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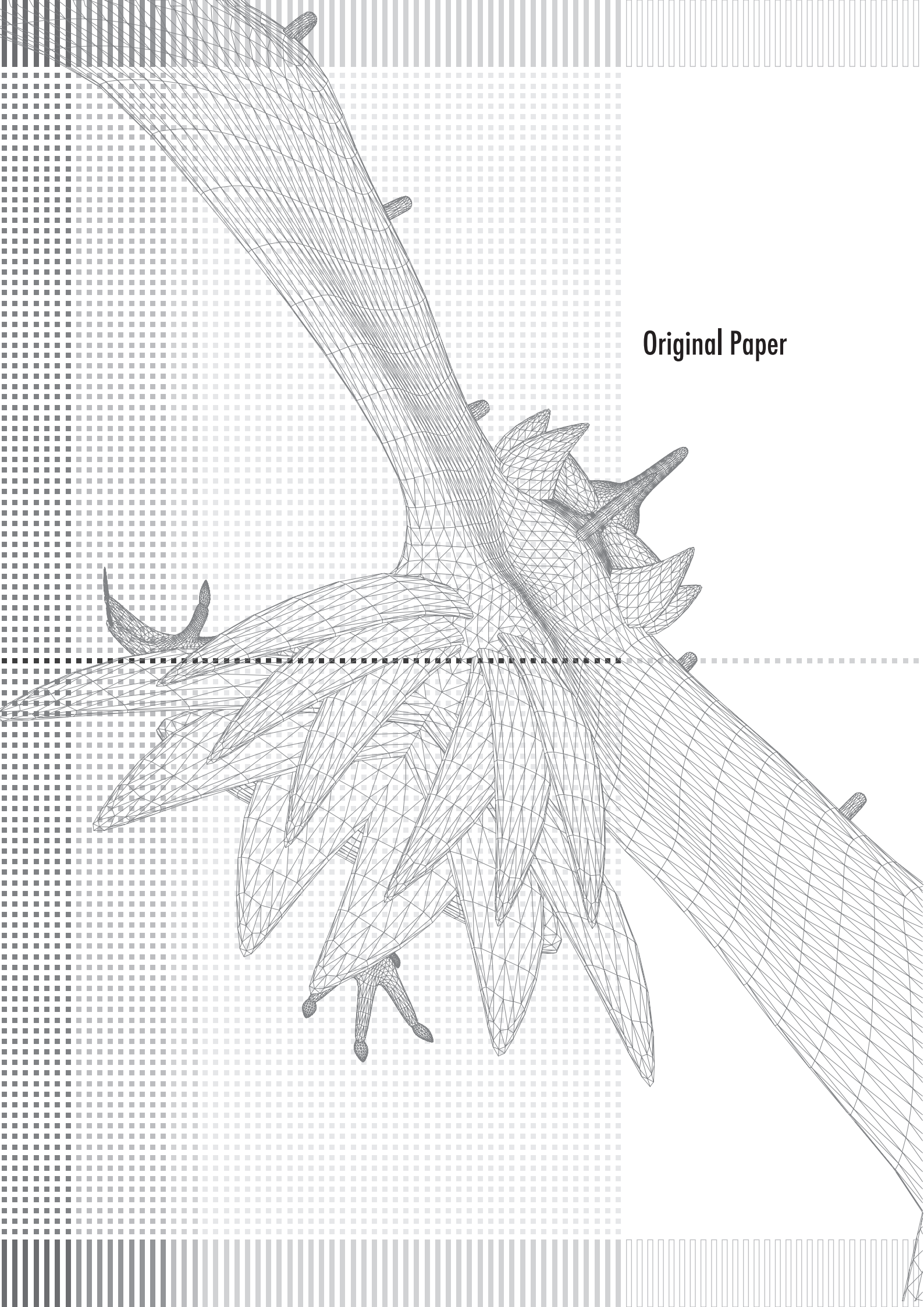


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**Original Paper**

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# 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

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## 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.

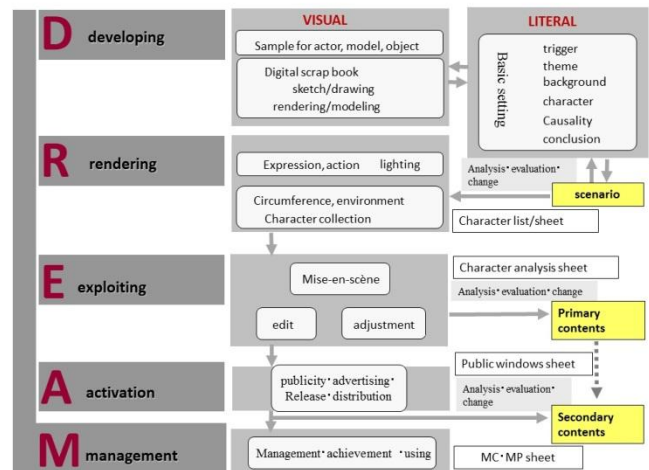


Fig. 1 Overview of DREAM Process

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.

