ 23:16	23:18 ~ 23:44	23:45 ~ 24:13
Characters	白拍子花子 [Shirabyōshi Hanako (Shirabyōshi Hanako)]	白拍子花子 [Shirabyōshi Hanako (Shirabyōshi Hanako)]	白拍子花子 [Shirabyōshi Hanako (Shirabyōshi Hanako)]
心 [Kokoro (Mind)]	娘 [Musume (Girl)] (P)	娘 [Musume (Girl)] (P)	娘 [Musume (Girl)] (P)
振り [Furi (Performance)]	白拍子 [Shirabyōshi (Shirabyōshi )] (P)	白拍子 [Shirabyōshi (Shirabyōshi )] (P)	白拍子 [Shirabyōshi (Shirabyōshi )] (P)
歌詞 [Kashi (Lyrics)]	鐘に恨みは 数々ござる [Kane ni urami ha kazukazu gozaru] (N)	初夜の鐘を 撞く時は [Shoya no kane wo tsuku toki ha] (N)	諸行無常と 響くなり [Shogyō- mujō to hibiku nari] (N)
Music genres and characteristics	能[Nō (Nō)] ( 鐘づくし [Kane-zukushi (Kane-zukushi)])	能[Nō (Nō)] ( 鐘づくし [Kane-zukushi (Kane-zukushi)])	能[Nō (Nō)] ( 鐘づくし [Kane-zukushi (Kane-zukushi)])
Narrators/Singers	歌い手 [Utaite (Singer)] (8 人 [8 nin (8 people)])	歌い手 [Utaite (Singer)] (8 人 [8 nin (8 people)])	歌い手 [Utaite (Singer)] (8 人 [8 nin (8 people)])
Musicians	三味線 [Shamisen (Japanese guitar)] (8人 [8 nin (8 people)]), 太 鼓 [Taiko (Drum)] [2 nin (2 people)])	三味線 [Shamisen (Japanese guitar)] (8人 [8 nin (8 people)]), 太 鼓 [Taiko (Drum)] [2 nin (2 people)])	三味線 [Shamisen (Japanese guitar)] (8人 [8 nin (8 people)]), 太 鼓 [Taiko (Drum)] [2 nin (2 people)])

increases. In the final part of “Suzu-daiko,” Hanako completely reveals her nature. At last, Hanako who changes to a ghost climb the bell of the Dōjōji temple and glares around.

Musical instruments	三味線 [Shamisen (Japanese guitar)], 小鼓 [Kozutsumi (Small drum)], 太鼓 [Taiko (Drum)], 笛 [Fue (Flute)]	三味線 [Shamisen (Japanese guitar)], 小鼓 [Kozutsumi (Small drum)], 太鼓 [Taiko (Drum)], 笛 [Fue (Flute)]	三味線 [Shamisen (Japanese guitar)], 小鼓 [Kozutsumi (Small drum)], 太鼓 [Taiko (Drum)], 笛 [Fue (Flute)]
Geza/Hyōshi-ita	None	None	None
Scenes	桜の木 [Sakura no ki (Cherry blossoms)], (道成寺 [Dōjōji (Dōjōji temple)])	桜の木 [Sakura no ki (Cherry blossoms)], (道成寺 [Dōjōji (Dōjōji temple)])	桜の木 [Sakura no ki (Cherry blossoms)], (道成寺 [Dōjōji (Dōjōji temple)])
Place on the stage	本舞台 [Honbutai (Main stage)]: 中央 [Chūou (Center stage)]	本舞台 [Honbutai (Main stage)]: 中央 [Chūou (Center stage)]	本舞台 [Honbutai (Main stage)]: 中央 [Chūou (Center stage)]
Costumes	赤 [Aka (Red)]	赤 [Aka (Red)]	赤 [Aka (Red)]
Props	中啓 [Chūkei]	中啓 [Chūkei]	中啓 [Chūkei]
Stage equipment	道成寺 [Dōjōji (Dōjōji temple)], 鐘 [Kane (Bell)], 桜の木 [Sakura no ki (Cherry blossoms)]	道成寺 [Dōjōji (Dōjōji temple)], 鐘 [Kane (Bell)], 桜の木 [Sakura no ki (Cherry blossoms)]	道成寺 [Dōjōji (Dōjōji temple)], 鐘 [Kane (Bell)], 桜の木 [Sakura no ki (Cherry blossoms)]
The point in a dancer's body	足 [Ashi (Foot)]	足 [Ashi (Foot)]	足 [Ashi (Foot)]



