Compact Cataract Screening System : Design and Practical Data Acquisition

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Abstract	The increasing number of cataract sufferers is a serious problem because cataracts are a leading cause of blindness in the world. To avoid blindness from cataracts, we need to detect them early. Today, ophthalmologists use a slit lamp to diagnose cataracts. This equipment is expensive and requires special training to use it. Unfortunately, a lot of developing countries have a limited number of ophthalmologists and health facilities, while a lot of cataract sufferers live in developing countries. Our algorithm is aimed at such developing countries and rural areas, and its main equipment is a compact digital camera. This equipment is inexpensive and easy for anyone to use without special training. Examination can be easily carried out in an outpatient department. We have already proposed a cataract screening method for the equipment that considers about specular reflection and statistical texture appearance inside the pupil. However, in order to accomplish our goal, not only the screening method itself, but also other aspects such as compactness and ease of use are crucial. In this paper, we will discuss system design for a compact cataract screening system. The final goal of our research is developing a simple and robust screening system for cataract with a compact digital camera. A user simply takes a patient's photograph and the system will automatically analyze the image by extracting information inside a pupil, including specular reflection analysis and texture appearance analysis, for distinguishing between serious and non-serious conditions. We emphasize how to implement our system in real conditions by giving a recommendation for acquiring appropriate image data while taking a photograph so that our system will work well. The results in a real implementation are similar to our recommendation.
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