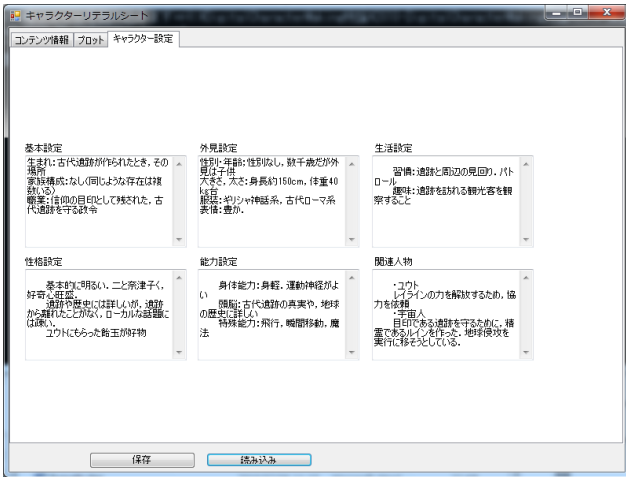


Fig. 2 Startup Screen for Character Background Tool

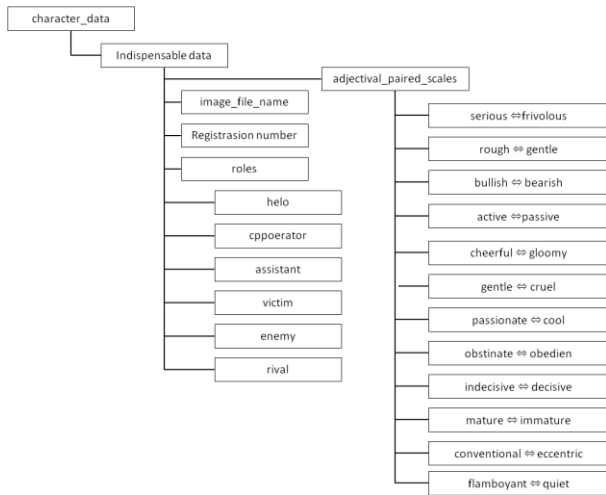


Fig. 3 Structure of Character Background Information

## 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.

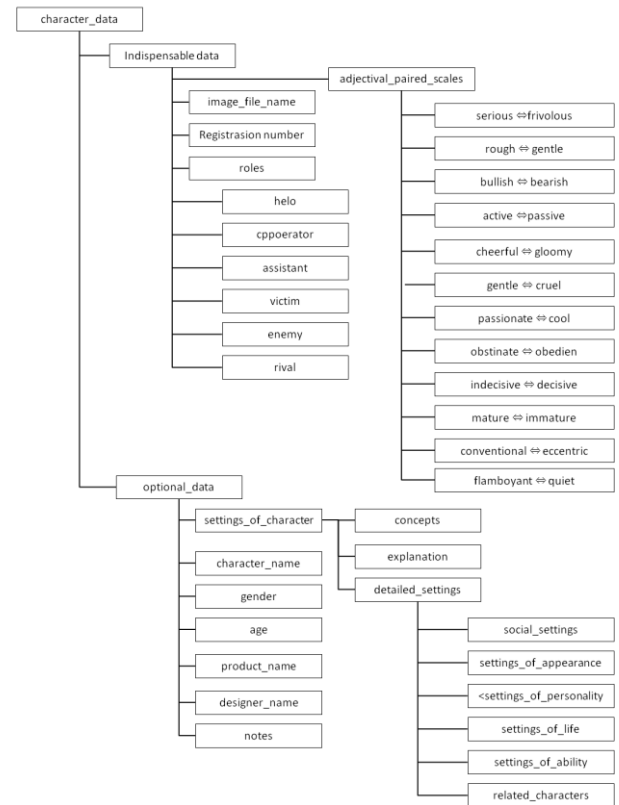


Fig. 4 Structure of Character Attribute Data

## 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.

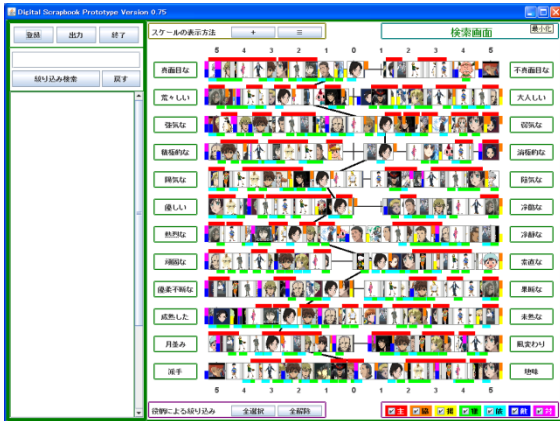


Fig. 5 Input Interface for Digital Scrapbook

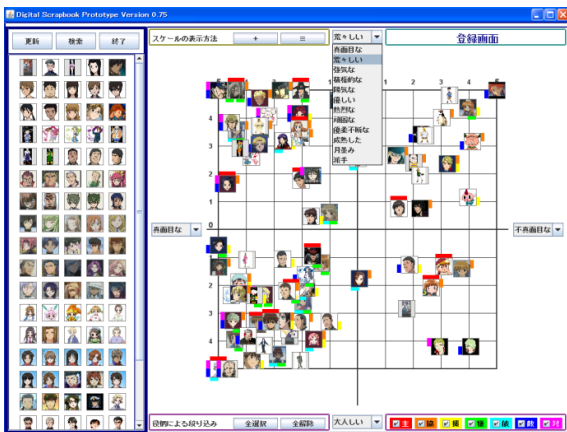


Fig. 6 Retrieval interface for Digital Scrapbook

```
<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.

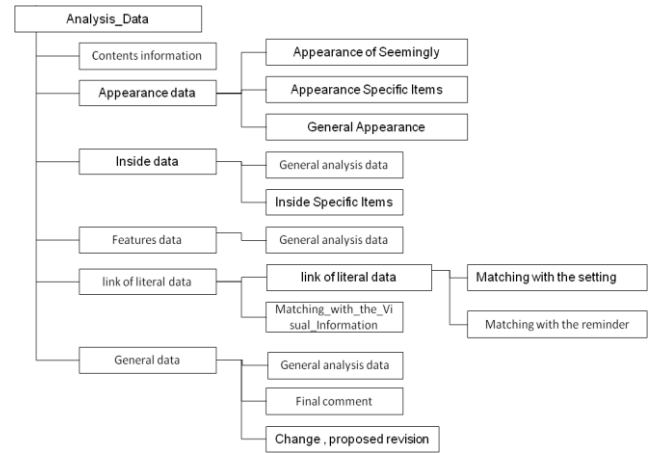


Fig 8 Structure of Character Analysis Data

##### 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

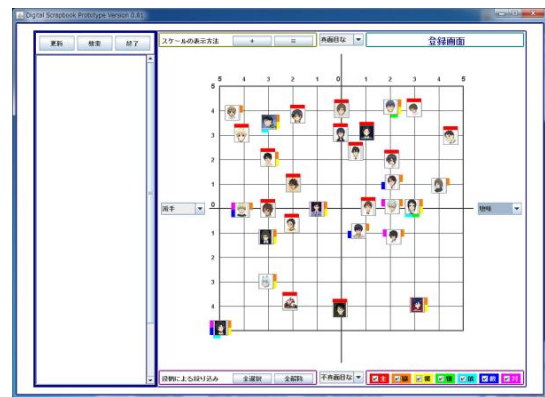


Figure 9(2) Character Impression Categorization

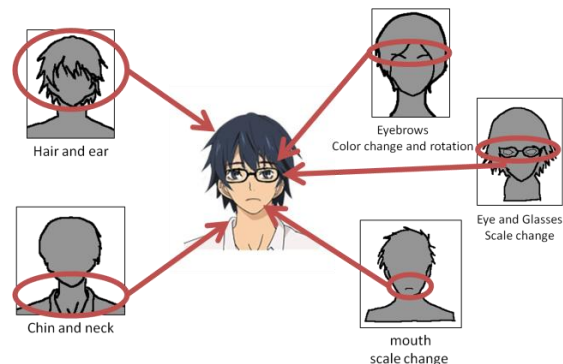


Figure 9(3) Production of Design Sample

## 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><b>基本設定</b></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><b>外見設定</b></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><b>生活設定</b></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><b>性格設定</b></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><b>能力設定</b></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><b>関連人物</b></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、飛鳥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

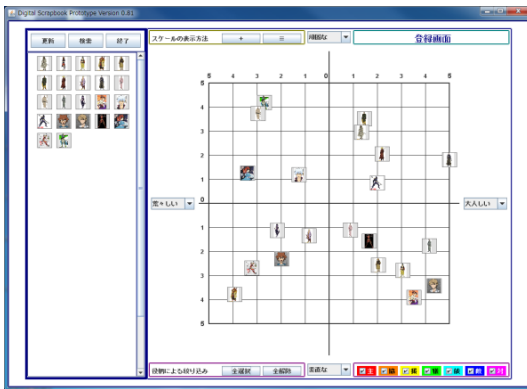


Figure 10(2) Character Attribute Categorization

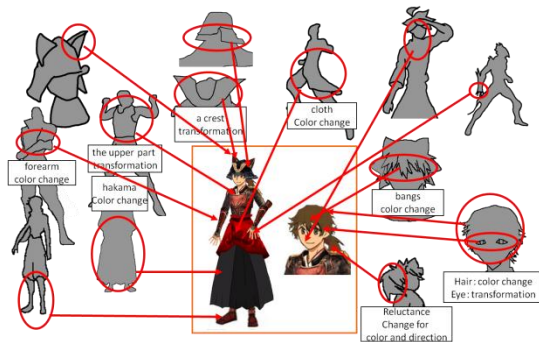


Figure 10(3) Production of Design Draft based on Collage Tool

### 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.

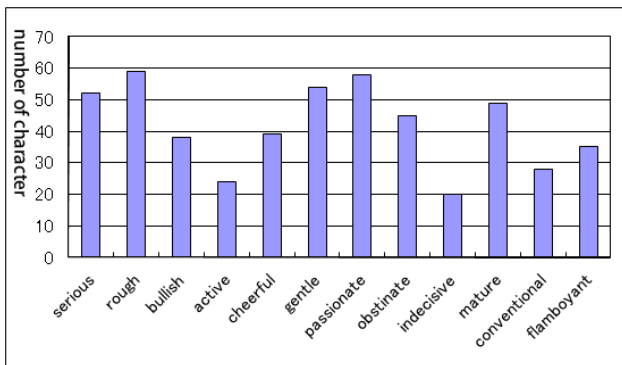


Figure 11 The usage of 12 attribute keyword sets

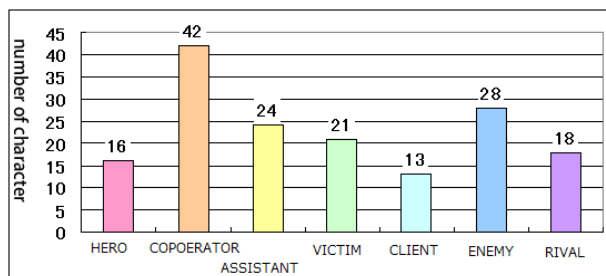


Figure 12 Distribution diagram for the usage of 7 roles among archived character imagery

### 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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# A study of transmitting tourism information for foreigners with Web2.0

A case of Kyushu tourism information website for Korean

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## Abstract

Web browsing is become one of the methods to gather tourism information. Also, Web 2.0 has led to the development of a variety of social media website characterized by the use of user-generated content. In Japan, many local governments have foreign language web pages with tourism-related information. However, many of those website do not have interactive system with tourists who need information. There are thousands of foreigners currently in the country producing information about Japan tour in native language. Tourism website is required to look for good ways to incorporate material already written in native language. A recent survey found that consumers trusted more websites with reviews than professional guides and travel agencies and far from being an irrelevance, blogs are often perceived to be more credible and trustworthy than traditional marketing communications. But there is a problem: given the sheer number of possibly relevant travel blogs there is a need to locate, extract and interpret blog content and this has proven so far to be time consuming, exhausting and costly, thus negating the relative value of the information obtained. It is necessary a empirical strategy based on the research and analysis to build an effective information system in tourism. In this paper, we present current issues of information system and services for travelers visiting Kyushu from South Korea. And we construct a intergrated tourism information system, 'OTakyu' for Korean tourists visiting Kyushu. It aims to develop a platform of tourism information based on Web 2.0. For the application, this study proposes