Fig. 2 All 2D animations in *Chūkei no Mai*



Fig. 3 The animation of 6th event in *Chūkei no Mai*

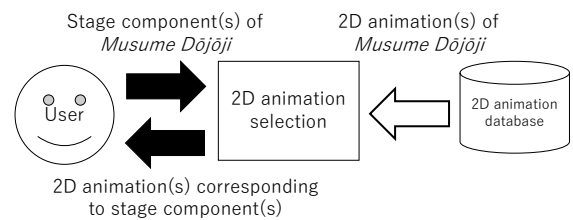


Fig. 4 Architecture of the 2D animation mechanism

### 3.2. 3D Animation Based on the Legend

In the previous study, we have developed animations for 6 events in 33 events in the Legend [5]. We have created animations for the 27 events in this study. Table 2 shows story in the Legend and the 3D animations correspond to each event in the story. The story for the Legend was created based on three works (*Honcho Hokke Genki*, *Konjaku Monogatari Shū*, and *Dōjōji Engi*) [7]. The story consists of 6 scenes and 33 events. In Table 2, the events and animations transition from left to right for each scene. The third is scene using a branching structure. In the 3-1 group in Table 2, the events in 3-1 and 3-2 are respectively defined by *Honcho Hokke Genki & Konjaku Monogatari Shū*, and *Dōjōji Engi*. Each event is classified as strongly negative (N+), strongly positive (P+), negative (N), or positive (P), based on the following criteria.

- Strong negatives (N+) are events related to the death of Anchin.
- Strong positives (P+) are events related to the rescue of Anchin and Kiyohime.
- Weak negatives (N) are events related to lies, sadness, and anger.
- Weak positives (P) are other events.

Fig. 5 shows the 3D animation mechanism's architecture. According to the input of one or more scene(s) in the Legend by a user, the mechanism selects one or more 3D animation(s) from a 3D animation database and displays the animation(s) on a screen. As



shown in Table 2, the above 3D animation database stores 3D animations corresponded to all events in the Legend, a format of each animation in the 3D animation database is text data, which selects one or more 3D models to be displayed on a screen and orders their placements.

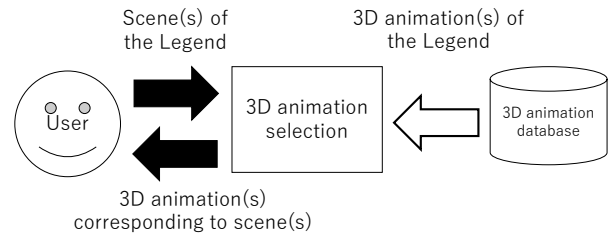








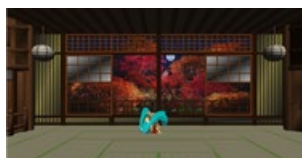
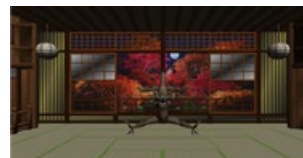










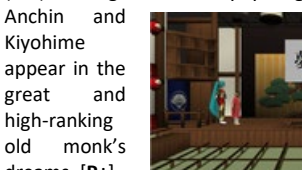



Fig. 5 Architecture of the 3D animation mechanism

Table 2 Animations corresponding to events in the Legend

Scene 1: Kiyohime falls in love with Anchin at first sight.			
(1-1) Anchin and an old monk go to Kumano region on a pilgrimage (Anchin is a young monk). [P]	(1-2) Two monks stay in a house of Kiyohime, who is a beautiful girl. [P]	(1-3) Kiyohime loves Anchin with first sight. [P+]	(1-4) Anchin says to visit Kiyohime's house on the way back. [N]
			
Scene 2: Anchin betrays Kiyohime.			
(2-1) Two monks, Anchin and the old monk, leave Kumano. [P]	(2-2) Two monks make a detour the Kiyohime's house and directly go to their temple. [N]	(2-3) Kiyohime knows Anchin's lie. [N]	
			
Scene 3: Kiyohime's body turns into a snake.			
(3-1-1) Kiyohime confines herself to her room. [N]	(3-1-2) Kiyohime feels sad and cries. [N]	(3-1-3) Kiyohime's body goes to transform into a snake. [N+]	
			
(3-2-1) Kiyohime swims across the Kirime River. [N]	(3-2-2) The snake of Kiyohime pursues Anchin. [N]	(3-2-3) Kiyohime seats herself on a big rock at Ueno. [N]	
			
(3-2-4) Kiyohime spits fire. [N+]	(3-2-5) The body of Kiyohime turns into a snake. [N+]		
			
Scene 4: Anchin and the old monk run away in a hurry.			
(4-1) Anchin and another monk know through a passer-by that a snake, Kiyohime, exists to pursue them. [N]	(4-2) Two monks are going to escape in haste. [N]		
			
Scene 5: Kiyohime burns Anchin to death in Dōjōji Temple.			

