

# Implicit Knowledge Participation in Picture Books

## Eigen Pattern in *Hyaku-man-kai Ikita Neko*

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**Abstract:** The implicit knowledge in *Hyaku-man-kai Ikita Neko* is studied by eigen pattern representing essential color image characteristics. At first, Neko appears as a lonely cat expressed by monotone color pictures as well as description without his feelings. Second, in the developing part, Neko is expressed without his feelings as well, but complicated pictures and various dark colors explain his dullness. Finally, the pictures are composed of pale colors, which explain his emotion such as happiness due to his marriage with the Shiroi-Neko. As a result, it is clarified that both pictures and text synchronize with the mind fluctuation of Neko.

**Keywords:** Visualization, Implicit Knowledge, Eigen Pattern, Picture Book

## 1. Introduction

The motivation behind this work was to clarify the implicit knowledge in a picture book. Picture book is a kind of visual arts. To understand the picture book world, it is important to read its story by text and atmospheres as enhanced by compositions with colors in pictures.

A picture book has given us great interests to our inner world in both our sensitivity through pictures and our logicality through its text. Pictures in good picture books reveal us the story line without the text (Seta, 1985). One would think pictures help us to understand the story, backgrounds about the scene, characters' emotion and so on.

Pictures are sure to bring us beautiful inner world stimulating readers' imagination and arisen by their interests. But no one approaches to investigate the role of pictures by using the objective method, especially the cross-fertilization between pictures and text in a picture book. To clarify the pictures' role in a picture book, the objective method with new computer graphics is employed. The key idea of the method is based on the eigen pattern that represents the characteristics of images independent of the resolutions and position images on pictures as the screen. The eigen pattern of an image is obtained by projecting the pixel information in x-y screen coordinate to red, green and blue coordinate systems.

In this study, the eigen patterns of pictures in picture book *Hyaku-man-kai Ikita Neko* (Sano, 1977) are extracted and visualized. This title in Japanese means 'the cat reincarnated a million times' in English. The Main character Neko described being selfish and isolated in the first half of this book. Million owners kept Neko, nevertheless Neko did not come to love not only his owners but also himself. In the last half of this story, Neko was born to be free. Neko have been living self-willed. One day Neko met Shiroi-Neko and felt in love with her. Neko knew the love for others

and even for himself. Neko could not have died million times in his life, because he did not know any emotion. This view of the world for after-death is based on the Buddhistic idea of called reincarnation. This is because, Neko could be dead by sadness when Shiroy-Neko was dead of old age in the last part in this story.

Sano also drew the pictures and wrote the text in *Hyaku-man-kai Ikita Neko*. Thereby the pictures reflect on the artist's thoughts and feelings for the story in this book. Color characteristics of this picture book and this artist are extracted and visualized in this method.

## 2. Method of Analysis

A color graphics image on a x-y plane coordinate system is represented by a set of the pixels containing the red, green and blue color information:

$$\begin{aligned} image &\in pixel_{i,j}, \\ pixel_{i,j} &\in f_r(x_i, y_j), f_g(x_i, y_j), f_b(x_i, y_j), \\ i &= 1, 2, \dots, m, \quad j = 1, 2, \dots, n, \end{aligned} \quad (1)$$

where m, n are the entire number of pixels in the direction of x, y axes; and subscripts r, g, b refer to the red, green and blue colors, respectively. Also the functions in Eq.(1) take the value between 0 and 1:

$$\begin{aligned} 0 &\leq f_r(x_i, y_j) \leq 1, \\ 0 &\leq f_g(x_i, y_j) \leq 1, \\ 0 &\leq f_b(x_i, y_j) \leq 1, \\ i &= 1, 2, \dots, m, \quad j = 1, 2, \dots, n, \end{aligned} \quad (2)$$

A red-green-blue (RGB in short) orthogonal coordinate system denoting the resolutions of the red, green, blue axes by R, G, B is considered, then a set of the functions  $g(r_o, g_p, b_q)$ ,  $o=1, 2, \dots, R$ ,  $p=1, 2, \dots, G$ ,  $q=1, 2, \dots, B$ , represents the image as

$$\begin{aligned} image &\in g(r_o, g_p, b_q), \\ r_o &\in f_r(x_i, y_j), \\ g_p &\in f_g(x_i, y_j), \\ b_q &\in f_b(x_i, y_j), \\ o &= 1, 2, \dots, R, \quad p = 1, 2, \dots, G, \quad q = 1, 2, \dots, B, \quad i = 1, 2, \dots, m, \quad j = 1, 2, \dots, n. \end{aligned} \quad (3)$$

