
Character Development Support Tool for DREAM Process

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Abstract

The purpose of this research is to develop a ‘Developing Support Tool’ for creating characters that will appear in visual content, such as animation, feature films, television programs, A character in visual content is an object which is able to move with its own ‘mind’ to create progress in a story, as well as arouse empathy from viewers. The impression that a character leaves viewers with is very important, which means that developing a character is not just about choosing the right shape or color. Determining a character’s background, facial expressions, actions, and other characteristics are just as essential. In this research, we have constructed the ‘Character Background Tool’, the ‘Character Digital Scrapbook Tool’, and the ‘Character Analysis Tool’ to efficiently create characters that are consistent with the aim of the DREAM production process. These tools save textual information about characters into XML, and use it throughout the DREAM process. As part of our research, we have conducted an evaluation test using these proposed tools for developing a character. From the test results, we found out that these proposed tools are useful in character development. (Define DREAM) ‘Developing’, ‘Rendering’, ‘Exploiting’, ‘Activation’, and ‘Management’.

Keywords : character making, character background, digital scrapbook

1. Introduction

Because of changes in production processes and exhibition methods, the visual content industry is required to produce an increasing large volume of high quality content (define the type of content that you are dealing with). Due to this, content production methods are critical. With the rapid spread and advancement of computer technology, it has been possible to increase the efficiency of production tasks such as coloring animation and digital video editing. However, development of software or databases to assist the preproduction process stills lags far behind. Therefore, there are opportunities to develop methods to improve the preproduction process and to use this information throughout the production. The creation of scenario and character are two very important elements in the preproduction process. It can be said that story represents the interior of content, and character represents the exterior of it.

Therefore, there is a direct connection between creating an appealing character, and creating appealing content, but current software does not support this connection. This is exemplified by many businesses that sell figurines or toys made from their content, in order to develop their brand. It is now also common to see many books published which document the production experience of creators, as well as books that use imagery to illustrate the character development process. There are also many commercial software packages for image editing such as Adobe Photoshop, or Maya for 3D modeling/animation. But due to the disconnect between

character background and scenario, there is no software that can help creators make artistic choices during the character development process. [1-6].

The purpose of this research is the proposal of the “DREAM” method for creating characters and implementation of character making tool based on “DREAM”. In this research, a ‘character’ is defined as (1) an object which has its own personality; (2) something that is able to move with its own ‘mind’; (3) something that the viewer is able to empathize with; and (4) something the viewer is able to like or dislike. Character making in this research is the creation of an object which fulfils the four criteria mentioned above, and is accomplished by a process that spans the initial idea and design to the distribution of content, which we will call ‘DREAM’.

In this research, three types of character development support tools are developed based on the DREAM process for character production. The first tool is a character background production system, which is used to record and consolidate character background information. The second tool is a character digital scrapbook, which archives physical features of existing characters into a database, which can then be used to create new characters. The third tool is a character analysis tool, which graphically represents characters based on a general set of personality attributes, assisting the process of character analysis.

In Chapter 2, we discuss the research related to character production. Then, in Chapter 3, the DREAM process is explained. In Chapter 4, we explain the structure of the proposed tools and how to use them. In Chapter 5, we explain the character building evaluation experiment using these proposed tools.

2. Related work

In this chapter, existing character creation research and methodology will be explained. This includes research related to character creation such as scenario development, character image editing techniques, and 2D sketch techniques.

(1) Scenario for Character Development

Kaneko, Kanno et al. [7-10] proposes a step-by-step method for quickly describing any scenario written for visual content. The objective of this method is to break the scenario into its most basic pieces of information (title, genre, target audience, etc.) This research uses Kanno's method to produce character background information (see Table 2).

(2) Collage Method and Image Database

Directors who cannot draw well will have difficulty producing the character design they have in mind. As a solution, Watanabe et al. [11] proposed a method to assist directors by producing character designs using a collage of pre-existing character images. Watanabe uses Poisson Image Editing to composite images of different character parts that have been resized, rotated and moved. This collage system enables the user to easily design an entirely new character. In our research, this collage system creates new characters based on multiple character images.

