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SUBSPECIALTY CONTENT

Physics and Basic Science

CODE: LL-PH6124-H02
SESSION: Physics - CAD
An Automated Dental Radiograph Identification System Using Phase-Only Correlation for Mass Disasters

DATE: Tuesday, November 27 2007
START TIME: 12:15 PM
END TIME: 01:15 PM
LOCATION: Lakeside Learning Center

DISCLOSURES

E.K. - Nothing to disclose.
R.K. - Nothing to disclose.
I.K. - Nothing to disclose.
A.N. - Nothing to disclose.
K.I. - Nothing to disclose.
T.A. - Nothing to disclose.

PURPOSE

In mass disasters such as earthquakes, fires, tsunamis and terrorism, identifying victims by their dental records is extremely time-consuming, since forensic experts must manually compare victim's records with many dental records. The purpose of this study is to develop a novel automated dental radiograph identification system based on Phase-Only Correlation (POC).

METHOD AND MATERIALS

POC is a high-accuracy image matching technique which uses the phase components in 2D Discrete Fourier Transforms of images and can estimate the sub-pixel translational displacement and evaluate the similarity between two images. The proposed system consists of three steps: (i) image registration using the extended version of POC which employs the Fourier-Mellin transform, (ii) distortion correction using a sub-pixel correspondence search technique based on POC and (iii) matching score calculation using POC. Our database consists of 120 images with 60 subjects and 2 different images of each radiograph which are taken before and after dental treatment.

RESULTS

In this experiment, 60 subjects after dental treatment are matched to 60 subjects before dental treatment; the total number of pairs is 3,600 (60x60). We evaluate the identification performance by the ranking of matching scores for each subject before dental treatment. From this experimental result, the number of the genuine pairs whose matching scores are ranked top 1 is 52; the recognition rate is 87% (52/60). The matching scores of the genuine pair are always ranked among the top 3. Thus, the proposed system can reduce the number of pairs to be matched by experts to 5% (180/3,600) of all the possible combinations. The computation time of our system is 3.6 seconds per pair. In addition, the subtraction between the aligned genuine pairs clearly shows the dental work. This result indicates that our system is also effective for medical diagnosis.

CONCLUSION

We have proposed an automated dental identification system using POC, which can correctly identify victim's images when mass disasters occur.

CLINICAL RELEVANCE/APPLICATION

An automated dental radiograph identification system based on POC allows identifying victims and imaging diagnosis such as digital subtraction radiography.

QUESTIONS ABOUT THIS EVENT EMAIL:

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