# A System Helping the Blind to Get Merchandise Information

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**Abstract.** We propose a system helping the blind to get best-before/use-by date of perishable foods. The system consists of a computer, a wireless camera and an earphone. It processes images captured by a user and extracts character regions in the image by using Support Vector Machine (SVM). Processing the regions by Optical Character Recognition (OCR) and the system outputs the best-before/use-by date as synthesized speech.

## 1 Introduction

From our interview to 14 blinds (10 males and 4 females) on merchandise purchase, we have found the following: 1) they can get rough location of shelf in stores where they often visit. 2) however, they cannot get merchandise name, price, and best-before/use-by date of perishable foods. Therefore the blind need help by a clerk or accompanying person in shopping. They, however, want to freely shop without relying on others. We propose a portable system which provides the blind with best-before/use-by date.

## 2 System Overview

This system consists of a note-computer (Intel Core i5 2.67GHz CPU, 4GB RAM, Windows 7 OS) , a wireless camera (SONY, DSC-W350) , OCR (Panasonic, Ver. 13.01) and an earphone. When users want to know best-before/use-by date of perishable foods, they take an image of merchandise by picking up it. After capturing the image, the system extracts the best-before/use-by date, by image processing. Finally the system provides the obtained information to the user as synthesized voice through an earphone.

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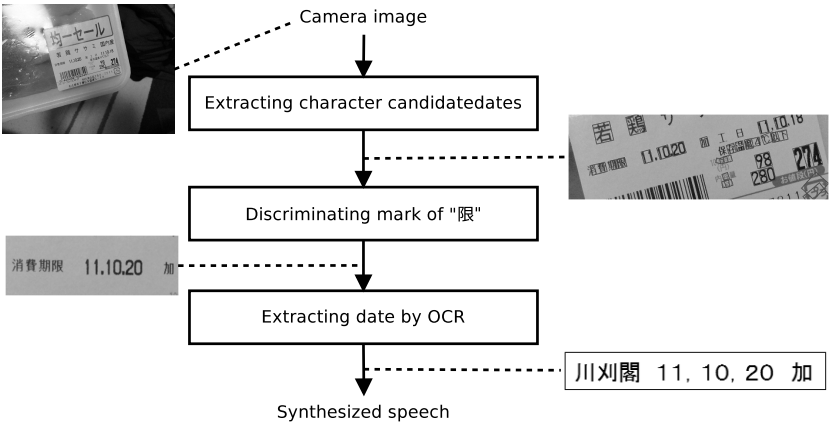



**Fig. 1.** Flowchart of best-before/use-by date recognition

## 3 Best-before/Use-by Date Recognition

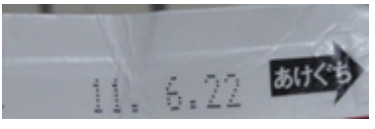
Figure 1 illustrates the processing flowchart. First, the system extracts character candidates consisting of edges. Next, it finds the special mark appeared in best-before/use-by date by applying Support Vector Machine (SVM) to the character candidates and extracts a rectangular region surrounding the extracted mark. Finally, Optical Character Recognition (OCR) is applied to the region, and the best-before/use-by date is recognized. In a case of perforation printing, the recognition using OCR is difficult. Therefore, to resolve this problem, we apply the dilation processing before OCR.

## 4 Evaluation Experiment

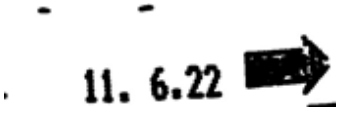
For SVM training, we prepared 193 images as positive dataset and 32,741 images as negative dataset. We applied the proposed method to 70 images of perishable foods and drink in paper pack (40 perishable food images and 30 paper pack images). If the recognition result of OCR includes correct best-before/use-by date, we classify it as successful recognition.

The number of images for which the method successfully could extract date region is 37 for perishable foods and 27 for drink in paper pack. Among these images, the date recognition was succeeded for 33 perishable food images and 13 paper pack images. The rate of date recognition is 0.825 (33/40) for perishable foods and 0.433 (13/30) for drink in paper pack. The processing time is about 1.128 sec. in average. Figure 2 shows an example of best-before recognition results.


(a) Input image




(b) Extracted region image




(c) Processed image

**Fig. 2.** Example of best-before date recognition

## 5 Conclusion

This paper has presented a portable system to provide the blind with the merchandise information. Evaluation experiments show that users can know merchandise information and pick up the specified merchandise by using the system. Our future subject is to evaluate how the developed system helps the blind.

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## References

1. Ye, Q., Jiao, J., Huang, J., Yu, H.: Text Detection and Restoration in Natural Scene Images. J. Visual Communication and Image Representation 18(6), 504–513 (2007)
2. Gllavata, J., Ewerth, R., Freisleben, B.: Text Detection in Images based on Unsupervised Classification of High-frequency Wavelet coefficients. In: ICPR 2004, pp.425–428 (2004)
3. Pan, Y., Hou, X., Liu, C.: Text Localization in Natural Scene Images Based on Conditional Random Field. In: ICDAR 2009, pp. 6–10 (2009)
4. Suzuki, Y., Takeuchi, Y., Matsumoto, T., Kudo, H., Yamamura, T., Ohnishi, N.: Improving the Character Extraction Rate and Ranking Voice Output in Systems Assisting Vision Impaired People Acquire Character Information from the Environment. The Journal of the Institute of Image Information and Television Engineers 58(12), 1800–1807 (2004)