Influence of the Size of Color Images Taken by Digital Camera on Image Reading: ROC Curve on Red Simulative Wound

Katsuhiko Ogasawara M.Sc.1), Kuniko Ito B.A.1), Guoqian Jiang M.D.1), Yukiko Uematsu M.Sc.1), Akira Endoh Ph.D1), Tsunetaro Sakurai M.D.1), Michio Kimura M.D.2), Yasuyuki Fukuhara B.S.3)

1) Dept. of Medical Informatics, Hokkaido University Hospital, Sapporo JAPAN
2) Dept. of Medical Informatics, Hamamatsu University School of Medicine, Hamamatsu JAPAN
3) Olympus Optical Co., LTD. Solution Integration Department, Tokyo JAPAN

Purpose:
The purpose of the study is to discuss the influence of the size of color images taken by digital camera on the binomial ROC curve from image reading. A basic experiment was taken by using the distributed test. Eight members (5 males and 3 females) in department of medical informatics participated the evaluation. A room with the fluorescence light and without windows was used for image reading in order to prevent the light from the sun. A CRT display (DV17B2) with 32 bit and 1024 x 768 made by NEC Company was used for the image reading.

Methods:
In order to keep a fixed environment for picture taking, a box with 70x70x80 cm was made by installing 2 white fluorescence lamps (80W) and by pasting the white wallpaper inside. All pictures were taken in the box. The CAMEDIA-XL (C-1400) digital camera made by Olympus Company was used for the experiment to take the pictures of human hands (within the wrist joint) from 13 volunteers. 50 digital images without sign and 50 ones with sign were obtained through the above procedures. The sign was a simulative wound with 0.4 mm dimension of red points made by red water pen on the site of human hand back between the metacarpophalangel (MP) joint and the wrist joint. All images were processed into large size with 1280x1024 and small size with 640x512.

Results and Discussions:
Through the analysis of ROC curve, the Az values (mean ± S.E.) were obtained with 0.70±0.06 for small size and 0.86±0.03 for large size. The paired-t test between 2 groups was performed and the result showed that there was significant difference between the 2 image groups with different size (p<0.01). The result indicates that the influence of image size on image reading should be considered when reading the images with tiny (0.4 mm) red simulative wound.