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A STUDY OF PUBLIC OPINION ON GREEN SPACES USING DATA FROM FREE-TEXT DESCRIPTIVE RESPONSES - A CASE STUDY OF REGIONAL CITY IN JAPAN -

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ABSTRACT: The present study analyzed public opinion data from free-text descriptive responses obtained by administering a questionnaire on green spaces to local residents. Maebashi City, the capital city of Gunma Prefecture, was selected as the subject for the study. Maebashi is a standard-sized city in Japan, thus the opinions of its residents can be analyzed and compared to other standard-sized cities. The present study adopted a text mining method for analysis. Text mining can discover the characteristics of words and examine the relationships between words in a large amount of text data objectively and quickly. By exploring the residents' thoughts on green spaces using the data from their free-text descriptive responses, the present study extracted problems with existing green spaces from the viewpoint of the public. Focusing on the words obtained from the free opinion, "park (1st)", "green (2nd)", "street tree (3rd)" which are the green space symbols in Maebashi city.

Keywords: Text data, Text mining, Image, Maebashi City

1. INTRODUCTION

1.1 Background

At present, depopulation, low birthrates, aging citizens, and decreased financial resources are serious social problems in Japan, and the appropriate development, maintenance, and management of urban facilities are urgently required. To deal with these social problems and related requirements, new policies on green and open spaces contain strategies to enhance the stock effects of nature spaces, to accelerate the cooperation between the government and private sectors, and to make further use of urban parks.

1.2 Social situation

To this end, the Ministry of Land, Infrastructure, Transport and Tourism published an interim summary of the "Review Meeting for the Nature of Urban Parks Corresponding to Urban Management of a New Era." This summary contains three main points.

First, in this new era, green and open spaces that help support cities, including urban parks and private gathering places, must be strategically secured and used.

Second, the multifunctional properties of urban parks must be advertised and exhibited using cooperation between the government and private sectors in order to draw on the power of individual towns and citizens.

Finally, a new framework must be constructed in which the quality of urban parks can be improved through this collaboration between the government and the private sector, including a wide range of entities such as local councils to support flexible urban park management.

1.3 Significance of this study

The city planning system in Japan has procedures such as hearing and briefing.

However, in order to create a mechanism of utilization and management of the green space of a new era reflecting the idea of the citizen, it is necessary to grasp citizen's thinking more structurally.

This study has the significance of utilizing it as a tool to support the green space mechanism of a new era by suggesting the method and the effectiveness of the citizen's opinion more structurally.

2. STUDY AREA AND STUDY METHODS

2.1 Study Area

Maebashi City, which is a study area, is shown in Fig. 1. Maebashi City is the prefectural capital of Gunma Prefecture, with a population of 340,000 people and a local city located about 100 km from Tokyo.

In Maebashi City, motorization is progressing even among local cities, and Maebashi City is studying toward realization of compact city.

Maebashi is a standard-sized city in Japan, thus

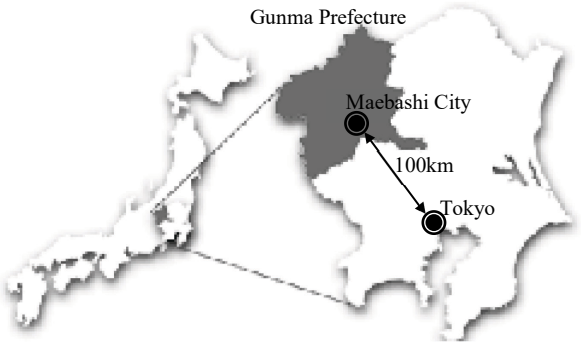

Fig.1 Location of Maebashi City, Japan

the opinions of its residents can be analyzed and compared to other standard-sized cities.

2.2 Review of literatures

We will review the existing studies related to this study. There are many studies on the quality of life given by green.

Morita et al. [1] focus on the environment of the water and green for Maebashi City, and evaluate the quality of life. Hashimoto et al. [2] analyzed the consciousness of residents due to environmental improvements after consolidation of municipalities. Tsukada et al. [3] researched on the relation of Urban Revival planning and using by the historical materials. In addition, Tsukada et al. [4] analyzed the relationship between consciousness and environment including water and green of the Tenguiwa-Irrigation in Maebashi City.

There are also many that analyzed free text data as a similar study. Text data must be processed using a particular method so that the data can be analyzed objectively and quantitatively. The field of natural language processing has developed specific software for text mining. As the text mining method can objectively extract important trends in words from statements and free-text descriptive responses, this method has been used in previous studies.

