

Publication

A Localized Statistical Motion Model as a Reproducing Kernel for Non-rigid Image Registration

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Thoracic image registration forms the basis for many applications as for example respiratory motion estimation and physiological investigations of the lung. Although clear motion patterns are shared among different subjects, such as the diaphragm moving in superior and inferior direction, in current image registration methods such basic prior knowledge is not considered. In this paper, we propose a novel approach for integrating a statistical motion model (SMM) into a parametric non-rigid registration framework. We formulate the SMM as a reproducing kernel and integrate it into a kernel machine for image registration. Since empirical samples are rare and statistical models built from small sample size are usually over-restrictive we localize the SMM by damping spatial long-range correlations and reduce the model bias by adding generic transformations to the SMM. As an example, we show our methods applicability on the example of the Dirlab 4DCT lung images where we build leave-one-out models for estimating the respiratory motion.

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