to use the metadata interface to collect and classify much tourism information. This platform offer a varied and appropriate information already being produced by local government, personal blog, and so on. We found that this application can promote the information sharing and networking. And it can be beneficial for the public facilities suffering from the lack of budget and human resources to provide sustainability information. In the future, we will improve the quality of the site, while organizing a wide variety of data types from different sources and generating a more detailed categorization.

**Keywords:** tourism information, website, metadata, Web 2.0

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## 1 Introduction

As the number of individual tourists increases, Web browsing has become one of the methods to gather tourism information. Prospective visitors are increasingly reliant in the Internet to get information on places they may want to visit.

For potential tourists, Web 2.0 has changed how they can get information about a destination. Web 2.0 has led to the development of a variety of social media website characterized by the use of user-generated content(UGC, sometimes referred to as consumer-generated content, or CGC and in Korea, user-created content, or UCC) such as social networks, podcasts, and blogs [1]. These features include information collection and information sharing by users. This information distribution form will extend increasingly, and the influence on the tourism industry will be significant [2].

## 2 Research background

In order to inceased its share of foreign tourists, Japan has placed a lot of emphasis on its national tourism information. Japan Tourism Agency has strongly embraced the idea of

developing effective information system and has formed international tourism promotion organization.

In Japan, cities and counties with foreign language version of their local government website have tourism information, but the information provided on these websites is not interactive system with tourists who need information, have not intergrated tourism websites with the other components of information systems in the tourism industry. There are thousands of foreigners currently in the country producing information about Japan tour in native language. Nevertheless, it is not comfortable for a tourist to search the exact information that really wants from this huge information. Tourism website is required to look for good ways to incorporate material already written in native language.

## 3 Related works

Several studies have been conducted on application of Web2.0 in providing information. Kajiyu[3] is reviewed the recent trend of drive information provisions and considered its future prospects from the viewpoint of "Web 2.0" based on the users'

responses and requests of “Northern Road Navi.” The Civil Engineering Research Institute for Cold Region (CERI) has operated the portal site of road in Hokkaido called “Northern Road Navi(northern-road.jp/navi)” and analyzed its user needs since July 1999.

Takaya[4] examined the possibility for local cities to solve the difficulty of transmitting tourism information, with web sites mainly composed of the user generated movie contents. By analyzing access data of the original site “Saihoku Net”(www.saihoku.net) and “YouTube”(www.youtube.com), it has become clear that one of the best solutions now is to create and publish movies of the scenery and the history in the region and to transmit them with CGM—Consumer-Generated Media—web sites.

