



Non-rigid point cloud registration based lung motion estimation using tangent-plane distance [↗](#)

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Fan Rao¹, Wen-long Li¹, Zhou-ping Yin¹

¹Huazhong University of Science and Technology

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Fan Rao

Huazhong University of Science...



Working

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EXTERNAL LINK

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THIS PROTOCOL ACCOMPANIES THE FOLLOWING PUBLICATION

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PROTOCOL STATUS

Working

Data Preparation

- 1 Extract dense point clouds F and R from 4DCT images at different phases, and they represent the status of lung surface at different time.
- 2 Simplify point cloud F to point cloud F'. The scale of F' should be around 4000.
- 3 Calculate the connectivity matrix M from point cloud F'.
- 4 Calculate the normal vector information N from point cloud R.
- 5 Simplify point cloud R and its normal vector information N to R' and N'. The scale of R' should be around 6000.
- 6 Bring point cloud F', connectivity matrix M, point cloud R' and normal vector information N' to the non-rigid registration procedure, and let F', R' denote the source point cloud and target point cloud respectively.

Non-rigid Registration

- 7 Initial the local affine transformation parameters X .
- 8 Initial the weight value α and the stiffness matrix G .
- 9 Calculate the the derivative of the objective function to the transformation parameters and update the local affine transformation parameters using stochastic gradient descent optimization. Repeat until a convergence criteria is met.
- 10 Output the local affine transformation parameters and the transformed points.



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