(5-1) Anchin and the old monk take refuge to the Dōjōji temple. [N]	(5-2) The monks of Dōjōji put Anchin into the bell of Dōjōji. [N]	(5-3) The snake of Kiyohime gets to the Dōjōji temple. [N]	(5-4) The snake, Kiyohime, ties the big bell in where Anchin exists using her body. [N+]
			
(5-5) The snake blows out fire on the bell. [N+]	(5-6) The snake takes her leave of the temple. [N]	(5-7) The monks of the Dōjōji temple peers over the bell. [N]	(5-8) The monks discover Anchin's charred body. [N]
			
<b>Scene 6: Anchin and Kiyohime are reincarnated through the Lotus Sutra.</b>			
(6-1) That night, a high-ranking monk dreams. [N]	(6-2) In that dream, Anchin and Kiyohime appear as snakes. [N]	(6-3) Two persons, Anchin and Kiyohime, ask the great old monk for salvation. [P]	(6-4) The high-ranking and great old monk and many monks continue to chant the Lotus Sutra at the Dōjōji temple. [P]
			
(6-5) The night of this day, young and reincarnated Anchin and Kiyohime appear in the great and high-ranking old monk's dreams. [P+]	(6-6) Young two persons, Anchin and Kiyohime, are thankful to the great and high-ranking monk. [P]	(6-7) Anchin and Kiyohime disappear from the dream of the old monk. [P]	
	 Kiyohime, are thankful to the great and high-ranking monk. [P]		

#### 4. Implementing a Combined Animation System

This section describes the combination rule of the two animations and a combined animation system that consists of the two animation systems.

##### 4.1. Combining with Two Animations

Because *Musume Dōjōji* is positioned as a continuation of the Legend, the inserted images of the Legend can be seen as a special form of remembering the past.

The stage components of *Musume Dōjōji* was analyzed in our previous research [2]. This paper focuses on the following elements: “心[kokoro (Mind)]”, “歌詞[kashi (Lyrics)],” and “振り[furi (Performance)].” Expressed emotions in each component are contradictory in some events in Table 1. For example, in *Chūkei no Mai*, “心[kokoro (Mind)]” is positive emotion associated with “daughter,” while “歌詞[kashi (Lyrics)]” contains negative words, such as “resentment.”

In [7], we have respectively divided the whole of *Musume Dōjōji* and the Legend into many scenes. In

addition, we have classified the above scenes into negative scenes and positive scenes. The “negative” and “positive” information functions for combining *Musume Dōjōji* and the Legend as presented in Section 4.2.

##### 4.2. Animation Combination Rules

Kawai, Ono and Ogata [7] developed a prototype system that combines animations based on the semantic structure of the two stories. This study extends the prototype to the entire Legend, allowing experimentation with the entire story.

Kawai, Ono and Ogata [7] proposed combination rules to associate positive and negative events in *Musume Dōjōji* and the Legend presented. The rules first calculate points by identifying positives and negatives for the elements in *Musume Dōjōji* (heart, choreography, and text). Table 3 lists the rules. The points indicate the degree of positivity or negativity of the selected event in the Legend, and the positives or negatives are selected according to the “心[kokoro (Mind)]” of *Musume Dōjōji*. Table 4 shows how the events of the Legend are selected

based on the point and the “心 [*kokoro* (Mind)]” of *Musume Dōjōji*, a decision rule to emphasize the contrast between *Musume Dōjōji* and the Legend.

Table 3 Point calculation method [7]

Kokoro = Positive			Kokoro = Negative		
Kashi	Furi	Point	Kashi	Furi	Point
P	P	0	P	P	2
P	N	1	P	N	1
N	P	1	N	P	1
N	N	2	N	N	0

Table 4 Selection method for events by points [7]

Kokoro	Point	Event
P	2	N+
P	1	N
P	0	P+ or P
N	2	P+
N	1	P
N	0	N+ or N

### 4.3. The Architecture of Combined Animation System

Fig. 6 shows an integrated animation system that combines the 2D animation system with 3D animation systems. Although a 2D animation selection mechanism in Figure 6 uses the mechanism described in Section 3.1, the 3D animation selection mechanism partially changes the mechanism explained in Section 3.2. In the integrated system, a 3D animation selection mechanism selects one or more 3D animation(s) corresponded to the selected 2D animation(s) using based on the combination rules.

