Scientific Posters

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SUBSPECIALTY CONTENT

- Physics and Basic Science

CODE: LL-PH2148-R06
SESSION:

Physics

Development and Evaluation of an Automated Human Identification System Using Dental Radiographs

DATE: Thursday, December 04 2008
START TIME: 12:15 PM
END TIME: 01:15 PM
LOCATION: Lakeside Learning Center

DISCLOSURES

K.I. - Nothing to disclose.

T.A. - Nothing to disclose.

E.K. - Nothing to disclose.

R.K. - Nothing to disclose.

I.K. - Nothing to disclose.

PURPOSE

Human identification using dental radiographs is an extremely time-consuming task in mass disasters such as earthquakes, fires, tsunamis and acts of terrorism. The purpose of this study is to develop a novel automated dental radiograph identification system using Phase-Only Correlation (POC).

METHOD AND MATERIALS

The developed system employs POC which is a high-accuracy image matching technique using the phase components in 2D discrete Fourier transforms of images and can estimate similarity transformation parameters and evaluate similarity between two images. The system consists of 3 steps: (i) scaling, rotation and translation alignment using POC, (ii) distortion correction based on the nonlinear image transformation model using POC-based sub-pixel correspondence search and (iii) matching score calculation using POC. Our databases consist of 500 periapical and bitewing radiographs (DB1) with 250 subjects and 2 different images of each radiograph and 50 panoramic radiographs (DB2) with 25 subjects and 2 different images of each radiograph, which are taken before and after dental treatment.

RESULTS

In this experiment, subjects after dental treatment are matched to all the subjects before dental treatment; the total numbers of combination pairs are 62,500 (250x250) for DB1 and 625 (25x25) for DB2, respectively. We evaluate identification performance by the ranking of matching scores for each subject before dental treatment. The numbers of genuine pairs whose matching score are ranked top 1 are 207 for DB1 and 19 for DB2; the recognition rates are 82.8% (=207/250) and 76.0% (=19/25), respectively. The matching scores of genuine pair are ranked among the top 10 for DB1 and the top 4 for DB2, respectively. Thus, the proposed system can significantly reduce the number of pairs to be matched by forensic experts. The computation times of our system are 3.2 seconds per pair for DB1 and 19.0 seconds per pair for DB2, respectively.

CONCLUSION

We have developed an automated human identification system using dental radiographs, which is useful for identifying victim's images in mass disasters.

CLINICAL RELEVANCE/APPLICATION

Our system can be used for the computer-aided diagnosis such as digital subtraction radiography for various medical images.

QUESTIONS ABOUT THIS EVENT EMAIL:

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