Kawatani has proposed a method to manage character images by labeling and archiving the divided parts of characters [12]. In this research, Kawatani has proposed a method where character face parts are divided into clusters such as hair, skin, eyes, and managed by assigning metadata. This method is purely visual, and so does not include management of character information.

There is also research to support a design process that uses "Kansei words" (words that communicate feeling, sensitivity or impression) to analyze images such as by Harada [13] and Kuroda [14]. But this research has not yet been made applicable to character production for visual content.

(3) 3D Sketch for Character Making

There is research that can generate character shapes from a user's sketch input, such as Smooth Mesh [15, 16]. The objective of this software is to produce a 3D model based on 2D sketch input. There is much research by Kondo [17] and Olsen [18] that introduces sketch input concepts, but they are mainly focused on shapes. Currently, there is no software that can use scenario or character profile information to help generate a character's physical appearance.

3. DREAM Process

In this chapter, we will explain the "DREAM" method for character making. Figure 1 shows the entire flow of the DREAM process. DREAM consists of 5 stages which include 'Developing', 'Rendering', 'Exploiting', 'Activation', and

'Management'. In our research, we focus on the 'Developing' stage, and to analyze the character produced in that stage, we will also explain the 'Exploiting' process.

3.1. Developing Process

In this section, we will explain what goes into a character background, as well as how to categorize existing characters by attributes for the 'Developing' process.

3.1.1. Content Information and Character Profile Information

In this section, we will explain the character profile. Characters that appear in visual content need a variety of background information to create personality. Hence, a template [1] is proposed to divide a character's profile into categories. This template is separated into 2 categories, which distinguish items to describe general project information from items to describe a character's specific background information. Table 1 shows the items for general project information and Table 2 shows the items for character background information.

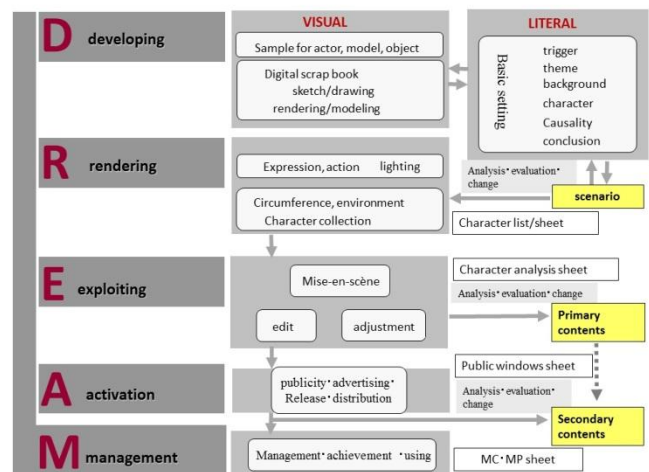


Fig. 1 Overview of DREAM Process

Table 1 Entry Items for Project Information

1. Project Title
2. Date and Time
3. Production Venue
4. Content Genre
5. Content Details
6. Content Objective
7. Target Audience
8. S Plot (Summary) Setup, the Confrontation and the Resolution
9. Scenario Writing S, M Plot

Table 2 Entry Items for Character Profile Information

Item	Details
Character Name	Character name
Role	Role played in story
Basic Details	Age, gender, etc
Society Setup	Family, job, etc
Exterior Setup	Height, body, etc
Personality Setup	To oneself, to others, etc
Life Setup	Hobby, habits, etc
Ability Setup	Physical ability, intellect, etc
Related Figures	Related people
Concept	Character setup's aim, etc
Remarks	Other remarks

3.1.2. Categories of Character by Kansei Keywords

In this chapter, the categorization of existing characters by attribute will be explained. This is a method by which users can identify characters based on universal personality traits that are ranked on a numeric scale according to intensity.

In this research, the Character Image Scale proposed by Motegi[1] is applied as a method to categorize characters by personality trait. This scale takes 2 pairs of opposite attribute words, such as "kind" & "cruel" and "cheerful" & "gloomy", and places them at opposite ends of the X and Y axes on a graph. The user then identifies values on a scale of 0 to 5 for both attributes, enabling the computer to plot the character's position on the graph. Once a character image has been entered into the system, users can look it up based on its attributes.