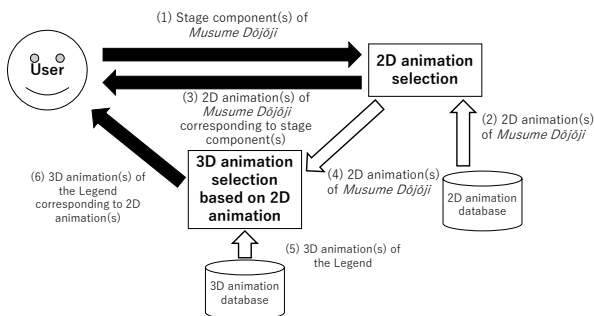


Fig. 6 Architecture of the combined animation system

The user inputs one or more stage component(s) of *Musume Dōjōji*. The integrated animation system displays 2D animation(s) and 3D animation(s) that correspond to the above 2D animation(s). The *Musume Dōjōji*-based 2D animation is displayed according to a chronological order. The Legend-based 3D animation is fragmentally represented. The combination algorithm for the above processing is as follows.

1. The user inputs one or more stage component(s) of *Musume Dōjōji* into the module of 2D animation selection.
2. The 2D animation selection module selects one or more 2D animation(s) based on one or more stage component(s).
3. The 2D animation selection module shows selected 2D animation(s) to the user.
4. Based on each selected 2D animation, a 3D animation selection module selects one or more 3D animation(s) based on the combination animation rules described in 4.2.
5. The 3D animation selection module shows the selected 3D animation(s) to the user.

## 5. Result and Discussion

Table 5 presents the eight combinations listed in from Table 4. “Combination” shows combinations of specific events. “Animation” shows displayed animation.

### A. Summary of animations

The animations shown in Table 4 are according to the rules explained in 4.2 to determine the 3D animations to be combine with 2D animations. Note that for (7) in Table 5, only the 3D animation corresponding to the combination is listed in the table, because the corresponding combination does not exist in *Musume Dōjōji*, at least in the authors’ current analysis.

The rule of combination is intended to emphasize the gap between the events in *Musume Dōjōji* and those in the Legend by contrasting the events in *Musume Dōjōji* with those in the Legend, and for the purpose animations with different images evoked by the events in the gap are combined.

For example, in (3) of Table 5, the lyrics indicate negative emotions, but Hanako dances a positive performance. This difference between positive and negative emotions is related to the event of Kiyohime bursting into tears after being betrayed by Anchin in the Legend. This example clearly illustrates the negative emotions contained in positive behavior.

### B. Controlled variety

In the case presented here, 3D scenes in the Legend are selected according to the scores derived by the calculation method described in Section 4.2. The selected scenes in the Legend have fluctuations for a given single score, corresponding to the positive and negative ratings for the scenes shown in Table 3. Thus, while controlling the type of scenes selected in the main scheme of things, on the other hand, a variety of generation is ensured in specific detailed aspects.



### C. Impossible combination

*Musume Dōjōji* not have the pattern (2) and (7), as shown in Table 5. Table 6 list the number of each pattern. Pattern (2) is “*Kokoro*/Positive, *Kashi*/Positive, *Furi*/Negative.” Pattern (7) is “*Kokoro*/Negative, *Kashi*/Positive, *Furi*/Negative.”

There are many events, such as Pattern (1), where the dances are positive and spectacular with respect to all elements, and Pattern (8), where the dances and lyrics are positive in contrast to the negative hearts. However, there are fewer patterns with positive hearts to begin with, and there is less tendency for the choreography itself to be negative.

