Abstract

Intensive medical use of the multimedia technology is rapidly progressing without sufficient attention to the risk that inappropriately reproduced colors may incidentally cause erroneous diagnoses. In this paper, present status of medical color imaging, targeted problems and possible solutions are reviewed.

Keywords: Medical Color Imaging; Digital Imaging; Morphological Diagnosis; Diagnostic Equivalence; Multispectral Imaging

Introduction

Many cases of critical decisions in medicine are made on morphological evidence observed in various color images and digital images will soon be common not only in medical practice, but also in medical education and research activities. However, a large amount of color data is lost by the A-D conversion and there is no guarantee that the same color is reproduced with various displays.

Present Status of Medical Color Imaging

The situation and grade of the problem with medical color imaging varies in sub-fields. In dermatology, even the photograph of the highest level is not yet believed to be able to substitute for the observation of the real objects. On the other hand, current commercial products for telepathology are considered to satisfy most of the practical requirements. Color is one of the most important factors in nursing and forensic medicine, but recognition of the problem is not enough yet.

Computerized lesion detection based on digitized images and medical applications of the virtual reality technology not only inherit these situations but also bring proper problems awaiting solution.

Recently, the diagnostic qualities of most of digitized medical images properly prepared were shown as almost the same as slide films, but inappropriately reproduced colors proved to incidentally cause erroneous diagnoses.

Solutions in Prospect

On the basis of the RGB system, color-matching technologies, color calibrators for displays and color charts used to adjust displays have been introduced to prevent such accidents. But this technique cannot reproduce the same colors on a display under different illumination.

Multispectral imaging is a more promising solution that reproduces precise colors and compensates the difference in illuminant conditions, and furthermore, may be used to reproduce even fine textures of skin lesions in medical practice.

Unfortunately, these technologies used for digital color imaging will not be sufficiently standardized for medical application in a short time. Therefore, another temporary and practical solution based on the concept of 'diagnostic equivalent', in which a set of typical medical images with authorized diagnoses is used as a practical calibrator for common displays, should be considered at present.

Conclusion

Investigation of color problems summarized here requires interdisciplinary collaboration of medical and engineering fields. For its promotion, recently Digital Biocolor Society (http://biocolor.umin.ac.jp/) was established and a first textbook exclusively focused on this topic was published [1]. Anyone interested in is invited to join.

Reference


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