To narrow down the adjectives needed for computation, Motegi proposed 12 permanent attribute pairs after doing analysis on existing characters. Table 3 shows the keywords selected for this research. Also, to more efficiently categorize the characters, seven types of roles (protagonist, collaborator, antagonist, victim, client, aid, opposition) [1] are used. In this paper, attribute keywords and the seven types of roles are used to develop the Digital Scrapbook, which is a character register/retrieval system.

Table 3 Impression Keywords

Serious↔Playful	Aggressive↔Shy
Firm↔Timid	Active↔Passive
Cheerful↔Gloomy	Kind↔Cruel
Passionate↔Calm	Stubborn↔Obedient
Indecisive↔Decisive	Mature↔Immature
Common↔Eccentric	Showy↔Plain

3.2. Exploiting Process

Exploiting is a phase where the data produced in previous processes is exhibited. In this process,

character designs are determined and analyzed prior to the production. This can be very helpful to filmmakers as they envision the world of their characters, allowing them to spot and improve weak points in the design. For example, if there is a tendency on the part of the filmmaker to create characters of a particular type (either consciously or subconsciously), this tool will bring that decision to their attention, possibly initiating edits to improve and vary their characters.

The data used for this process is created by character analysts, who are trained by the Visual Industry Promotion Organization (VIPO) in Japan to assess the quality of a character objectively before physical production starts. This analysis is aimed at improving any weaknesses in character (e.g. Failure to arouse empathy with the audience, failure to fulfill a particular role in the story) [6].

In this paper, character analysis criteria is divided into items by referring to an analysis template [6] that was created based on character background. The analysis criteria is divided into five categories which are appearances, interior, function, other materials, and an overall category. Implementation of the analysis support tool for converting character analysis information into XML will be explained in chapter 4.

4. Production Steps and Tool Proposal based on DREAM

In this chapter, the three tools developed based on the DREAM process and their application will be explained. 4.1 explains the Character Background System; 4.2 explains the Digital Scrapbook System; 4.3 explains the Character Analysis System; and 4.4 explains the recommended application steps for these tools.

These tools will save the character information generated during use into XML format. By doing this, it is possible to consolidate information and manage it centrally. This tool has two feature points.

1. All information of "DREAM" process can be converted and stored in XML. Character creation information can be unified and managed; therefore, large information sharing costs can be reduced.

2. Using the proposed tool, novice class users can easily produce the information required for character making. The necessary information for character making is the literal setting information of the character, which is then transmitted to the person who is in charge of the next process.

4.1. Development of Character Setting Tool

The character setting support tool for creating and managing character profiles efficiently is used to record and manage the character profile information such as in Table 1 and Table 2.

Information input using this tool will be saved in an XML file. The Character Scrapbook Tool introduced in Chapter 4.2 shares the same data entry structure, thereby helping to centralize data management and bridge the tools together. The startup screen for Character setting tool is shown in Fig. 2, while Fig.3 shows the XML file structure.



Fig. 2 Startup Screen for Character Background Tool

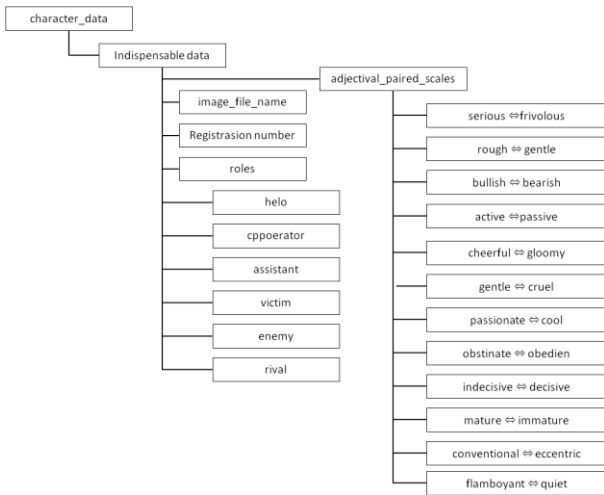


Fig. 3 Structure of Character Background Information

4.2. Structure of Digital Scrapbook

The Digital Scrapbook[20, 21], a tool for registering and looking up existing characters, creates an archive of character parts, which are labeled by the user according to the attribute scale described in 3.1.2. These labels are turned into metadata, which can then be used in searches when the user is looking for a character with unique attributes. When the user enters attribute criteria, the program will automatically call up character parts that most closely match those criteria.