## 4 Purpose of research

With Web 2.0, the users can create the web contents with their travel experience. It makes it easier for the tourism information providers and the tourists’ needs to match. Therefore it’s beneficial for both parties. However, since anyone can disseminate any information, this can cause a flood of unorganized information, however we want to seek valuable information we can trust. In addition, although we have gained users by introducing Web 2.0, many tourism information sites have not been updated consistently. Creating an effective tourism information system on the web requires an empirical strategy based on research and analysis.

In this study we derive the current problems and challenges in providing information to Korea, focusing on the Kyushu area. We would like to set up a strategy that is based on the information above. Our goal is to embody the Kyushu tourism information site and present a vision of dissemination of regional tourism information for foreigners in Web 2.0.

## 5 Base research

### 5.1 Providing information regarding travel to Kyushu for Korean

In Korea, rapid developments of ICT are driving and supporting the change from the industrial to the information age. To deal with these challenges, information has become a critical input for tourism. Personal blog in particular have achieved remarkable impact in life and stand as an effective means of information dissemination. 49.5% of Kyushu visitors from Korea use a personal blog as a source of tourism information. It is much larger compared with 6.4% of Japan National Tourist Office website.

Tourist organizations of the municipalities and facilities in Kyushu, in order to attract foreign tourists, and have promoted a multilingual tourist information websites. However, there are problems with mistranslation from Japanese into Korean caused by cultural differences. It has significantly reduced the Korean customer satisfaction.

The reason why the number of people using these website for gaining information is low, contents are not rich enough to satisfy needs of visitors. And the contents cannot be viewed by foreigner because of the operational problem. As result of research on search engine site “naver”, 9 websites were

searched with the keyword “Kyushu”, and 8 websites were searched with the keyword “Nagasaki”.

## 5.2 Analysis of the Kyushu Tourism Site

### 5.2.1 New trends in CGM

Consumer-generated media (CGM)—content created by consumers on blogs, discussion boards, forums, user groups and other social media platforms—is today’s fastest growing online segment. With the advent of Web2.0, focus has shifted towards sharing, communication and collaboration using social media.

In this study, we defined a CGM as a model providing value created by consumers and service by proactively providing information.

CGM has been recognized as validation tools, Kyushu has developed a interface which provides sightseeing information using CGM.

**Table 1** Analysis of CGM of Kyushu tourism sites for Korean

サイト名	CGM特徴
 Join J-ROUTE	<ul style="list-style-type: none"> <li>・フォトブックカテゴリ</li> <li>・ユーザによるアップロード</li> <li>・地域ごとにユーザたちがアップした写真とコメントが見られる</li> <li>・TwitterとFacebookを通じてコンテンツを共有できる</li> </ul>
 九州の旅	<ul style="list-style-type: none"> <li>・ブログカテゴリ</li> <li>・運営者によるアップロード</li> <li>・特定のブロガーの書き込みが見られる</li> </ul>
 九州ブログ	<ul style="list-style-type: none"> <li>・NAVERにPRブログの設置</li> <li>・九州グルメ中心のコンテンツ</li> </ul>
 JR九州ブログ	<ul style="list-style-type: none"> <li>・NAVERにPRブログの設置</li> <li>・イベントに参加した有名ブロガーの書き込みを紹介</li> </ul>
 日本情報交流99s	<ul style="list-style-type: none"> <li>・スタッフブログカテゴリ</li> <li>・スタッフたちが書き込んだ店や観光地の紹介が見られる</li> <li>・TwitterとFacebookを通じてコンテンツを共有できる</li> </ul>

Recent trends on CGM of Kyushu tourism are summarized in the following three strategies,

- 1) The use of blogs and social media services
- 2) Utilizing user-generated content
- 3) Service user involvement

In the first case uses a Korean server which easily to retrieves information and is equipped with a blog system function to easily diffuse information. However, Kyushu’s official blog is independently operated by committing a Korean provider and thereby it is not differentiated from common blogs. Also, the blog has focused on only updating contents without building the network based on the social media function. It makes it difficult to share information efficiently.

