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Registration Research

Simple ITK Documentation
https://buildmedia.readthedocs.org/media/pdf/simpleitk/master/simpleitk.pdf

4.3 ImageRegistrationMethod To create a specific registration instance using the ImageRegistrationMethod you need to select several components which together define the registration instance: 1. Transformation. 2. Similarity metric. 3. Optimizer. 4. Interpolator.

4.3.1 Transform The type of transformation defines the mapping between the two images. SimpleITK supports a variety of global and local transformations. The available transformations include: • TranslationTransform. • VersorTransform. • VersorRigid3DTransform. • Euler2DTransform. • Euler3DTransform. • Similarity2DTransform. • Similarity3DTransform. • ScaleTransform. • ScaleVersor3DTransform. • ScaleSkewVersor3DTransform. • ComposeScaleSkewVersor3DTransform. • AffineTransform. • BSplineTransform. • DisplacementFieldTransform. • Composite Transform.

4.3.2 Similarity Metric The similarity metric reflects the relationship between the intensities of the images (identity, affine, stochastic. . . ). The available metrics include: • MeanSquares . • Demons. • Correlation. • ANTSNeighborhoodCorrelation. • JointHistogramMutualInformation. • MattesMutualInformation.

**Simple ITK Notebooks 63_Registration_Initialization**
http://insightsoftwareconsortium.github.io/SimpleITK-Notebooks/Python_html/63_Registration_Initialization.html

1. Do nothing (hope springs eternal) - initialize using the identity transformation.
2. CenteredTransformInitializer (GEOMETRY or MOMENTS) - translation based initialization, align the geometric centers of the images or the intensity based centers of mass of the image contents.
3. Use a sampling of the parameter space (useful mostly for low dimensional parameter spaces).

4. Manual initialization - allow an operator to control transformation parameter settings directly using a GUI with visual feedback or identify multiple corresponding points in the two images and compute an initial rigid or affine transformation.

Simple ITK Notebooks 60_Registration_Introduction

http://insightsoftwareconsortium.github.io/SimpleITK-Notebooks/Python_html/60_Registration_Introduction.html

**Registration Components**