The metadata is saved into XML format, and is divided into two types: data essential for categorizing the character using the Character image scale (attributes and role information as in 3.1.2), and data related to character setting (name, height, weight, etc., as in Tables 1 and 2). This information is searchable, providing convenient points of reference for the user. The Character Impression Data structure is shown in Figure 4. Figure 5 shows the display of the character input screen. The character image will be converted into numbers based on the 12 attribute scale. With this, a character's attributes can be set. Figure 6 shows the character search screen. After setting the attribute scale, the

character images will appear on the graph. The character roles can also be set in this screen.

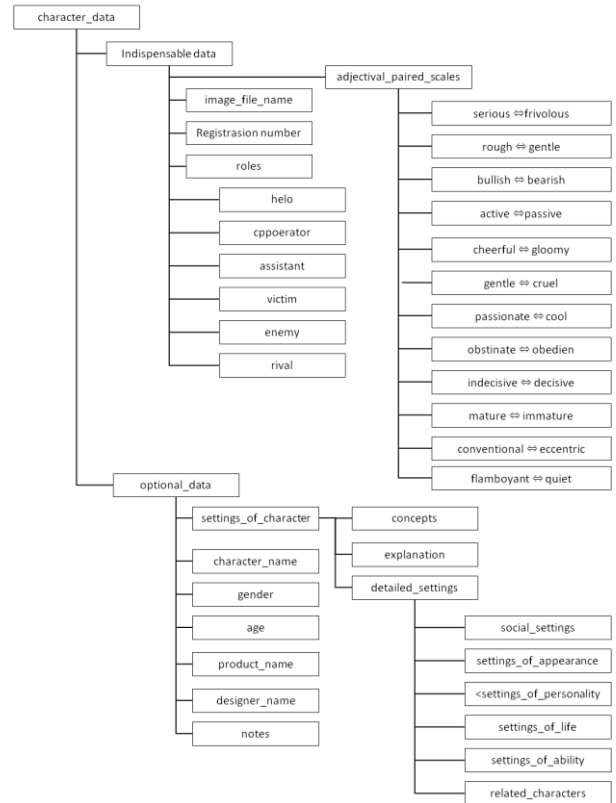


Fig. 4 Structure of Character Attribute Data

4.3. Development of Character Analysis Tool

In this chapter the Character Analysis tool, which is a tool to analyze and evaluate characters, will be explained [22]. This tool is designed to increase the efficiency of character analysis [1]. Figure 5 shows a sample XML file produced by the tool and Figure 6 shows the structure of XML produced by the analysis tool. This tool's interface consists of textboxes and radio buttons. Textbox fields are optional and can be used for making miscellaneous notes. Radio buttons indicate required data fields, and there are options of 0 to 9 for each field.