In the second case functions to upload contents and writings from certain users to the website by using capture and reediting functions. This provides users with the advantage to enable users to write their experiences in their native language, while there is a problem which the information for specific people and its selection criteria are not clearly defined and information is unreliable.

In the third case induces users to open a section which enable users to freely upload contents or write comments rather than

an administrator. However, Kyushu's tourist homepage has not been equipped with any bulletin board to be activated based on it. I think it is that there is no strategy motivating users to participate.

### 5.2.2 Web2.0 guidelines for evaluating

To survey the influence of Web 2.0 on Kyushu's tourist information and deduct how to utilize it more efficiently, an objective evaluation based on the tourist information guideline is required. This study set a guideline composed of four items (including eight sub-items) referring to the Web 2.0 Evaluation Model of Travel Agency Websites and then evaluated Kyushu's Tourist Information Website for Korean tourists.

Table 2 Web2.0 evaluation of tourism websites

提供	サイト名	Community	Communication	Contents	Connection	ウェブ2.0 活用度(%)
日本政府 観光局	地域観光情報 九州	0	0	0	0.5	12.5
	Join J-ROUTE	1	0	0.5	1	62.5
九州観光 推進機構	九州の旅	0	0	0.5	0.5	25
	九州ブログ	1	1	0.5	0.5	75
福岡県 観光連盟	クロスロード ふくおか	0	0	0	1	25
佐賀県 観光連盟	佐賀県 観光情報	0	0	0.5	1	37.5
	佐賀県ブログ	1	1	0.5	0.5	75
長崎県 観光連盟	長崎 ホームページ	0	0	0.5	0.5	25
佐世保 観光協会	佐世保 ブログ	1	1	1	0.5	87.5

As a result, it has been identified that the blog generally keeps a higher score than the homepage and creates a good environment in Web 2.0. That is why the blog system provides users with Web 2.0 functions such as membership, comments, Trackback, tag, and RSS.

The different scores among blogs is from the blogs that were classified into blogs using user contents actively and there were different scores in the Contents item. factors unprovided in any blog is an item of 'Combine Technologies or Contents Provided by other Multiple Suppliers', which is the second item of Connection. This is a representative trend of Web 2.0, Mashup. Recently, it has been much used to improve the website's usability or visitation rate. However, it has not yet been applied in Kyushu's blog.

### 5.3 Challenge of tourism information services in "web 2.0"

"Building platform which implements collective intelligence and cooperation"

As blog, SNS, and Web technologies are innovated, a definite division between service providers and service receivers vanish. Accordingly, a new strategy of tourist information supply is required that tourists can directly participate in supplying tourist information produce and share it. As mentioned above, the blog system being serviced has the

function to which this strategy is applicable. However, its use cannot be expanded only by opening the blog. What is needed are strategies that utilize user's information more efficiently, persuade users to participate and cooperate, and arrange these strategies efficiently on one website.

## 6 Production of tourism site for foreigners

### 6.1 Overview and Significance

Based on the basic survey above, this study suggests an integrated tourist information website for foreigners, 'OTakyu' based on Web 2.0. This website is designed to build database through RSS of information being distributed in the website, extract and structuralize the data by a format that users can use it easily, and then characterize it for tourist information.

