Permute Axes Transform for ITK

Release 1.1

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Abstract

The current ITK release (2.8) already contains a filter that enables permuting coordinate axes of an image: `itk::PermuteAxesImageFilter`. PermuteAxesTransform provides similar functionality in form if ITK transform. It enables permuting axes as a part of image resampling or it may be combined with other transforms. Such techniques save system resources as they does not require an extra filter to be present in a pipeline.

This document describes the implementation of Permute Axes Transform for the Insight Toolkit ITK `www.itk.org`. The paper is accompanied with the source and testing code for purposes of testing of this implementation.

The current ITK release (2.8) already contains a filter that enables permuting coordinate axes of an image: `itk::PermuteAxesImageFilter`. PermuteAxesTransform class provides similar functionality in form if ITK transform.

This class is very simple and the implementation generally follows the `itk::PermuteAxesImageFilter`. The permutations are represented as `itk::FixedArray` of `unsigned int`egers, where the value $perm[j]$ of the j-th component means, that j-th axis of the output space corresponds to the $perm[j]$-th axis of the input space. (See ITK Software Guide [1] for details on input and output spaces of the transforms.)

The actual permutation can be set via `SetOrder()` method, which validates the permutation. `GetInverse()` method sets a transformation so that it corresponds to the inverse permutation of the current transformation. `SetIdentity` sets the current transform to identity transform.

The main contribution of having this functionality in form of ITK geometric transform is that it can be used in `itk::ResampleImageFilter` or it can be combined with other transforms (for example as a bulk transform of `itk::BSplineDeformableTransform` or using approaches such as *CombinationTransform*, that has been submited to IJ - 2006 January - June).

References

[1] L. Ibanez, W. Schroeder, L. Ng, and J. Cates. *The ITK Software Guide*. Kitware, Inc. ISBN 1-930934-15-7, http://www.itk.org/ItkSoftwareGuide.pdf, second edition, 2005. (document)