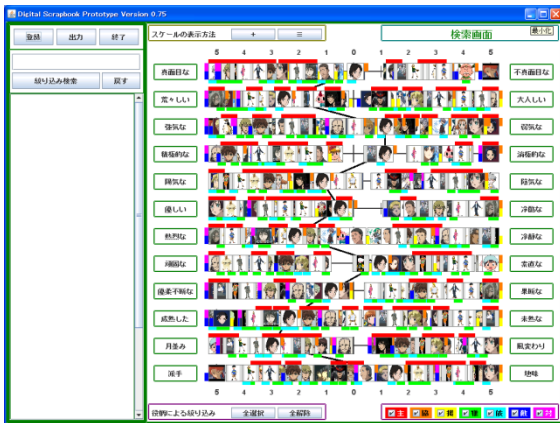


Fig. 5 Input Interface for Digital Scrapbook

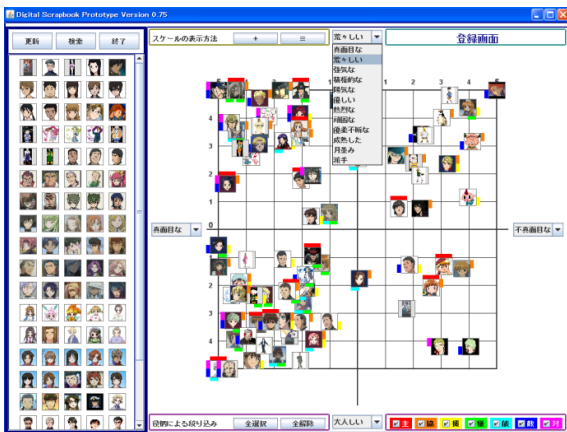


Fig. 6 Retrieval interface for Digital Scrapbook

```
<Appearance_Specific_Items>
- <Body>
  <Comment>平安時代らしさ、清少納言らしさの不足(黒
  長髪と若干の顔立ちの特徴のみ) </Comment>
  <Value>5</Value>
</Body>
```

Fig 7 Example of XML in Character Analysis Tool

4.4. Character Production Steps Using Proposed Tools

In this chapter, the four steps for character production using the three proposed tools will be explained.

Step.1 Plot Production of Character Profile

In this section, the production of character profiles and plot to summarize story will be explained. This data is input and stored using the Character Setting Support Tool.

1. Production of content information such as S, M Plot

Content information is inputted using the Character Setting Support Tool proposed in Chapter 4.1.

First, plot for visual content is inputted. For the purposes of our research, we refer to “plot” as a summary of visual content. In DREAM there are two types of plots: S for short plot and M for Medium plot. S plot refers to a summary of about 60 words, while M plot refers to about 200 words in Japanese.

2. Character Profile Information Input

Next, character profile information shown in Table 2 is input by the user using the Character Background Support tool. With this tool, filmmakers can check and confirm the information they have created about their characters.

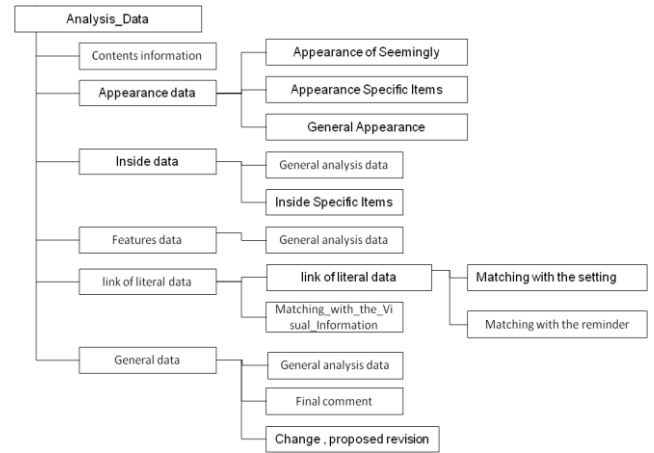


Fig 8 Structure of Character Analysis Data

Step.2 Input and Retrieval of Existing Characters

In this chapter, the character archiving and search functions of the Digital Scrapbook will be explained.

1. Registering a Character

In Digital Scrapbook, users need to set the value for 12 sets of attribute keywords for each character part (face, hands, clothes, etc.) . The 12 sets of attribute keywords are arranged in one screen, shown in Figure 5. The image of the character part will appear in the middle of the axis and user shall move the images towards the appropriate attribute accordingly.

2. Looking up a Character

In Digital Scrapbook, by choosing two out of 12 pairs of attribute keywords from a pull-down menu, users are able to setup an attribute graph. Once keywords have been chosen, the most closely matching character part images will appear. For example, if the user chooses “Serious⇔Playful” and “Aggressive⇔Shy”, then images entered into the database under those keywords will appear on the graph. These images can be used as reference for a unique design, or as parts of a collage design.

Step3. Creating a Character Design Sample

1. Production of Design Draft using Collage

At this stage, a new character is constructed from various character parts that were called up by the attribute search. Parts of the character are cut out and placed in the collage. Edits such as resize, rotate, transform, and color changes are done for each part. Image editing software such as

Adobe Photoshop or CharaCollage[11] can be used for making the collage.

2. Using Image Editing Software and Sketches

Fine adjustments are done by drawing sketches based on the collage. Sketches of a character can be drawn by hand or by using image editing software, and can be either colored or left in black and white.

Step4. Analysis of Produced Character

By using the Character Analysis Tool, grading is done for items that are mentioned in Chapter 3.4 on a scale from 0 to 10. Some data is inputted with the radio button, while other data uses the text box. Character attribute evaluation is done based on the numbers input for each attribute.