The following two goals are set to plan this website. The first goal is to build a automatic collection system to enable users to efficiently use user contents which provide effective tourist information. Tourism-related user contents characterizes that tourist information is continuously produced by potential information providers and tourists. Also, the website for foreigners requires a lot of manpower and spending for the production and management of contents, while the operating work and cost can be reduced by using user contents and its management system.

The second goal is to build a space connecting regions with foreign tourists. Unlike unilateral provision of information so far, this website enables users to spread and share much information by using various links like Web 2.0 and Mashup. In addition, this ultimate objective is to act as a role of Kyushu Tourist Portal Site which enables users to simultaneously share various information contents being provided everywhere in Kyushu. Provision of tourist information with this unity of Kyushu is expected to reduce expenses which occur to promote respective region websites.

### 6.2 Establishing web environment

To set this system, this paper uses and modularizes open-source software, 'Bloglounge' created by 'Daum foundation' for tourism information web site. Also uses PHP programming language and the MySQL4 database.

### 6.3 Processes and basic settings

This system processes collection and classification based on database of tourism-related information which are describes by metadata.

A system provider searches for website or blog that are relevant tourism and registers its RSS feed. It allows this system to read metadata of the RSS feed and automatically collect RSS feed content items. Also, this system asks all the servers in its feed list if they have new content.

The collected content is displayed according to the category provider create on this system. To organize and present the gathered content, this system use category plugin installed.

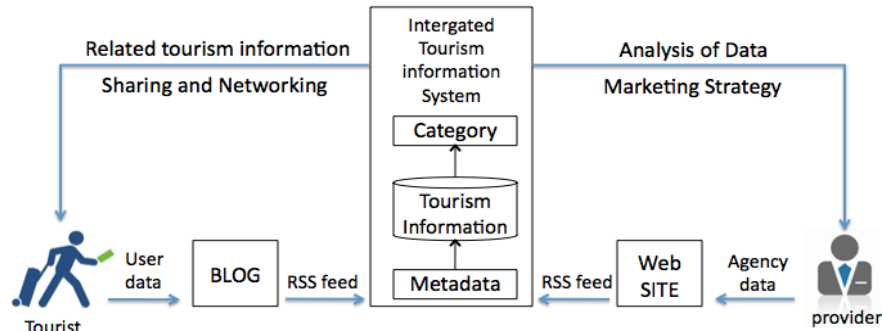


Figure1 The Basic Phases of the System

### 6.3.1 Data collection

The metadata system is structured data which describes the characteristics of a resource. It creates a new representation where it contains

meta-information such as that usually does not appear in the original resource, that is, metadata about the original information (data) [5]. RSS is used to deliver content syndication, or feeds, in XML metadata format. Lately, RSS has been widely used in many web service. [6]

This study tries to describe tourism information with metadata. All information can be described by its attributes or specifications such as, title, URL(link), description, classification or tag. This metadata is useful in collecting data and classifying according to subject.

This system can create a filter by a specific keyword. We filter the names of the top 25 most visited tourist attractions in Kyushu for the keywords.

### 6.3.2 Data classification

This system is equipped with a plug-in that is automatically categorized to extract the tag of the data collected. It allow users to set the category in the "classification" of the management screen.

Using the two categories of regional and thematic tourism on Kyushu, we have multiple situations installed on the same server. After operating each situations separately, it has been set for two categories from each management screen.

### 6.3.3 Data extension

This system can be configured to aggregate a large number of data access and keywords to display as popular content. That is, realizing that the data can be reused as a new content by systematic analysis of trends in user-interest and re-processing of log data.

Since the data accumulated by the system automatically create their own RSS feeds by the system. Users can get updated information and use the service with RSS feeds. For example, a service called RSS widget has been commonly used.

