Pill recognition using image processing and neural networks

*H-C. LEE, T-Y. CHANG. **Pill recognition using image processing techniques and neural networks.** Gerontechnology 2014;13(2):335;* doi:10.4017/gt.2014.13.02.244.00 **Purpose** Medication errors happen because of people's mistake or misunderstanding. It is difficult for the general public, especially the elderly, to recognize medicine simply by its appearance. In order to solve this problem, many hospitals construct their own online drug recognition systems. Most systems can only be searched with keywords containing the drug name or pharmaceutical company, which is not a user-friendly system and may cause errors. In recent years, some researchers have worked on the pill/drug recognition problem. The major features used for pill recognition are the shape and color of the pill[1]. In addition, imprint or more detailed information about the pill is also used for pill recognition[2-4]. The objective of this study is to use the widely available web cam or smartphone for pill image acquisition and to facilitate pill recognition using the proposed system with image processing techniques and neural networks. **Method** We propose an automatic pill image recognition system that extracts features from a pill, such as shape, color, and imprint. After multiple appearance and color features are extracted from the image of a pill that is taken with a camera (*Figures 1* & *2*), these features will be processed with the SimNet Neural Network for pattern classification. The proposed system will calculate and show information for pills that have the top 5 closest similarity to the image. **Results & Discussion** Experiments were conducted with over two thousand pill images, and promising results were obtained. Multiple appearance features were extracted from a pill image that was taken with a camera, and the features were processed by the proposed system with the SimNet Neural Network for pattern classification. The proposed system showed the information for similar pills that were correctly matched at ranks 1 to 5 (i.e., the 5 pills that were ranked most similar to the image). We conducted experiments with the proposed approach on an image set containing a total of 2,015 pill images. The success rate for the image of the target pill to be ranked highest (i.e., most similar) is 92.66% and to be ranked in the top 5 (i.e., 5 most similar) is 96.13%.

References

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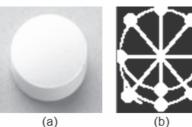
Figure 1. Pill's shape features: (a) original pill image; (b) edge and nodes detection

Figure 2. Pill's shape features: (a) original pill image; (b) 'diameter' of various angles