5. Evaluation

In this chapter, character production experiments using the proposed tool and their evaluation will be discussed. First, the experiment objectives and methods are described in 5.1. In 5.2, examples of character production experiments done by the test users are shown. In 5.3, an evaluation of the proposed tools will be detailed, while 5.4 contains interview results with the test users.

5.1. Experiments Objectives and Method

The experiments were performed to test the usefulness of the proposed tools and to evaluate the validity of character profile criteria. The experiment was to produce a character using the proposed tools.

The experiment steps are listed below:

- (1) Creation of visual content profile information and S, M Plot
- (2) Entering character profile information into a searchable archive
- (3) Collection of existing character images and categorization based on attributes
- (4) Producing a design draft based on collage and/or sketch
- (5) Evaluation and analysis of produced character

In these steps, the Character Setting Tool is used for (1) and (2), the Character Digital Scrapbook is used in step (3), and step (4) uses the Character Analysis Tool. The Purpose of this experiment is to evaluate the effectiveness of our method and proposed tools.

The subjects for this experiment are 5 professional movie creators and 18 Tokyo University of Technology students..

登場人物名: 神保 明人	役別: 主人公
基本設定 (生まれ・家族構成・職業など): 生まれ : 京都府出身 家族構成 : 父・母・兄・妹 職業 : 大学3年生	外見設定 (性別・年齢・大きさ・髪色・服装・表情など): 性別・年齢 : 20歳 大きさ・高さ : 標準で175cmくらい 服装 : ゆったりした服装 表情 : あっとした表情
生活設定 (習慣・趣味など): 習慣 : 古本屋巡りがライフワーク 趣味 : 読書・古本漁り	性格設定: 人当たりが良く、人望がある。 ただ、自分のことに関しては不器用で、奥手な面もある。
能力設定 (身体能力・運動・特殊能力など): 身体能力: 元陸上部で持久力はあるが、筋力はたいてい弱い 頭脳 : 本で得た知識が多く、成績は上の下くらい 特殊能力: 霊感が強い	関連人物: 同窓生 柴田、山本、新田 同じバイト先 本郷、石原

Figure 9(1) Character Settings/Background

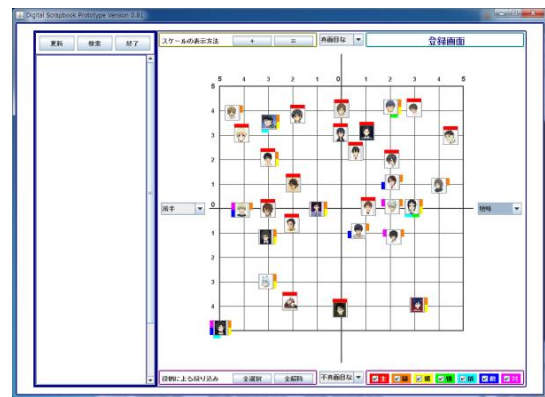


Figure 9(2) Character Impression Categorization

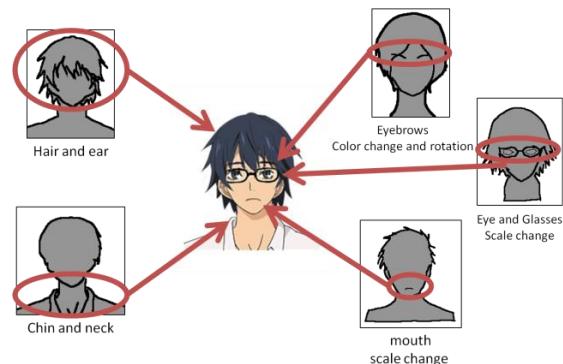


Figure 9(3) Production of Design Sample

5.2. Example of Character Production Experiment

Figure 9 and Figure 10 show the examples of a character produced using the proposed tools.

Each example consists of (1) Character background; (2) Categorization of collected character images by attribute; (3) Example of a character sample made using the collage method; and (4) Character sample drawn by hand or with image editing software.