Sasaki et al. [5] studied about Traffic Policy towards the introduction for Fuji-yoshida City, Yamanashi Prefecture. Sasaki attempted to visually analyze public opinions using statements made in workshops transformed into text data. Kobayashi et al. [6] analyzed by Text Mining, the residents' evaluation of living environment and the characteristics were grasped by the Correspondence Analysis and Cluster Analysis. And problems and possibility of application were considered in the questionnaire survey. Nishio et al. [7] analyzed using the text -mining was considered appropriate to objectively examine regional activities that preceded placement of the Tomioka Silk Mill on UNESCO's World Heritage List.

Table 1 Details regarding the questionnaire survey

Date of survey	- Distribution: October 14-16,2015 - Collection: October 31,2015
Data collection	Maebashi City area, Gunma Prefecture
Data collection method	- Distribution: putting mail box - Collection: Mailing
Question	Please enter your thoughts about the green spaces surrounding you, and your opinions and desires regarding Maebashi City's future policies on green spaces, parks, and street trees. - in Maebashi City area - free answer
Distribution and collection	- Number of questionnaire cards distributed: 1,500 - Number of questionnaire cards collected: 402 - Recovery: 26.8%

2.3. Purpose and method of this study

The present study analyzed public opinion data from free-text descriptive responses obtained by administering a questionnaire on green spaces to local residents, and evaluate the quality of life.

The present study adopted a text mining method for analysis.

Text mining can discover the characteristics of words and examine the relationships between words in a large amount of text data objectively and quickly.

By exploring the residents' thoughts on green spaces using the data from their free-text descriptive responses, the present study extracted problems with existing green spaces from the viewpoint of the public. Comparing the problems identified by the study with those recognized by an administrative organization allowed the present study to better examine future policies regarding the green spaces.

2.4 Study methods

The present study used KH Coder software, the technical information of which has been published and which has been used for several existing papers. A morphological analysis function has been incorporated into this software.

Fig. 2 Small scale-park, Maebashi City

Fig. 3 Roadside-tree, Maebashi City

Morphological analysis is an operation to divide a statement or a sentence into minimal units that have a syntactic function, and to discriminate each part of speech. This is used to analyze data faster and more objectively than artificial data processing. In the present study, we conducted a questionnaire survey on the Table 1.

The present study analyzed free-text descriptive answers to the question, "Please enter your thoughts about the green spaces surrounding you, and your opinions and desires regarding Maebashi City's future policies on green spaces, parks, and street trees". The responses were encoded as text data and then analyzed in order to understand the image that the residents have of green spaces, and evaluate the quality of life.

The initial questionnaire on green spaces was administered by the Maebashi Institute of Technology on October 16,2015, in which 1,500 questionnaires were randomly distributed to households in Maebashi City. 402 completed surveys were collected by mail.

The present study analyzed 181 samples, in which the free-text descriptive responses were examined as text data.

Table 2 Result of extracted words

No.	Extracted Ward	Frequency
1	park	102
2	suppose	80
3	greenery	68
4	roadside tree	43
5	management	35
6	environment	30
7	Maebashi	28
8	many	26
9	tree	26
10	construction	24
11	road	24
12	maintenance	21
13	good	21
14	near	19
15	place	19
16	necessary	18
17	rose	17
18	child	17
19	people	17
20	plant	16
21	cleaning	15
22	resident	15
23	nature	14
24	tree and shrubs	14
25	can	14
26	urban	13
27	feel	13
28	cut	13
29	think	12
30	few	12
31	increase	12
32	district	12
33	flower	11
34	do	11
35	go	10
36	walk	10
37	city	10
38	citizen	9
39	live	9
40	very	9
41	absent	9
42	greening	9
43	beautiful	8
44	advanced age	8
45	surroundings	8
46	housing	8
47	grass	8
48	money	7
49	refuse	7
50	bad	7