Table 5 Examples of animations according to combinations of positive and negative

Combination	Animation
<p><b>(1) Kokoro, P; Kashi, P; Furi, P. 0 point</b>  <i>Musume Dōjōji</i> (2D): 「鈴太鼓」花に心を深見草 [Hana ni kokoro wo fukami-gusa]                      The Legend (3D): Kiyohime loves Anchin with first sight. [P+]</p>	
<p><b>(2) Kokoro, P; Kashi, P; Furi, N. 1 point: Musume Dōjōji</b> (2D): There is no corresponding event., The Legend (3D): -</p>	
<p><b>(3) Kokoro, P; Kashi, N; Furi, P. 1 point</b>  <i>Musume Dōjōji</i> (2D): 「中啓の舞」是生滅法と響くなり [Zesyō-meppō to hibiku nari]                      The Legend (3D): Kiyohime feels sad and cries. [N]</p>	
<p><b>(4) Kokoro, P; Kashi, N; Furi, N. 2 points</b>  <i>Musume Dōjōji</i> (2D): 「鈴太鼓」思えば思えば恨めしやとて [Omoeba omoeba urameshiya tote]                      The Legend (3D): The snake blows out fire on the bell. [N+]</p>	
<p><b>(5) Kokoro, N; Kashi, N; Furi, N. 0 point</b>  <i>Musume Dōjōji</i> (2D): 「くどき」とんと言わずに済ませぞえ [Tonto iwazuni sumaso zoe]                      The Legend (3D): The snake, Kiyohime, ties the big bell in where Anchin exists using her body. [N+]</p>	
<p><b>(6) Kokoro, N; Kashi, N; Furi, P. 1 point</b>  <i>Musume Dōjōji</i> (2D): 「道行」ただわれをのみ追い来るかと [Tada ware wo nomi oikuru ka to]                      The Legend (3D): Two monks are going to escape in haste. [P]</p>	
<p><b>(7) Kokoro, N; Kashi, P; Furi, N. 1 point</b>  <i>Musume Dōjōji</i> (2D): There is no corresponding event., The Legend (3D): -</p>	
<p><b>(8) Kokoro, N; Kashi, P; Furi, P. 2 points</b>  <i>Musume Dōjōji</i> (2D): 「手踊り」氏神さまが可愛がらしゃんす [Ujigami-sama ga kawaigara shan su]                      The Legend (3D): The night of this day, young and reincarnated Anchin and Kiyohime appear in the great and high-ranking old monk's dreams. [P+]</p>	

Table 6 Amount of each pattern

Pattern	Kokoro	Kashi	Furi	Total
(1)	P	P	P	65
(2)	P	P	N	0
(3)	P	N	P	9
(4)	P	N	N	3
(5)	N	N	N	14

(6)	N	N	P	12
(7)	N	P	N	0
(8)	N	P	P	76

### 6. On Explanation Generation and its Expansion

In the above parts, we described the basic architecture of the proposed system from the point of view of the mutual



relationships between *Musume Dōjōji* and the Legend. Although we have not presented in detail, this system includes mechanisms for generating important and interesting explanations that relates to the above narratives. In this section, first, 6.1 introduces our previous explanation studies and 6.2 considers a new method using generative AI.

### 6.1. An Overview of Explanation Mechanisms

This section presents two mechanisms. First, an explanation generation mechanism is introduced. Then, an “unchiku” generation mechanism based on the explanation generation mechanism is introduced.

“Explanation” in this study refers to insert descriptions of the characteristics of various objects in a story into the story. As an example, the opening sentences of *Dōjōji Engi* [10] is as follows:

紀伊国室の郡真砂と云所に宿あり [Kii no Kuni Muro no Koori Manago to iu tokoro ni yado ari (There is a guest house in Masago, Muro-no-Koori, Kii Province.)]. 此亭主清次庄司と申人の姫にて、相随ふ者数在けり [Kono teishu seiiji no shōji to mousu hito no yome nite, ai shitagau mono kazu ari keru (A wife of a man named Seiiji no Shoji has many people, such as housepepers.)]

The above sentences provide the information of the location of the guest house where Anchin stayed, and the information of the owner and wife of the guest house. Narratives do not only narrate events occurred in a story or the content in a story, but also present explanations about objects and things contained in the story. Although a literary theory proposed by Genette [13] systematically organizes rhetorical methods of expressing the content of a story, explanation methods are also included in the theory. One of the explanation’s functions temporarily stops the flow in a story.

Ogata tries to integrate narrative theories with AI theories [14] in the context of narrative generation. The implement of an explanation mechanism based on Genette’s theory is an example of the integration [15].

#### A. Explanation generation

For instance, a general definition of “Kinkaku-ji Temple (金閣寺; The Golden Pavilion),” which is a Japanese cultural heritage, includes various descriptions, such as “the temple is located in Kyoto,” “Kinkaku-ji is a popular name; its official name is Rokuon-ji.” In addition, in more deep definitions, there is also the information that *The Temple of the Golden Pavilion* by Yukio Mishima [16] is based on the 1950 arson incident at Kinkaku-ji.

