

Research Article

A Framework of Automatic Narrative Generation Game Based on the Russian Invasion of Ukraine

Jumpei Ono¹, Takashi Ogata²

¹Faculty of Software and Information Technology, Aomori University, 2-3-1, Kobata, Aomori, Aomori, 030-0943, Japan

²Faculty of informatics, Yamato University, 2-5-1, Katayama-cho, Suita, Osaka, 564-0082, Japan

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ABSTRACT

“Automatic narrative generation game” that we have been studying is a concept of game system for generating narratives through a game process. As this paper presents a game mechanism based on the concept of automatic narrative generation game, this research corresponds to an extension to a direction of the automatic narrative generation game. In particular, the proposed game uses as the ongoing Russian invasion of Ukraine (beginning in February 2022) as the object. Moreover, our study of this kind of game refer to “tabletop role-playing game” or “table-talk role-playing game” (TRPG). TRPG is a type of analog game in which participants advance a shared storyline through dialog mainly. The proposed game system provides the knowledge of disinformation to the game user by simulating of the spread of disinformation. Through the game play, the game user can acquire knowledge for countering disinformation. We implemented two types of stories based on the timeline data of the Russian invasion of Ukraine. The first is a type of story in which Ukraine resists Russia and the second is a story of Ukraine’s collapse.

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1. Introduction

Caillois, a French philosopher, defined “play” as an activity that is essentially isolated from the rest of life, which is usually completed within the definite limits of time and place [1]. Moreover, play is executed through a shared narrative among participants under the control of the rules of play. In the space of play, participants experience events in a simulated manner through their own independent actions during the period specified by the rules of the particular play. As play is a fictional activity, it has no direct impact on the real world. Therefore, failures are allowed in play.

The above qualities in play are also presented in games. The “play” referred by Caillois has a wide range of activities, including sports, theater, gambles, merry-go-rounds. According to the definition by Juul [2], we consider that play also includes game. In particular, for us, each game is a medium to proactively simulate

narratives. For instance, tabletop role-playing games (TRPGs) and live-action role-playing games (LARPs) are used to simulate fictional stories or real-life stories. In the games, the players play roles of characters in fictional stories or historical events. players in LARPs role characters in historical events. The process in LARPs gives the player to pseudo-experience of historical events. Correspondingly, nature of the LARPs has attracted attention as a method for learning cultural heritage [3]. Ensslin described that narrative voices or perspectives appeared in novels and films can be replaced with the experiential qualities in games [4]. Like learning about historical events through reading, the games give knowledge to the players.

In particular, there are games concerning events in the real world and intended for educational purposes. The games were called “serious games.” They have been defined as “serious games that are developed and used to solve problems in various areas of society” [5]. *This War of Mine* [6] is an example of “serious games.” The motif of this game is the Siege of Sarajevo in the Bosnian War

Corresponding author E-mail: j.ono@aomori-u.ac.jp, ogata.takashi@yamato-u.ac.jp

in 1990s. The game players in this game correspond to general citizens in a surrounded city by enemies. Poland government added this game to the reading list for students [7].

Other instance is *Ukraine War Stories* [8], an adventure game based on the Russian invasion of Ukraine beginning on February 24, 2022. The game was released in October 2022. The game has three stories at Hostomel, Bucha, and Mariupol. The images of the game are drawn based on actual events and eyewitness testimonies. Additionally, they also use photographs taken on many actual battlefields.

In our previous studies, we presented an automatic narrative generation game modeled on a TRPG [9]. The objective of this paper to present a game concept based on the framework of the automatic narrative generation game. This game system simulates the spreading of disinformation using a story generation mechanism to give the game users the knowledge on disinformation as the power to resist disinformation narratives.

This paper is an extended version of [10]. In particular, we mainly extended parts of the basic mechanism in the proposed system (Section 4.2), and problems and future works in this study (Section 6).

Our game introduced in this paper is based on the Russian invasion of Ukraine or the Russo-Ukrainian War beginning in February 2022 and still ongoing. Abe, Ono, and Ogata collected the linguistic date concerning the Russo-Ukrainian War of TV videos [11]. Moreover, Ogata called the way of battle using disinformation in the Russo-Ukrainian War “narrative warfare [12].” In this book, the author, Ogata, collected discourses and documents on Russia and Ukraine to organize them in the context of narrative theory and “narrative warfare.” In particular, this book dealt with Toru Hashimoto who is a famous Japanese TV commentator to introduce the analysis of his actual documents including tweets of Twitter. This paper uses a part of the results of the work.