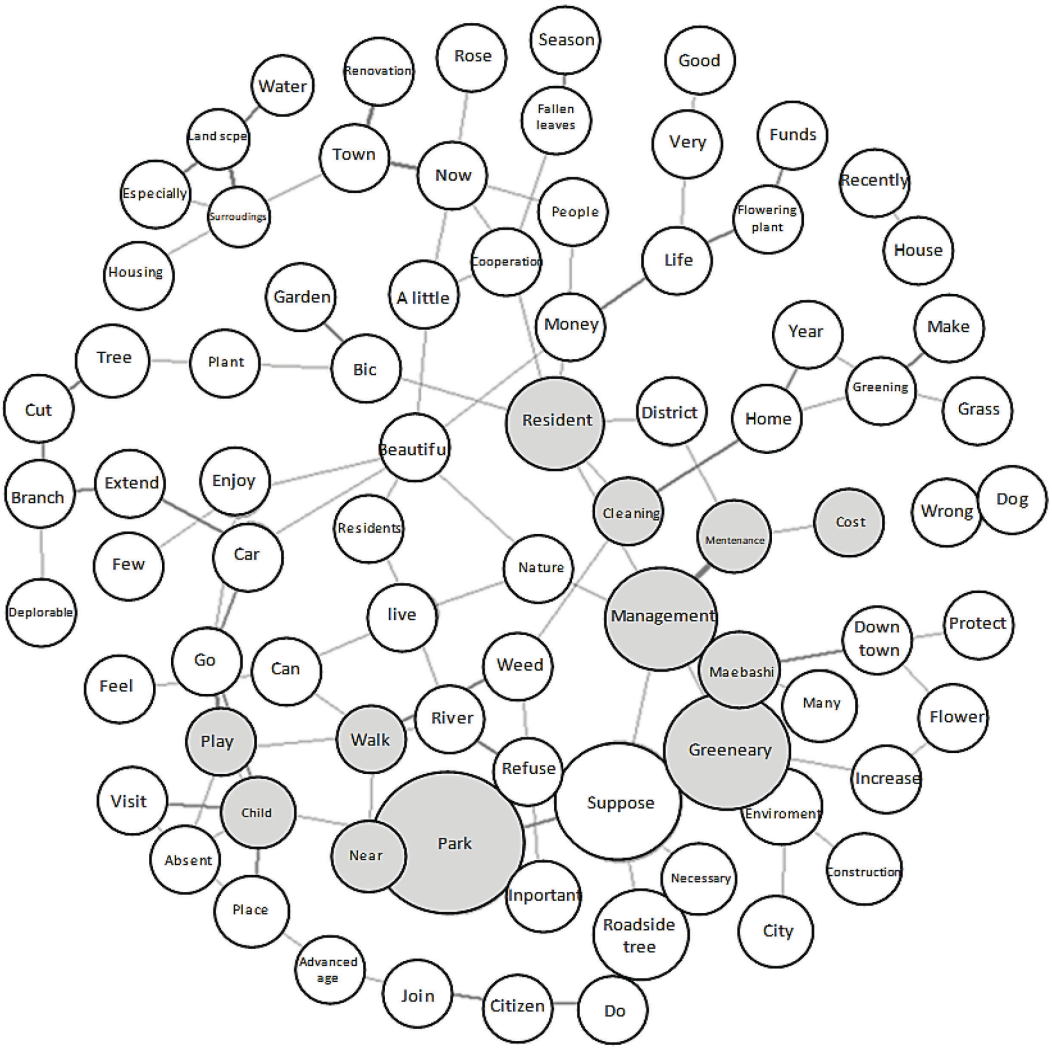

Fig. 4 Co-occurrence network

3. Result of Analysis

3.1 Result of extracted words

The present study examined free-text descriptive responses regarding green spaces, obtained from residents via questionnaire and analyzed as text data.

The researcher performed morphological analysis on the data and created a list of top 50 words with higher frequencies of appearance (Table 2).

Of the nouns and adjectives extracted from these responses, “park” (first place, Fig.2), “suppose” (second place), “greenery” (third place), “roadside tree” (fourth place, Fig.3), “management” (fifth place), “environment” (sixth place), “Maebashi” (seventh place), “many” (eighth place), “tree” (ninth place), “construction” (tenth place), “road” (11th place), “maintenance ” (12th place), “good” (13th place), “near” (14th place), “place” (15th place), “necessary” (16th place), “rose” (17th place), “child” (18th place), “people” (19th place), “plant” (20th place), “cleaning” (21th place), “resident” (22th place), “nature” (23th place), “tree and shrubs” (24th place) and “can” (25th place), all symbols of greenery in cities, were the most common.

The reason for this result was that Maebashi City had a park area of 11 m2 converted per citizen (2017.3). In the Urban Park Law of Japan, the standard park area per person is set at 10 m2.

In addition, it was thought that the management of the small park was done by the residents' volunteers.

3.2 Result of Co-occurrence network

It was revealed that the residents were more interested in having parks and street trees installed and managed by the public sector rather than in greenery kept on private land. Since “environment,” “Maebashi,” and “many” were extracted in sixth,

Fig. 5 Children's playground at the edge of the waterway, Maebashi City

Fig. 6 Forest trees and broken play facilities, Maebashi City

seventh, and eighth place, respectively, the residents were revealed to feel that the environment of Maebashi City is rich in greenery.