We describe our previous generate explanation study on *Musume Dōjōji* and the Legend. We have collected texts of *Musume Dōjōji* and the Legend from Wikipedia and compiled the collected texts into a hierarchical knowledge base [5]. These texts are related to the explanations.

We return to the above novel by Mishima, *The Temple of the Golden Pavilion*. As stated above, this novel proposes the general information about Kinkaku-ji. On the other hand, Mizoguchi, the narrator in the narrative, presents a variety of explanations of Kinkaku-ji that are mixed with Mizoguchi’s own subjectivity. The character’s thoughtful explanations often give unique and original characteristics to the novel. For example, although he often expresses the beauty of Kinkaku-ji, we understand them explanations, in the wide meaning, seen from his very subjective point of view. Before he actually saw the temple, he compared its beauty to that of natural phenomena, like paddy fields shimmering in the sunlight or mountains glowing at sunrise. However, after he directly saw the real Kinkaku-ji, the beauty in his mind was idealistically exaggerated. Although the above description is a mere example, there are a deeper and detailed explanation methods, such as the above subjective explanation. We call such explanation unchiku in Japanese.

#### B. Unchiku generation

“Unchiku” is a word used to indicate a deep knowledge or extensive, profound, vast stock of knowledge of an object or topic. The Japanese representation of “蘊蓄を傾ける [unchiku wo katamukeru]” means the explanation using the profound knowledge that a person has accumulated. However, in recent years, unchiku is often associated with trivia and “蘊蓄をひけらかす [unchiku wo hikerakasu]” refers to showing off one’s knowledge in undesirable situations.

We have considered deep knowledge concerning the stage components and events shown in Table 1 in the relationships with the unchiku of *Musume Dōjōji* and presented a mechanism for inserting the unchiku knowledge into the generated text [17], [18]. Moreover, we have combined the general mechanism of explanation and the mechanism of unchiku generation and classifies the collected texts and contents, shown in Table 1, into the following three categories: general information, unique information, and unchiku information. The three explanation categories are inserted into a generated story [19].

## 6.2. Extending the System Using Generative AI

We have extended the previous studies with generative AI. Existing generative AI systems have generally a strong ability for generating surface language. However, we consider that it is weak in the point of an ability to organizationally or strategically produce macro text structures like narrative structures. A research group of narrative generation presented a hybrid method of traditional narrative structure-based generation mechanism and neural network-based generation mechanism [20]. When we use this method, a narrative macro structure is generated through the traditional mechanism and it is extended in detail using the neural network-based generation mechanism.

We compared four chat AI systems based on text generation AI to investigate the above hybrid generation [21]. We used the following four types of chat AI systems: ChatGPT 3.5 (released by OpenAI), Perplexity (released by Perplexity.ai), Microsoft Copilot (released by Microsoft), and Google Bard (released by Google. It was renamed to Gemini at February, 2024). In addition, we used versions at November, 2023. Moreover, Google Bard is based on a model developed by Google, while the other three systems are based on the GPT model.

We commonly prepared a prompt text in all of the chat AI systems and compared the generated results. The used prompt is as follows: “道成寺伝説について蘊蓄を傾けてください。[*Dōjōji densetsu ni tsuite unchiku wo katamukete kudasai* (Please explain about the legend of Dōjōji using the profound knowledge that you have accumulated.)]”

We consider the results. Microsoft Copilot and Perplexity approximately outputted semantically accurate information in response to the prompt. Google Bard and ChatGPT 3.5 generated many inaccurate sentences. For instance, ChatGPT 3.5 produced a new and fake legend different from the actual Dōjōji legend.

Next, we divided the above four AI systems into two groups. Group-A includes ChatGPT 3.5 and Google Bard, in which the outputs were inaccurate as a whole. Group-B including Perplexity and Microsoft Copilot outputted approximately accurate sentences. In the next attempts, we gave different prompts from the first ones to respective generative AI systems to consider the results by two groups.

- Group-A: The second prompt clearly pointed out the semantic mistakes in sentences from the first prompt. Although ChatGPT 3.5 outputted new sentences considering the pointed points, the newly generated sentences contained different semantic

mistakes. On the other hand, Google Bard could correct all of the pointed mistakes.

- Group-B: Additional explanations were requested using a second prompt. These two generative AI systems could generate new and accurate explanation sentences of the Legend. The sentences included different contents from the first common prompt.