A normalized value of the function  $|g(r_o, g_p, b_q)|$  in Eq.(3) takes a value between 0 and 1:

$$\begin{aligned} 0 &\leq |g(r_o, g_p, b_q)| \leq 1, \\ o &= 1, 2, \dots, R, \quad p = 1, 2, \dots, G, \quad q = 1, 2, \dots, B. \end{aligned} \quad (4)$$

The functions in Eq. (3) are given by

$$\begin{aligned} \text{Initial} \quad &\text{for all } g(r_o, g_p, b_q) = 0, \\ \text{If } &r_o = f_r(x_i, y_j), g_p = f_g(x_i, y_j), b_q = f_b(x_i, y_j), \\ \text{then } &g(r_o, g_p, b_q) = g(r_o, g_p, b_q) + 1, \\ o &= 1, 2, \dots, R, \quad p = 1, 2, \dots, G, \quad q = 1, 2, \dots, B, \quad i = 1, 2, \dots, m, \quad j = 1, 2, \dots, n, \\ \text{Final normalization} &\quad \frac{g(r_o, g_p, b_q)}{\text{Max}[g(r_o, g_p, b_q)]}. \end{aligned} \quad (5)$$

(Wakabayashi, et. al., 1998 ).

### 3. Results and Discussion

Table.1 lists the scenes of the picture book “*Hyaku-man-kai Ikita Neko*”.

Table 1. Scene of Each Picture

Scene No.	Figure	Story
1	Fig.1	Introduction of Neko reincarnate million times
2	Fig.2	King keeps Neko
3	Fig.3	Fisherman keeps Neko
4	Fig.4	Magician keeps Neko
5	Fig.5	Thief keeps Neko
6	Fig.6	Old Lady keeps Neko
7	Fig.7	Young Girl keeps Neko
8	Fig.8	Neko is born to be free
9	Fig.9	Neko loves himself
10	Fig.10	Neko meets Shiroi-Neko
11	Fig.11	Neko fall in love with Shiroi-Neko
12	Fig.12	Neko lives happily with Shiroi-Neko and their kitties
13	Fig.13	Neko wishes to live with Shiroi-Neko forever
14	Fig.14	Shiroi-Neko dies. Then Neko dies, either
15	Fig.15	Neko is not reincarnated forever

#### 3.1 Eigen Patterns of the Picture Book

The pictures are divided four parts along the story unfolding. The first part is the introduction visualized these eigen patterns in Fig.1. The second part shown as the development part consisting of six pictures is clarified these eigen patterns in Fig.2. The third part of this story is turn and conclusion part, and Fig.4 shows the four pictures of the ending part.

