3D-2D image registration by nonlinear regression

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Abstract

We propose a 3D-2D image registration method that relates image features of 2D projection images to the transformation parameters of the 3D image by nonlinear regression. The method is compared with a conventional registration method based on iterative optimization. For evaluation, simulated X-ray images (DRRs) were generated from coronary artery tree models derived from 3D CTA scans. Registration of nine vessel trees was performed, and the alignment quality was measured by the mean target registration error (mTRE). The regression approach was shown to be slightly less accurate, but much more robust than the method based on an iterative optimization approach.

AUTHOR KEYWORDS

- 2D/3D image registration
- image guided interventions
- regression

IEEE TERMS

- Feature extraction
- Image registration
- Neural networks
- Optimization
- Robustness
- Training
- X-ray imaging