In summary, Microsoft Copilot and Perplexity are effective when accurate explanations and knowledge are required. In addition, we think that there are merits in using ChatGPT 3.5 and Google Bard. For example, intentionally or strategically propelling the generation of texts including mistakes and errors using such type of generative AI systems will contribute generating interesting stories.

We would like to describe a topic concerning our future plans. For instance, a function of explanation and unchiku generation systems adjusts, according to the information of the user, the quantity and quality to be outputted as an explanation [19]. The proposed framework is not limited to the scope of explanation generation in this section. We will be able to use the proposed method in other generation mechanisms, such as story generation.

In Section 6, we have presented an overview of the explanation generation mechanisms, which are placed as important functions in the system that connects *Musume Dōjōji* to the Legend. Moreover, we have showed a future extension plan.

## 7. Conclusion

This paper presented an experimental mechanism for integrating the 3D animations of the Legend into the 2D animations of *Musume Dōjōji*. The proposed system presents a story concerning the Legend that is the background of *Musume Dōjōji* for a user. The system inserts the 3D animations for the Legend into the 2D animations of *Musume Dōjōji*. Our future plan is to expand to a more valuable mechanism through evaluating the relationships of two of the mechanisms.

In addition, we extend the systems by a parameter-based explanation selection mechanism [19]. Regarding narrative generation using generative AI, we have conducted a research based on *Musume Dōjōji* and the Legend [21]. One of our future plans is to present a new approach through combining our narrative generation and generative AI. The method in this paper is a case study of explanation generation using text generative AI. Regarding the combining our generation system with the

generative AI, we can consider other media other than text, such as image generative AI.

### Acknowledgement

This work was supported by JSPS KAKENHI Grant Number JP21K17870.