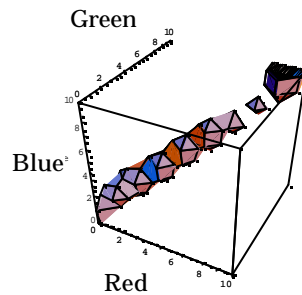


Fig.1. Eigen Pattern of Scene 1 in the Introduction Part

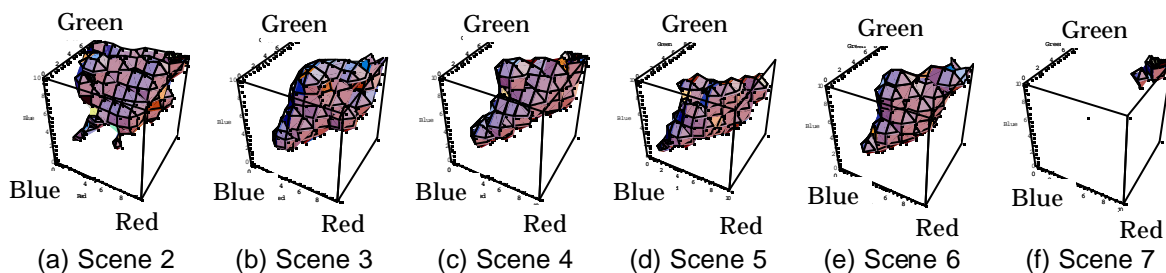


Fig.2 Eigen Patterns in the Development Part

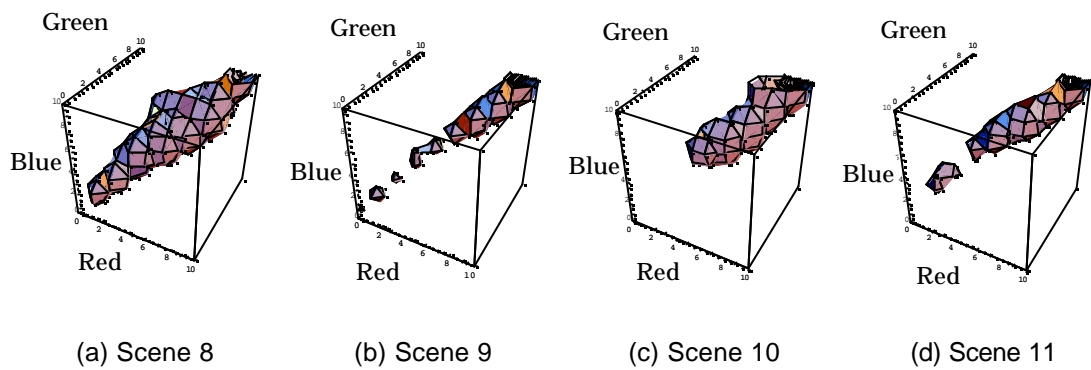


Fig.3 Eigen Patterns in the Turn and Conclusion Part

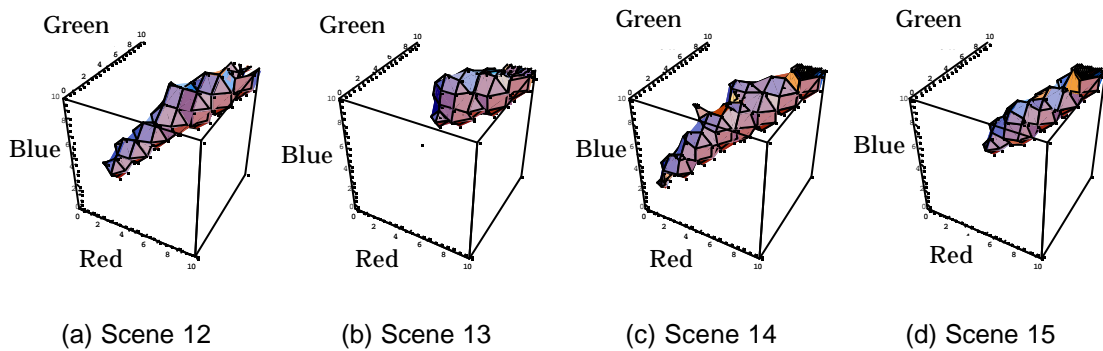


Fig.4 Eigen Patterns in the Ending Part

### 3.2 Relationship between Pictures and Story

The scene of the introduction draws only Neko in white background. The eigen pattern draws a diagonal and appeared on the clear black-to-white gradation line. The first impression for the Neko is quite simple and clear. This means that readers have been encouraged for imaging about Neko's characters, behaviors and so on.

The second part of this story employed the method of legend is employed in the second part of this story not involving the expressions. (Ozawa, 1983). In the story, the changeless patterns of both story and pictures make in a harmony. The character's mind was stable, and each picture was not changed and drew with much color. The eigen patterns were slightly changed through Fig. (a) to (e) in Fig.2. The repeat of the similar eigen patterns as well as the continuous appearance of similar style are the most attractive way for children (Seta, 1980). This part encourages leading readers into this Neko's story.

The quite different pattern is shown in (f) of Fig.2. Namely, the story was written with the method of legend, however the background color of picture was suddenly changed from black to white in this page of the picture book. The white background gives readers the same impression at the first scene of the introduction part and brought us back to the first of story. So this scene works a role as the turning point of Neko's life.

The third part of this story is told by quite different style compared with that of the second part. Instead of the legend style, modern literary style is applied in this part. In the modern literary style, the expression of inner world by text plays an important role. The stable story flow has been composed of the interesting combination with the changeable pictures. Neko's mind is stable in the story, however the rhythm of eigen patterns in pictures is observed.

The last ending part of the story describes the Neko last life with his wife, Shiroi-Neko. Comparing with that of the pictures in the second part, there is not so much color in this part. Pictures in this part are reflected on the stabilized and happy life of the Shiroi-neko's family. In addition, the backgrounds of this part paint in white is the same as the scene 1 and scene 7.

## 4. Conclusion

To visualize the eigen patterns of this picture book, the role of pictures in the book is verified. Pictures in this picture book have not only the role of supplement, but taking on the same important role of telling the story.

The important role of white-background is also pointed out as the results of the visualization. White-backgrounds are effective to imagine the focalized character's emotion and changeover the situation.

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