使用ツール : Adobe Photoshop, Adobe Illustrator, Paint Tool SAI

Figure 9(4) Sample based on a Collage Image



Figure 10(4) Hand drawn Sketch Design Sample

<p>基本設定</p> <p>生まれ : 日本の西国 家族構成 : 両親共に死去 職業 : 侍(領主)</p>	<p>外見設定</p> <p>性別・年齢: 19 大きさ、太さ: 長身(約185cmくらい)。 服装: 朱塗りの甲冑に黒い兜と袴。 表情: 人から好かれるような穏やかな表情。 イメージ: 柴犬</p>
<p>生活設定</p> <p>習慣: 鍛錬を欠かさない。 趣味: 色々なものに興味を示し、様々な文献を読んだりしている。</p>	<p>性格設定</p> <p>純粋な思考の持ち主で、先入観や噂などに左右されず、自分で感じたことを信じる。人に対しては温厚で、親切。忠義にあつい。勇猛果敢。頑固。</p>
<p>能力設定</p> <p>身体能力: 槍の達人 頭脳: 柔軟な考えにより奇抜な発想で戦術を立てる。</p>	<p>関連人物</p> <p>アヤメ: 幼い頃、世話になったことがあり恋心を抱く。 弥三郎、飛昌が幼い頃からずっと傍にいる世話係り。 永井康政: 敵軍の大将。</p>

Figure 10(1) Character Profile

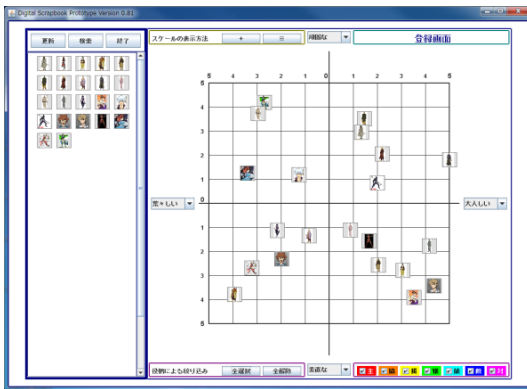


Figure 10(2) Character Attribute Categorization

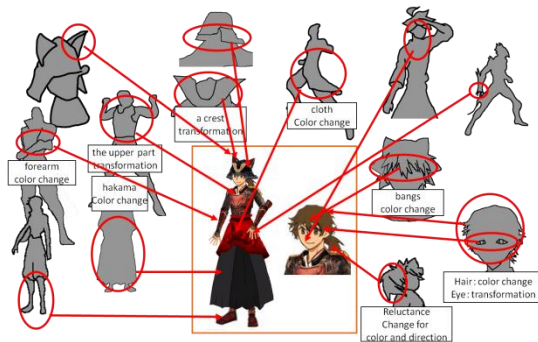


Figure 10(3) Production of Design Draft based on Collage Tool

5.3. Evaluation of Character Development Support Tools

In this chapter, the evaluation of the Character Background, the Digital Scrapbook and the Character Analysis Tool will be explained.

5.3.1. Evaluation of Character Settings/ Background Production Tool

All testers were able to input the content information and character background information by using the proposed tools. Since the character background information generated using our defined parameters was found useful to the character creation process, we concluded that the Character Setting Tool is useful. Also, the input character setting information can be managed centrally, therefore increasing the ease of data management.

5.3.2. Evaluation of the Digital Scrapbook

The objective of this experiment is to verify whether or not character attributes can be effectively categorized. Thus, the validity of 12 sets of attribute keywords and 7 character roles were tested.

Below are the test results for the usability of predefined attribute keywords and character roles:

a. Usability of 12 sets of attribute keywords

To test the usability of 12 sets of attribute keywords, an experiment to input 100 character images was conducted. Figure 11 shows the distribution diagram for the input, with different attribute terms listed along the X axis. As a result, more than 20 characters were input under each attribute keyword. Based on experiment results, it was concluded that the 12 sets of attribute keywords are suitable for categorizing characters.

b. Usability of seven character roles

To test the accuracy of the role categories, character roles distribution information was analyzed. The subjects were 100 randomly picked characters. Figure 12 shows the results of this experiment. As Figure 12 shows, each role has more than

10 registered characters. From these results, we concluded that the labeling system for character roles is accurate and useful.