### References

1. T. Watanabe, *Musume Dōjōji*, Shinshindō, 1986. (In Japanese)
2. M. Kawai, T. Ogata, “An analysis of Kyōganoko Musume Dojoji for the generation of the staging structures of Kabuki from narrative plots,” *Proceedings of the 63th Special Interest Group on Language Sense processing Engineering*, No. 63, pp. 25-61, 2019. (In Japanese)
3. M. Kawai, J. Ono, T. Ogata, “The stage structure of a kabuki-dance: Survey, analysis, and representation of *Kyōganoko Musume Dōjōji*,” *The 37th Annual Meeting of Japanese Cognitive Science Society*, P-117, pp.720-729, 2020. (In Japanese)
4. M. Kawai, J. Ono, T. Ogata, “Analyzing the relationship between the legend of Dōjōji and the kabuki-dance *Kyōganoko Musume Dōjōji* to develop prototyping systems,” *Journal of Robotics, Networking and Artificial Life*, Vol. 8, No. 3, pp. 151-160, 2021.
5. M. Kawai, J. Ono, T. Ogata, “Analysis and generation of the narrative elements in a “Dōjōji” story,” *Proceedings of the 3rd International Conference on Computational Intelligence and Intelligent Systems*, pp. 44-45, 2020.
6. M. Kawai, J. Ono, T. Ogata, “Towards a system that combines *Kyōganoko Musume Dōjōji* and the legend of Dōjōji,” *Proceedings of the 65th Special Interest Group on Language Sense processing Engineering*, No.65, pp. 13-24, 2021. (In Japanese)
7. M. Kawai, J. Ono, T. Ogata, “Prototyping narrative representation system using a kabuki dance and legendary story for the narration function of robots,” *Journal of Future Robot Life*, Vol. 3, No. 2, pp. 147-181, 2022.
8. Dainihonkoku Hokekyō Genki, In M. Inoue, & S. Ōsone (Collation editors.), *Ōjōden Hokegenki*, pp. 43-219, Tokyo: Iwanami Shoten, 1977. (In Japanese)
9. Japanese Tales from Times Past, In K. Mabuchi, F. Kunisaki, & T. Konno (Eds.), *Konjaku Monogatari-shū*, Vol. 1, Tokyo: Shōgakukan, 1999. (In Japanese)
10. Mabuchi, K. (Ed.), “Color Dōjōji Engi, vols. 1–2,” In T. Ouga, M. Gunji, Y. Enomoto & S. Shibasaki (Eds.), *Dōjōji* (Vol. 1, pp. 9–16; Vol. 2, pp. 33–40). Tokyo: Shōgakukan, 1983. (In Japanese)
11. N. Yasuda, “From the legend of Dōjōji to *Kyōganoko Musume Dōjōji*,” *Gifu Shōtoku Gakuen University National Language Japanese Literature*, 8, pp. 1–12, 1989. (In Japanese)
12. T. Bandō (dance), *Kyōganoko Musume Dōjōji: Bandō Tamasaburō butō shū Vol.1* (DVD). Tokyo: Shōchiku home video, 2003. (In Japanese)
13. G. Genette, *Monogatari no Dexisukuru: Hōhō-ron no Kokoromi* (H. Hanawa & R. Izumi, Trans.). Suiseisha. 1985. (In Japanese) (Original: G. Genette, *Discours du Récit in Figures III*. Seuil. 1972.)
14. T. Ogata, “Concepts and aspects of an integrated narrative generation approach based on post-narratology,” In, P. Dawson, & M. Mäkelä (Eds.), *The Routledge Companion to Narrative Theory*, pp.433-447. UK: Routledge, 2022.
15. T. Akimoto, T. Ogata, “Towards a discourse mechanism in narrative generation system: Proposal of a system introducing narrative discourse theory and reception theory.” *Cognitive Studies*, Vol. 20, No. 4, pp. 396–420, 2013. (In Japanese)
16. Y. Mishima, *Kinkaku-ji*. Shinchosha. 2020. (Original work published 1956) (In Japanese)
17. J. Ono, T. Ogata, *Unchiku generation using narrative explanation mechanism*. In, *Digital Libraries at Times of Massive Societal Transition*. (LNISA, volume 12504), pp.240-247, 2020.
18. J. Ono, M. Kawai, T. Ogata, *Consideration of unchiku generation with moving illustration using kabuki dance knowledge*, Vol. 9, No. 1, pp. 1-12, 2022.
19. M. Kawai, J. Ono, T. Ogata, “Kabuki explanation system based on user’s knowledge and interests,” *Proceedings of the 4th International Conference on Computational Intelligence and Intelligent Systems*, pp.70-475, 2021.
20. A. I. Alhussain & A. M. Azmi, “Automatic story generation: A survey of approaches.” *ACM Computing Surveys*, Vol. 54, No. 5, pp. 1-38, 2021.
21. S. Kudo, J. Ono, T. Ogata, “Comparing the output results of kabuki-related sentences from generative AI systems: Using the legend of Dōjōji,” *Proceedings of the 73th Special Interest Group on Language Sense processing Engineering*, No.73, 2023. (In Japanese)
22. T. Ogata, “Kabuki as multiple narrative structures,” T. Ogata & T. Akimoto, (Eds.), *Computational and Cognitive Approaches to Narratology*. 391-422. Hershey, PA, USA: Information Science Reference, IGI Global. 2016.
23. T. Ogata, “Toward kabuki (2): Aspects of multiple narrative structures,” In, T. Ogata, Y. Kawamura & A. Kanai, *Informational narratology: Artificial intelligence/cognition/social process and narrative generation*. pp.209-244. Tokyo: Hakuto Shobo. 2018. (In Japanese).
24. T. Ogata, “Fusion of kabuki, post-narratology and pre-narratology,” In, T. Ogata, *The Post-narratology of Narrative Generation: Toward Narratology of an Age of Artificial Intelligence 2*, pp. 75-126. Tokyo: Shin’yosha. 2022. (In Japanese).

---

---

## Authors Introduction

Dr. Jumpei Ono



He took his bachelor's degree from the Faculty of Software and Information Science, Iwate Prefectural University in 2010. He took his MS and PhD from the Graduate School of Software and Information Science, Iwate Prefectural University in 2014 and 2018. He worked as an information and communication technology instructor at the Vocational School of Digital Arts Sendai since 2018. At present, he is a senior lecturer at the Faculty of Software and Information Technology, Aomori University. He is interested in the interdisciplinary field, including computer game technologies, artificial intelligence, Common Lisp programming, and story generation systems.

Mr. Shunta Kudo



He received his bachelor from the Faculty of Software and Information Science, Iwate Prefectural University in 2023 and has been in the Graduate School of Software and Information Science, Iwate Prefectural University since 2023.

Prof. Takashi Ogata



He took his bachelor from Waseda University in 1983, his MS from Tsukuba University in 1992, and his PhD from the University of Tokyo in 1995. He worked at software companies since 1983. He has been an associate professor in the Faculty of Engineering at Yamanashi University since 1997 and a professor in the Faculty of Software and Information Science at Iwate Prefectural University since 2005. He is currently a professor in the Faculty of Informatics at Yamato University since 2024. He has studied broad research areas, including AI, cognitive science, narrative generation, narratology, kabuki, narrative warfare, and content creation.