The widget will help users to get website updates directly to their inbox. Also RSS adds a feed link where readers can subscribe directly in a feed reader.



Figure2 A use case for RSS widget

### 6.4 Configuration of the main page

The production site "OTakyu" involves three types of tourism information by information sources. First, agency data is information from agencies such as local governments and tourism organizations in Kyushu. Second, user data is information collected from personal blogs and sites in Korea. Third, analysis data is the unit of information itself that has been analyzed.

All three types of data is divided into 'New area', 'Updated area', 'PR area', and needs to be well organized in a manner that it is easily searched, and easily managed.

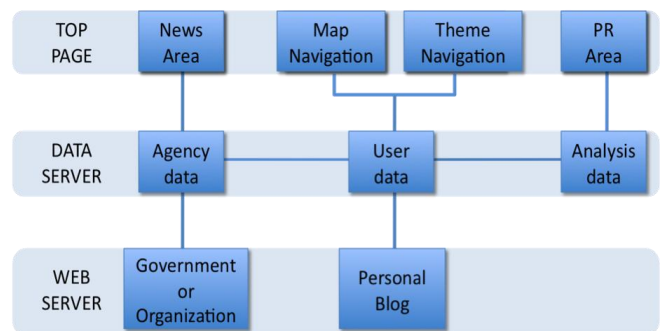


Figure3 A Configuration Diagram Hierarchy of 'OTakyu'



News area including information had been provided timely such as events is placed at the top of main page for an eye-catching. Now three of agency data are set to be visible in the top page, all data list can be seen by clicking the title called 'Kyushu News'.

Updated area is put in well designed category to reduce the chances of various information themes leading to confusion. As this area has been constantly updated and replaced by more and more, needs to provide navigation system tailored to the specific needs of users. Creating a region map for category allows users to access information on this site more quickly.



Figure4 New area and Updated area

PR area concerned with analysis and recommendation by provider of this system is grouped and placed at side of main page. This section offers information that include hit item, post rankings, popular keyword etc. These optional services is good way of getting people to into come to this site. Also, to take advantage of real-time bulletin board and exchange information, we installed a widget of the social networking service "Twitter".



Figure5 PR area



Figure6 Main page of 'OTakyu'

## 7 Evaluation

### 7.1 Statistical analysis of access data

The daily average number of visits in OTakyu is 60 times. The total number of visits is 4,506 times at the lapse of three months after opening. It is a low value as a portal site. However, it is absurd to say that the value is low considering that the website handles only tourist information confined to Kyushu.

OTakyu focuses on providing and sharing much information if possible. The satisfaction level can be forecasted by analyzing the index which indicates the traffic visiting the website again. In consideration that the world's biggest SNS, Facebook has the revisiting traffic of 70%, the revisiting traffic (66.39%) of OTakyu is never low. But, it is a low value in consideration of the high the percentage of website visitors that leave the website (74.79%). Therefore, the strategy required is to increase the number of website visitors conforming to OTakyu's characteristics and also to enhance the revisiting traffic to enable users to reside in the website. The website should be composed that even though a visitor clicks various information icons in the main page and goes into other site, users can return to OTakyu and search desired information.

## 7.2 Analysis for update intervals of data sets

OTakyu has a total of 12 registered sites: 6 personal blogs and 6 institutional blogs. Only blog among Kyushu tourist information sites for Korean people provides a RSS service. This study only registered and verified blogs.

At the time which twelve sites have been registered, the average daily frequency of content updates of OTakyu is 6 times. It is expected that if registered sites increase, the update frequency will also increase. The survey result of updating frequency for Kyushu's multilingual homepage shows that a majority of update was once a year. Therefore, it is identified that the above value is very high. Also, this is based on the automatic collection system. Therefore, it has the advantage which separate cost and manpower are not required. It will be more profitable for regional cities which have been difficult of providing information continuously because of securing budget.