2. Related Studies 1: An Overview of TRPG

TRPG is an analog game to advance a story through participants’ conversation. The story works as a constraint for participants’ conversation. Participants in TRPG role the game master (GM) or the players (PLs). In playing a TRPG, the GM and PLs share a story called “scenario.”

Fig. 1 is an architecture of a scenario in TRPG. The GM has a fair overview of the scenario and changes events or scenes in the scenario, based on the PL’s actions turn. The story can be a tragedy or comedy. TRPG is intended to be entertaining, the objective of the game is usually to satisfy both the GM and PLs. PLs insert new events or scenes into the scenarios prepared by the GM. PLs insert events or scenes based on the various stories known by the PLs. There are differences in the flows of the story that each participant recalls. The differences change the main plot of the story.

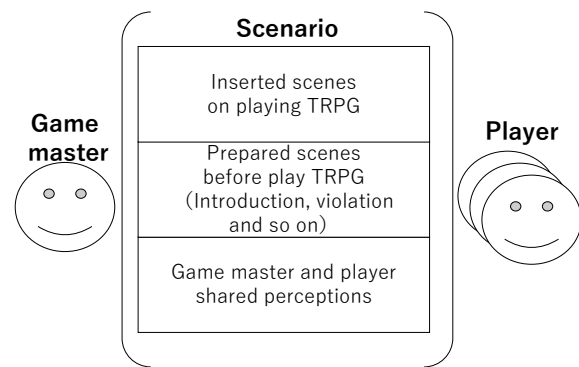


Fig. 1. Architecture of a scenario in TRPG [10]

There is a study to use TRPGs to support leisure activities for children with developmental disabilities [13]. By mixing the act of narrating into the game, TRPGs provide more good fun for the participants. In addition to “actually playing,” there are various ways to enjoy TRPGs. The game processes itself is a work that can be watched and enjoyed. Participants can challenge recording and publishing the game processes in writing or video, or live-streaming the game on a video distribution site. Moreover, Participants can make works based on the game processes. As an application, the proposed game facilitates story generation and can support the creation of stories through the game.

3. Related Studies 2: Computer Games Concerning Disinformation and Narrative

The proposed game is a text adventure game. In the public opinion that the nation should surrender, the players must control people’s morale for keeping the nation. In the existing works, the proposed game is similar to the following game that simulates the manipulation of public opinion through actual or fake news.

Headliner [14] and *Headliner: Novi News* [15] are adventure games in which the player becomes the editorial director of a news bureau or newspaper in a fictional nation and manipulates public opinion. The player selects the articles to report. Some articles contain disinformation. In any case, the articles selected by the player can drastically change the state of affairs in the fictional nation. *Plague Inc.* [16] is a simulation game in which the player becomes an epidemic, aiming to evolve and destroy the human. In 2019, under the supervision of the American fact-checking organization “Politifact” and others, a mode for spreading fake news was added to the game.

Bad News is a game developed by researchers at the University of Cambridge for simulating the spread of fake news [17]. A player in this game is positioned as a distributor of disinformation and selects a fake news from many candidates to gradually increase the influence to public opinions. Moreover, the player can select more

adequate fake news for an event to effectively increase the influence of disinformation. Through the game play, the player can acquire the abilities of cognitive resistance for fake news.

The style of game process of “Solo Journaling RPG” (<https://itch.io/jam/solo-journaling-rpg-jam>) is similar to the proposed game. In the Solo Journaling RPG, the players create a story and write a diary from an introspective game experience. The players create stories by matching relationships between events from fragments of events selected using random number generators such as dices and playing cards. The objective of the Solo Journaling RPG is on how the players themselves feel about the events, as recorded in their diaries or monologs. *Skyworthy* (developed by A Couple of Drakes, <https://acoupleofdrakes.itch.io/skyworthyzine>) is a Solo Journaling RPG. In the game processes, the player act as a flying boat with many sailors on board and write a diary of his observations of the lives of the crew members.