The success of the attribute and role labeling systems also made possible the success of the Digital Scrapbook tool, which uses the data from those labeling systems to archive character imagery and enable users to search for character features based on attribute and role terminology.

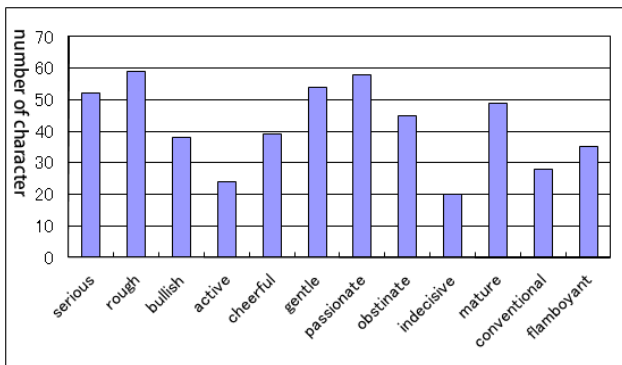


Figure 11 The usage of 12 attribute keyword sets

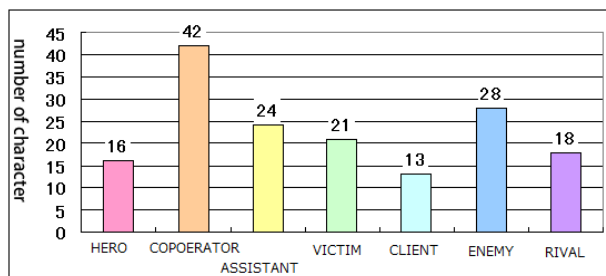


Figure 12 Distribution diagram for the usage of 7 roles among archived character imagery

5.3.3. Character Analysis Tool Evaluation

By using this tool, users are able to input information necessary for character analysis. The proposed method uses a template with input data spread over more than 10 pieces of paper, which made analysis slow and cumbersome. By using this tool, analysis information can be saved in one file and reduce the complexity of information management.

5.4. Interview Result

Interviews were held for the five test users with visual production experience on the proposed tool. Below are the interview results for the character background and analysis tools. Interview details were mainly focused on the efficiency of character making and usability of the proposed tool.

a. Character Setting Tool and Interview Result

The interviewees answered that they were able to fill in the description more efficiently than in simple templates.

They also commented that using the Character Background Tool enabled them to more easily spot gaps in character profile information.

It was recommended that these tools be tested in an actual production before making any final assessments of their value.

Although the tools performed well in the test, some users thought that it was difficult to assess the accuracy or usefulness of the labeling systems criteria based solely on this experiment.

b. Character Analysis Tool and Interview Result

For character analysis using the proposed tools, there were comments that the data input method using radio buttons was effective. However, some users suggested that a slider control might be more user-friendly for assigning numeric values to the character images.

In an interview about the validity of character analysis criteria, there were comments that there were too many criteria, and that the examinee sometimes became confused about what they were analyzing and evaluating in the middle of the test. Also, the ten marking levels of 0 to 9 seemed too many for some testers. They suggested a simpler scale containing three to five levels. We found that there is a need to do further research before concluding on an optimal number of levels for the best balance between precise, but user-friendly, character analysis.

6. Conclusion

In our research, 3 types of character developing support tools were developed for the DREAM process. These tools are the Character Background Tool, the Character Digital Scrapbook, and the Character Analysis Tool. The results of our research are as follows:

- (1) The Character Setting Tool aids in the creation of new characters. Character profile information and content information can be managed centrally.
- (2) Management of information is easier with Character Digital Scrapbook. Its archive and search features are useful in brainstorming new character designs.
- (3) The Character Analysis Tool allows users to analyze and evaluate characters using a limited number of essential criteria. The XML file format allows all three programs to share data and makes it easier to create a centralized network of character data.

The following is future work.

- (1) Optimize the number of evaluation items, as there were comments that evaluation was difficult due to the large quantity of analysis items tested with the Character Analysis System.
- (2) The DREAM process includes the development of character facial expressions, actions, and direction, as well as presentation, management, and other related processes. These stages of DREAM are beyond the scope of this research. However, it is recommended that digital tools are created that can integrate these stages with the tools created by this research in order to consolidate information for better data management during the entire production.

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