

Purpose/Objectives(s): Breast images compose of soft tissues with low contrast in MRI imaging modality. However, even small amounts of motion can have large effects on clinical analysis, since each individual pixel needs to be careful checked. We investigate a strategy to obtain high precision deformable registration method for breast images.

Materials: The data set contains 3 series. Each series contains 32 slices, with a different number of time points. Series 1 contains 15 time points ($15 \times 32 = 480$ images), Series 2 contains 20 time points ($20 \times 32 = 640$ images), and Series 3 contains 20 time points ($20 \times 32 = 640$ images). Some potential complicating factors are: 1) In Series 1, the MRI flip angle is different for time points 1-5, 6-10, and 11-15, which causes each set of 5 time points to potentially have different contrast. 2) Contrast agent is administered in series 2, so the contrast changes over time. 3) There is a space of a few minutes between each series, when the patient may move. 4) Series 3 is a "wash-out" series. As the contrast agent washes out, the image contrast may change.

Methods: Our calculation consists of two natural steps. First, a number of control points are auto-searched based on tissue intensity information. Control points in fixed image and moving image are matched together using SIFT (Scale Invariance Feature Transformation) method. In the second stage, the matched control points serve as a priori information for the TPS (Thin Plate Spline) deformable registration calculation.

Results: Breast images are matched well using this hybrid registration method. The subtraction images are presented to show the registration results.

Conclusions: The proposed method can be used in the soft tissue images and large deformation images. Comparison to the conventional deformable registration, this method can effectively increase the local registration quality.