4. Basic Mechanism of a TRPG-based Story Generation Game

First, we show a framework of story generation based on TRPG (Section 4.1). Next, we propose a game system based on the above framework (Section 4.2).

4.1. A framework of story generation based on TRPG

We present a model for story generation based on the automatic narrative generation game developed by Ono and Ogata [9]. Fig. 2 shows the model. A scenario is a structure that determines the scenes that start the story and scenes that can occur during the story. The story is a collection of events or scenes narrated by the GM. The story state changes with the scenes. Each PL monitors the story and interfere with the story when the state of the story meets certain conditions. “Interference” means to the process of changing the scenes that the GM plans to narrate.

In Fig. 3 that shows a story generation model of the proposed model, a GM inserts a scene, which comprises of an event and states, into a story. A state is defined using data concerning characters, objects, and places. A scene inserted into a story generating by a GM is according to a story’s framework made preliminarily by herself or himself. Based on the scene by the GM, the PLs insert a scene following the scene by the GM or rewrite the scene by the GM. The scene is added to the last part of the existing story generated and a story is gradually extended. In addition, in the narrative generation model of the game, the story is thought that a scene and the next scene have a causal relationship or temporal relationship. However, we do not strictly consider such relationship semantics in this stage of the study. Next, “rewriting” relates to a function that change the global framework of the story to be generated through the use of the different story

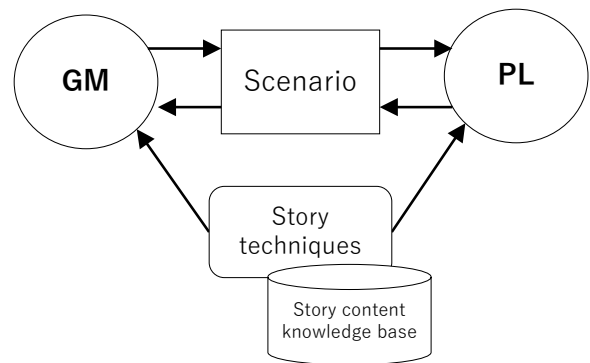


Fig. 2. Story generation model based on TRPG [10]

framework from the story framework that the GM has used.

The GM can change the scenes to be inserted based on the scenes by PLs. The GM will insert a scene that deviates from the prepared story framework, especially if the PL’s rewriting creates a significant change in the story. In the next section, we explain the methods of generation more specifically.

4.2. Basic mechanism of proposed game system

The story in the game system is based on the Russo-Ukrainian War. In particular, the story was prepared in accordance with a Web article published by Sankei Shimbun, “Jikeiretsu de Miru Ukuraina Shinkō” (*The Invasion of Ukraine in Chronological Order*). The article is edited according to the chronological order of the war. The first event in the article corresponds to the event at 12:18 on February 24, 2022. The article is still being updated [18].

In particular, the game system uses the timeline from 24, Feb., 2022 to 30, Apr., 2022. Table 1 shows a part of the timeline. The “Date” and “Time” refer to the date and time the article was published. “Content” is the title of the article and indicates the event that took place. “Category” means categories of “Content” and includes five types of content categories as shown in the following description.