To understand the residents' opinions on green spaces in detail, a co-occurrence network diagram (Fig. 4) was created using KH Coder, which visually expressed the correlations between words that appeared in the responses.

From this diagram, the rough groups "concerning the use of green spaces" and "concerning the maintenance and management of green spaces" were created.

First, the group "concerning the use of green spaces" was strongly connected with the words "walk," "near," "child," and "play," centering on "park." The trends of these words revealed that the situation of using a park, such as "I can walk in a nearby park," and the desire for a park, such as "there is no place for my child to play in a nearby park," were related (Fig. 5).

Next, the group "concerning the maintenance and management of green spaces" was strongly connected with the words "management," "maintenance," "cleaning," "resident," and "cost," centering on "greenery" (Fig. 6).

By studying the tendencies of these connections, the desire for maintenance and management of greenery was extracted as, "resident participation and costs are required to maintain and manage abundant greenery in Maebashi City."

4. CONCLUSION

4.1 Results of Study

The results of the study can be summarized as follows:

(1) The present study administered a questionnaire on greenery in Maebashi City, used free-text descriptive responses obtained in the survey as text data, applied the text mining method to the text data, and perform morphological analysis of the residents' opinions on green spaces expressed by word choices in the responses.

(2) When the residents' opinions on green were visually analyzed using a co-occurrence network diagram, the groups "concerning the use of green spaces" and "concerning the maintenance and management of green spaces" were extracted. Subsequently, opinions such as "there is no place for my child to play in a nearby park" and "resident participation and costs are required to maintain and manage abundant greenery in Maebashi City" were extracted.

(3) These opinions of the residents were related to political issues, which administrative organizations have attempted to address themselves. Words related to the development of dog runs and the management of greenery by community residents appeared in the minority of responses.

4.2 Conclusion

The whole parks in Maebashi City is obsolete and needs renovation. Meanwhile, due to the population decrease and aging, the financial situation of Maebashi City will be severe. Thus, I think that highly efficient collection is necessary.

By exploring the residents' thoughts on green spaces using the data from their free-text descriptive responses, the present study extracted problems with existing green spaces from the viewpoint of the public.

I think that it will be a new tool to support quality of life and renovation of parks for the citizen. As mentioned above, the present study will be able to reflect public opinions on the development of parks.

The next study subject is to create a method to specifically utilize structured free opinions for planning and designing the green open spaces.

By reflecting the opinions of the residents in the

plan and design of the green space, I think that the participation of residents in the utilization and maintenance of the park will be obtained.

5. AKNOWLEDGMENTS

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6. REFERENCES

[1] Morita T, Kogure Y, Sugita H, Baba T, Tsukada S and Miyazato N, "A Study on Evaluation of Quality of Life in Consideration of Water/Green Environment", International Journal of GEOMATE, Vol. 2, No. 2, 2012, pp. 241-246.

[2] Hashimoto T, Yuzawa A, Morita T and Tsukada S, "Changes in Residents' Consciousness to Environmental Improvements after Consolidation of Municipalities", International Journal of GEOMATE, Vol. 2, No. 2, 2012, pp. 235-240.

[3] Tsukada S, Morita T, Yuzawa A, "Inquiry of the Value of Park in the Characteristics and Use of Park Through Urban Revival Planning Projects in Maebashi City", International Journal of GEOMATE, Vol. 3, No.1, 2012, pp. 285-289.

[4] Tsukada S, Morita T, Yuzawa A, "Study on Assessing the Value of the Tenguiwa Irrigation Canal", International Journal of GEOMATE, Vol. 10, Issue 22, 2016, pp. 2007-2010.

[5] Sasaki K and Maruishi K "Summarization and Visualization characteristics of a Workshop Discussion using Text Mining Method", Journal of Japan City Planning Review, 43 (6), 2011, pp. 1039-1044.

[6] Kobayashi Y, Terada A and Sato S, "Analysis of Free Answer in Questionnaire Survey and Evaluation of Living Environment by Text Mining", Architectural Institute of Japan, Vol. 77 (671), 2012, pp. 85-93.

[7] Nishio T, Tsukada S, Morita T and Yuzawa A, "Activities of community development for tourism preceding placement of Tomioka Silk Mill by using text mining", Architectural Landscape Institute of Japan, Vol. 79(5), 2016, pp.519-524.