BE22-A.1

A FAST CORRELATION TECHNIQUE FOR MULTIMODALITY IMAGE MATCHING

Anthony Apicella,* Joachim Nagel, Ph.D.

Advanced nuclear medicine imaging modalities such as single photon emission tomography and positron emission tomography provide valuable functional or physiologic information. As this information is complementary to anatomic images obtained via Nuclear Magnetic Resonance, the diagnostic potential of the Nuclear Medicine images may be augmented by objective, accurate matching of the different data sets.

Different techniques, such as correlation analysis, edge detection, or fiducial landmarks have been proposed for image matching. They all suffer from severe shortcomings with regard to either reliability and precision or mathematical complexity resulting in unreasonable calculation times.

We developed a new correlation analysis to compute the three dimensional translational and rotational shifts of the image planes necessary to combine or overlay the different images. Current correlation analysis approaches are limited, as the coupling of the registration variables requires an iterative, computationally expensive algorithm. The approach described here improves upon past work by first decoupling the translational and rotational components, thus eliminating the iterative part of the algorithm and significantly reducing the computational expense.

The input images are first transformed into images which are translation invariant. These translation invariant images are converted to polar coordinates and the rotation angles calculated. The rotational corrections are applied to the original images, and then the translation distances are calculated. Given the matching differences between the two data sets, the NMR images are transformed so that they are aligned with the PET images.