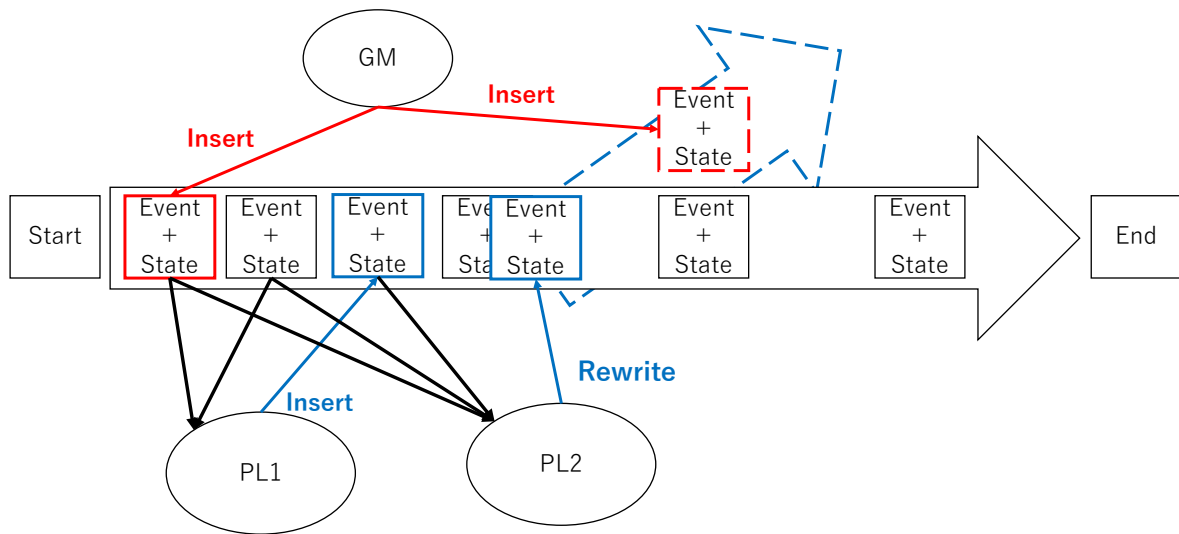


Fig. 3. The process of the story generation by TRPG

1. “Military” is information related to the military actions and damages in Russia and Ukraine.
2. “Negotiation” is information related to the meetings, conferences, and speeches regarding to the Russo-Ukrainian War.
3. “Economy” is information related to the finances, imports, and exports regarding to this war.
4. “Anti-war” is information related to the anti-war speeches and demonstrations on this war.
5. “Sport” is the topics associated with the sports in the context of this war.

The game system consists of two PLs and a GM. The user’s role corresponds to a PL. Another PL corresponds to the *World Commander Hashimoto-kun** (we call it as “*Hashimoto-kun*” in the rest of the paper) [12], [19]. The user is a character on the Ukraine side. *Hashimoto-kun* is a disinformation speaker based of the Russia side’s opinions. On the other hand, the GM manages the story to be generated through the game process and presents adequate events the Russo-Ukrainian War prepared in this system to the PLs. The GM also controls a parameter called “morale.” The “morale” parameter that is expressed as an integer indicates the power of Ukraine’s willingness of the resistance to Russia. When the parameter is less than 0, Ukraine stops resisting Russian invasion and Ukraine will collapse. The user’s objective is to continue the resistance to Russia to hold the game story.

The generation algorithm is as follows. In this algorithm, “event” appears in the story based on the timeline of the Russo-Ukrainian War [18]. Here, on the above events, states are not considered. “The list of processes” is a

variable that stores events to be used in the story generation processes.

- (i) The GM extracts the first event from “the list of processes.”
- (ii) The GM shows the above event to *Hashimoto-kun* (PL1).
- (iii) *Hashimoto-kun* represents his opinion about the event.
- (iv) The user (PL2) decides whether to add a new event based on the *Hashimoto-kun*’s opinion to the story to be generated.
- (v) The GM calculates Ukraine’s “morale.” In the following paragraph, the calculation method is described in detail.
- (vi) If “the list of processes” is empty or “morale” is less than 0 or is equal to 0, the generation process finishes. Otherwise, the process returns to Step (i).

The initial value of “morale” is 100. The value of “morale” increase or decrease based on the events shown by the GM or the opinions of *Hashimoto-kun*. The events to be categorized as the type that indicates the willingness of the Ukraine government increase the value of “morale.” In contrast, the anti-war events of the Ukraine government decrease the valued of “morale.” If the value of “morale” falls below 0, the GM appends an event showing the surrender of Ukraine to the final part of the story.

* Hashimoto Toru is one of the most famous commentators on television and was a lawyer and politician. Hashimoto is expressing his opinions on politics, economics, and many social areas through media. *World*

Commander Hashimoto-kun is based on his posts of Twitter from February 2022 to June 2022.

