

Examination of a Method to Retrieve Similar  
Trademarks Reflecting Human Subjectivity1106740 文理情報短期大学 \*神田太樹 KANDA Taki  
工学院大学 長嶋秀世 NAGASHIMA Hideyo

## 1 Introduction

Retrieval of similar trademarks based upon physical features extracted from trademarks does not always reflect human subjectivity. Methods to make retrieval reflect human subjectivity have been studied [2],[3],[4],[5]. In these methods physical features such as intensity, symmetry, frequency distribution etc. are extracted from trademarks and physical feature space is constructed based upon the extracted physical features, and the physical feature space is transformed into subjective feature space by multivariate statistical approach [2], weighting physical feature space [3] or excluding the physical features which people do not perceive from the physical feature space [4],[5], and similar trademarks are retrieved in the subjective feature space.

Here, we consider the method [4], [5] previously reported to find the physical features which people do not perceive by using the results of a questionnaire actually set out and exclude them from the physical feature space, and examine the efficiency of this method with respect to the degree of reflection of human subjectivity.

## 2 Entropy of questionnaire

In the questionnaire set out, we prepared 48 key trademarks and 63 sample trademarks, asked many answerers to choose a trademark as the most similar trademark to a key trademark from among 63 sample trademarks and obtained the ratios of the number of the answerers which people chose each sample trademark as the most similar trademark to a key trademark.

Now let  $P_i(1), P_i(2), \dots, P_i(n)$  be the ratios of the number of the answerers for key trademark  $i$  and suppose we have a set of possible events whose probabilities of occurrence are the ratios. For each key trademark there is a set of probabilities  $P_i(j)$  of choosing sample trademark  $j$ . Thus there is an entropy  $H_i$ , given by [1]

$$H_i = - \sum_{j=1}^n P_i(j) \log_2 P_i(j).$$

Tables 1 and 2 show the ratios of the number of the answerers who chose each sample trademark as the most similar trademark to key trademarks No.37 and 34, the entropy  $H_{37}$  and  $H_{34}$ , and the order of retrieval of the sample trademarks which most answerers chose as the most

Table 1 The ratios of the number of answerers, entropy and order of retrieval for key No.37

sample No	ratio	sample No	ratio
32	0.8358	23	0.0036
45	0.0620	26	0.0036
1	0.0182	37	0.0036
40	0.0146	38	0.0036
49	0.0109	43	0.0036
2	0.0073	47	0.0036
17	0.0073	53	0.0036
41	0.0073	54	0.0036
44	0.0073		
Entropy $H_{37}$ is 1.1745.			
Sample trademark No.32 is retrieved 2nd in the physical feature space and 1st in the subjective feature space respectively.			

similar trademark to key trademarks No. No.37 and 34 respectively.

Table 2 The ratios of the number of answerers, entropy and order of retrieval for key No.34

sample No	ratio	sample No	ratio
24	0.3279	22	0.0097
13	0.2175	58	0.0097
30	0.1916	2	0.0065
11	0.0779	27	0.0065
46	0.0552	63	0.0065
54	0.0325	16	0.0032
14	0.0227	40	0.0032
55	0.0130	60	0.0032
5	0.0097	61	0.0032
Entropy $H_{34}$ is 2.7907.			
Sample trademark No.24 is retrieved <u>7th</u> in the physical feature space and <u>4th</u> in the subjective feature space respectively.			

### 3. Examination of retrieval as to entropy

We conducted retrieval experiments to find out whether the results of retrieval vary with entropy. Table 3 states that 74 and 100 percent of the sample trademarks which most answerers chose as the most similar trademark to each key trademark are retrieved within the third in the physical and subjective feature space respectively in case of  $H_i < 2.25$  while 48 and 80 percent in case of  $H_i > 2.25$ . It is seen that the results of retrieval vary with entropy, that is, the smaller the entropy which means un-

certainty of information is the more retrieval reflects human subjectivity.

Table 3 Examination of retrieval as to entropy

entropy	physical feature space	subjective feature space
less than 2.25	1st 61% 2nd 13% 3rd 0% total 74%	1st 78% 2nd 22% 3rd 0% total 100%
not less than 2.25	1st 32% 2nd 12% 3rd 4% total 48%	1st 52% 2nd 28% 3rd 0% total 80%

### 4 Final remarks

Here, we examined the efficiency of the method to retrieve similar trademarks with respect to the degree of reflection of human subjectivity by using entropy and found that the results of retrieval vary with entropy.

### References

- [1] C.E.Shannon, The Bell System Technical Journal, vol.27, No.3, pp.379-423, Jul.(1948).
- [2] T.Kurita, H.Shimogaki and S.Kato, Trans.IPS Japan, vol.31, No.2, Feb.(1990).
- [3] H.Nagashima and Y.Hijikata, Trans. IEICE, vol.J74-D-II, no.3, pp.311-320, Mar.(1991).
- [4] T.Kanda and H.Nagashima, Abs.The 19-94 Fall National Conference of ORSJ, pp.186-187, Oct.(1994).
- [5] T.Kanda and H.Nagashima, Abridged Proceedings HCI International'95 in Tokyo, p.52, Jul.(1995).

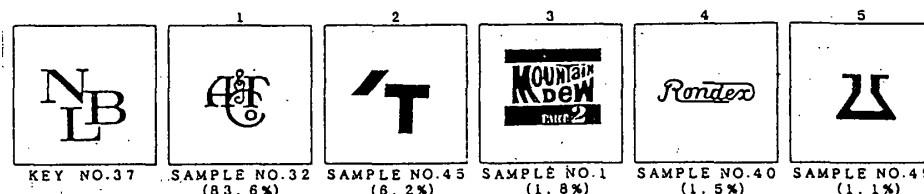


Fig.1 Retrieval in the subjective feature space in case of  $H_{37} = 1.1745$