## 7.3 Limitations and challenges

In this time, this study brings only the upper part of contents title and its substance from registered sites and then sets it to view in OTakyu that by clicking links, users can go to relevant sites and read a whole of the sites. If users move to other site, the secession rate of visitors increases and it is thereby difficult to grasp user's needs.

When making the original region tourist site like OTakyu, the greatest problem results from the low level of awareness. If you refer to AISAS (Attention → Interest → Search → Action → Share) for a user behavior model proposed by Tentsu, when there is no advertising budget through mass media, how to implement Attention first remains as an important issue.

Basic data of OTakyu are based on information collected from respective sites. There is no unique information of OTakyu. Therefore, the role of OTakyu is to efficiently arrange and display valuable information out of infinite information being searched by a keyword of Kyushu Tourism. For this, user evaluation data affecting the value of information should be well utilized. The website should provide users with unique information of OTakyu by adding communication factors which include favorite information ranking by theme or user participation questionnaire, etc.

## 8 Conclusions

With this study from the point of view of a new trend Web 2.0, we analyzed the current situation of information dissemination towards attracting Korean tourists in Kyushu, embodied the total tourist information website based on the issues that are derived from the analysis and obtained the findings below about the role model of the local tourism dissemination towards foreigners in Web 2.0.

First, we have found that the issues of "the lack of knowledge (human resources) about multilingualization", which currently many information websites have been faced with, will be solved by foreigners using CGM that leads to the enhancement of web contents.

However as a result of analyzing the trends of CGM for Kyushu tourism information websites for Korean people, it

reveals many websites are left with no strategic practical use because the management system and the function for the use of CGM are not provided. To solve this problem, on the assumption of the introduction of Web 2.0, we evaluated the Kyushu tourism information websites for Korea in order to derive the empirical challenges. The result shows that blogs have a better system for the Web 2.0 environment than a Homepage. However there is no guarantee that the usage will expand only by starting a blog. We found a concrete strategy to induce the users' cooperation and integrate as well as diffuse their information efficiently as needed.

Based on this basic analysis we created this tourism information site called 'Otakyu' using the automated data collection system to propose the total tourism information website for foreigners using Web 2.0 with this study. We know that 'Otakyu' is updated 6 times a day on average and it's beneficial for provincial cities, where they barely disseminate information continuously due to the lack of a budget and human resources. We found we could elaborate a variety of strategies such as arrangements by the attention level using the data classification function as well as the understanding of the trend of the users by using the data analysis function to attract customers.

We think we need to upgrade the website, expand the range and volume of collecting data and improve a more detailed categorization from now on.

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