Table. 1. A part of the timeline of the Russo-Ukrainian War

Date	Time	Category	Content
Feb. 24	12:18	Military	Putin decides to launch military operation in eastern Ukraine
Feb. 24	12:29	Military	Explosions in Kiev and other cities, reported by CNN.
Feb. 24	13:14	Military	Russia launches attack on Ukraine
Feb. 24	14:10	Military	Russia's full-scale invasion lands in the southern part of the country, martial law is declared in Ukraine.
Feb. 24	14:33	Military	Ukraine declares state of war
Feb. 24	15:26	Military	Administration Holds NSC Meeting to Discuss Response to Russian Invasion of Ukraine
Feb. 24	18:55	Negotiation	Ukraine overcomes distance to Russia, President Zelensky announces
Feb. 24	19:14	Military	Ukrainian Presidency "Over 40 Dead, Dozens Injured"
Feb. 24	20:02	Negotiation	Foreign Minister Hayashi demands immediate withdrawal, Russian ambassador says invasion didn't happen.
Feb. 24	23:46	Negotiation	G7 Summit begins discussions on response to Russia's invasion of Ukraine
Feb. 25	8:46	Economy	Announced 3 additional economic sanctions against Russia, Prime Minister Kishida's press conference
Feb. 28	6:39	Anti-war	Anti-war protests in Russia Over 2,700 detained in 52 cities
Mar. 3	11:55	Sport	"Disappointed" by Russia's Acceptance of Para Participation, U.S. and U.K. Release Statement

of "morale" falls below 0, the GM appends an event showing the surrender of Ukraine to the final part of the story.

5. Example of Story Generation

An example of the generation results is shown. The input is the temporal sequence of Russo-Ukraine War. In particular, 530 events from 24, Feb., 2022 to 30, Apr., 2022 are given to PL from GM in order from the first

event. Through the process, the value of "morale" becomes 0 or less, the game process is over. In the following generation result, after 65 events were given to the PLs from the GM, the value of "morale" became -10 and the process was over.

{GM (Morale 100)}: Putin decides to launch military operation in eastern Ukraine. (Event 1)

{World Commander Hashimoto-kun}: The mission of a country with no military power (such as Ukraine) should be to protect its citizens, and should refrain (in Hashimoto Toru's opinion) from raising grandiose ideals that are beyond its own power.

{User}: world commander's opinion is wrong.

{GM (Morale 87)}: Explosions in Kiev and other cities, US CNN reports. (Event 2)

{World Commander Hashimoto-kun}: International political scientists such as Mr. Shinoda, who believe in the supremacy of the international order, a battle-first policy, and the unavoidable sacrifice of civilians, can easily withdraw troops without leaving civilians behind for reasons of military rationality, but this is absolutely wrong. Even if we consider military rationality, the primary purpose of withdrawal should be to protect civilians, and the decision to continue the war should be based on this rationality.

{User}: world commander's opinion is wrong.

{GM (Morale 76)}: Russia begins attack. Ukraine. (Event 3)

{World Commander Hashimoto-kun}: Stopping Russia's use of chemical weapons and tactical nuclear weapons requires either crushing Russia militarily or a political compromise, but if the former cannot be adopted to avoid a world war, NATO should reach the latter political compromise with Russia.

{User}: world commander's opinion is wrong.

{GM (Morale 64)}: Russia has launched a full-scale invasion, landed in the south, and declared martial law in Ukraine. (Event 4)

{World Commander Hashimoto-kun}: With NATO not intervening militarily, China not imposing economic sanctions on Russia, and the economic sanctions of the Western countries worrying about their own energy, when one wonders what the goal of Ukraine's resistance is to gain, (Hashimoto) should leave it to the Western countries to defeat Russia and evacuate the people first who want to escape anyway Hashimoto thinks that the people who want

to flee should first be evacuated out of the country, leaving Russia to be defeated by the Western powers.

{User}: world commander's opinion is wrong.

{GM (Morale 64)}: Ukraine declares wartime regime. (Event 5)

{World Commander Hashimoto-kun}: Western countries should responsibly and accurately inform President Zelensky about the comparison of Ukrainian and Russian military forces, analysis of the war situation and future prospects, including the disintegration of Putin's regime, and should save Ukrainian lives as much as possible, which is true support for Ukraine

{User}: world commander's opinion is wrong.

{GM (Morale 66)}: Government holds NSC meeting to discuss response to Russian invasion of Ukraine. (Event 6)

<55 events are omitted>

{GM (Morale 21)}: U.S. Approves Additional \$23.4 Billion Military Assistance to Ukraine (Event 62)

{World Commander Hashimoto-kun}: NATO should hold talks with Russia on a political conclusion on a European-Ukrainian security framework, backed by military force

{User}: world commander's opinion is wrong.

{GM (Morale 28)}: Russia reportedly places intelligence officials under house arrest, Putin "punishing" them. (Event 63)

{World Commander Hashimoto-kun}: When war breaks out and military power and its equipment are "used" by state power, the way of exercising power that sacrifices the people should be restricted by the Constitution, but there is no organization or discussion of this point in Japan today.

{User}: world commander's opinion is wrong.

{GM (Morale 22)}: Another attack in western Lviv: explosions early in the morning, shaking buildings. (Event 64)

{World Commander Hashimoto-kun}: There are reports of a sharp increase in deaths, fears of a quagmire, ceasefire negotiations, difficulties in reaching a compromise, over 1 million Ukrainian refugees, and the invasion of Russian troops.

{User}: world commander's opinion is wrong.

{GM (Morale 4)}: Russian missile near Lviv, military base in western part of the country, 35 dead. (Event 65)

{World Commander Hashimoto-kun}: The U.S. is the most powerful nation in the world, and NATO has completed collective security assurance by 30 nations, including the

nuclear powers of Britain and France, but Japan has no nuclear weapons, relies on the U.S., and has insufficient collective self-defense. In order to maintain the balance of military power and the balance of honor (with whom?), a pipeline for dialogue is absolutely necessary. Dialogue is (and should be) absolutely necessary to maintain the balance of military power and the balance of power and dignity.

{User}: world commander's opinion is wrong.

{GM (Morale -10)}: Ukraine accepts requests of Russia. Ukraine collapses. (Event 66)

The 66th event represents the collapse of Ukraine and is inserted by the GM at the end of the generation. As described in Section 4.2, GM inserts append the extra event. The event is not included in the input temporal sequence of the Russo-Ukrainian War.

We explain a story generation process according to the above generation example. First, the GM gives the following event, "Putin decides to launch a military operation in the eastern Ukraine", to the PLs (*Hashimoto-kun* and another game user). Next, *Hashimoto-kun* shows the following two types of instructional opinions for the game user: the first opinion is that the nation with no military power, i.e., like Ukraine, must to protect the nation's people from other countries' invasion. The second one is that the nation needs to weaken wrong thought, such as drastic resistance to another country, i.e., Russia.

He also mentions that "Japan, which is constrained by Article 9 of the Japanese Constitution[†], should do the same." In the context of Ukraine, the opinion encourages surrender and decreases its "morale" of Ukraine. The game user accepts or rejects the *Hashimoto-kun*'s opinion. "Morale" is decreased when the *Hashimoto-kun*'s opinion is affirmed and increased when it is denied. The opinion does not necessarily only decrease morale.

6. Discussion

We discuss the problems, limitations, and future works of the proposed game system described in the previous chapters. In the above description of "problems" and "limitations," the former is the problems in the developed system and the latter means the problems outside the developed system.

We have not fully considered the power of *Hashimoto-kun*'s influence on "morale." Although the opinion of *Hashimoto-kun* basically decrease the value of "morale" as indicated in Section 5, the value rarely increases by his opinion. For instance, we can see the following example—"Western countries should responsibly and accurately inform President Zelensky about the comparison of Ukrainian and Russian military

[†] The following shows the actual statement of Article 9 of the Japanese Constitution – "Aspiring sincerely to an international peace based on justice and order, the Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as means of settling international disputes.

^② In order to accomplish the aim of the preceding paragraph, land, sea, and air forces, as well as other war potential, will never be maintained. The right of belligerency of the state will not be recognized." (https://www.japaneselawtranslation.go.jp/ja/laws/view/174#je_ch2)

forces, analysis of the war situation and future prospects, including the disintegration of Putin's regime, and should save Ukrainian lives as much as possible, which is true support for Ukraine." As described in the next section, considering the relationships between *Hashimoto-kun*'s opinion the morale parameter. We shortly discuss this problem in addition to another problem.

6.1. Problems

The proposed game system has two problems. The first is the criteria for judging *Hashimoto-kun*'s correctness. The second is the vagueness of the characters' positions.

In the first problem, the objective of the proposed game is to preserve the nation, Ukraine. When Ukraine's resistance to Russia's invasion ceases, Ukraine collapses. And, when Ukraine collapses, the game ends. Therefore, the parameter "morale" is reduced by the *Hashimoto-kun*'s opinion urging Ukraine to surrender. Although *Hashimoto-kun* says that people's lives should be actively defended, this opinion itself is correct from a broad perspective. However, in the context of the Russo-Ukrainian War, as Ukraine's surrender is connected to the Ukraine's collapse, we regard this kind of opinion by *Hashimoto-kun* as incorrect thinking.

In the second problem, we have not clearly defined the positioning of PLs in the Russo-Ukrainian War. The PL corresponding to the game user, character, stands on the Ukrainian side. This kind of character supports the Ukrainian resistance against Russia and can be a Ukrainian citizen or a person from a particular nation other than Ukraine.

On the other hand, the PL corresponding to *Hashimoto-kun* is a character who stands on the Russian side. This character supports the Russian invasion of Ukraine and can be a Russian citizen or a person from a particular nation other than Ukraine. However, *Hashimoto-kun* is a mechanism based on a famous Japanese commentator. The PL corresponding to *Hashimoto-kun* is regarded a Japanese person. The PL's positioning in the game system influences the game user's choices. Moreover, the game user can be a disinformation speaker standing on the side of Russia.

6.2. Limitations

There are two limitations of the proposed game system. The first is the fact that stories generated are too simple. The second is that the number of the characters simulated is too few. For both, we need to expand the system to generate more interesting stories by improving the above limitations.

In two patterns of the stories generated in the proposed game are, the first is that Ukraine collapses and the Russo-Ukrainian War finishes. The second is that Ukraine continues the resistance to the Russia invasion to Ukraine. However, we can also consider other patterns. For example, there are the following patterns—"Ukraine collapses, but Ukraine's guerrilla continues to resist to

Russia," "The Russo-Ukrainian War finishes and Ukraine continues as the puppet government of Russia."

In the second limitation, the characters simulated are divided into only three types. The first type is the disinformation speaker who is the PL corresponding to *Hashimoto-kun*. The second is the character opposing disinformation who is the PL corresponding to the game user. The third type is the character affected by disinformation and is represented based on the value of "morale" controlled by a GM. In the proposed game system, only one character is used by each type in the above three types. In this paper, we have not considered the situation in which multiple characters are interacted each other. In real societies, however, many disinformation speakers exist and many people are affected by their discourses based on disinformation.

6.3. Future works

This part describes the future works based on the above two sections. The first future work is to give to the user different positionings. The new function will enable to expand the range affected by disinformation in the proposed game system. The second is to increase the number of characters. For example, the spread of disinformation on social networking services is enhanced through the interaction of many characters. In one of the future works, the use of many characters in the game world will increase a variety of results affected by various types of disinformation to observe and evaluate them.

7. Conclusion

We presented a game concept based on the Russo-Ukrainian War using the framework of an automatic narrative generation game. Based on the timeline of the Russo-Ukrainian War as published by Sankei Shimbun, we prepared a story of the Russo-Ukrainian War up to April 30. We then summarized the characters and progression of the story based on the Russo-Ukrainian War story within the framework of the automatic narrative generation game. We then presented an example of story generation using the prepared story. In this example, the story progressed when the user (i.e., the player) accepted or rejected the statements of instructions given by *World Commander Hashimoto-kun*. Finally, we described important two future works in the above section.

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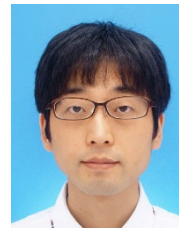
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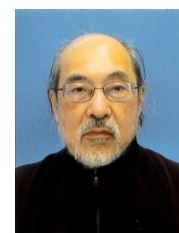
Authors Introduction

Dr. Jumpei Ono



Jumpei Ono received his bachelor’s degree from the Faculty School of Software and Information Science, Iwate Prefectural University in 2010. He received 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. He is interested in the interdisciplinary field including computer game technologies, AI, cognitive science, and narrative generation system.

Prof. Takashi Ogata



Takashi Ogata received his bachelor from Waseda University in 1983, his MS from Tsukuba University in 1992, and his PhD from the University of Tokyo in 1995. After his industrial experience at software development 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, and he is currently a professor in the Faculty of Informatics at Yamato University since 2024. He has studied broad research fields, including AI, cognitive science, narrative generation, narratology, kabuki, narrative warfare, and content creation.
