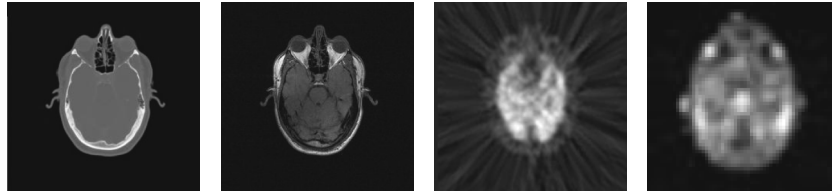
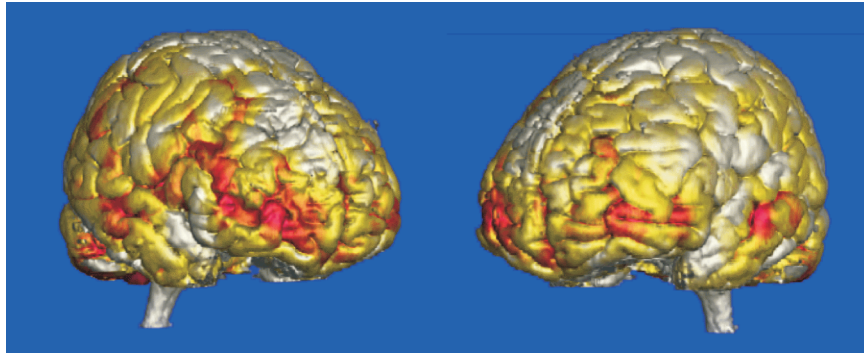


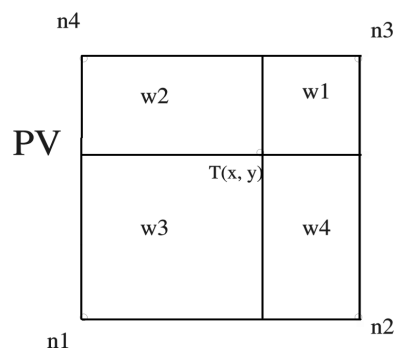
## CHAPTER 15: DEFORMABLE MODEL-BASED IMAGE REGISTRATION



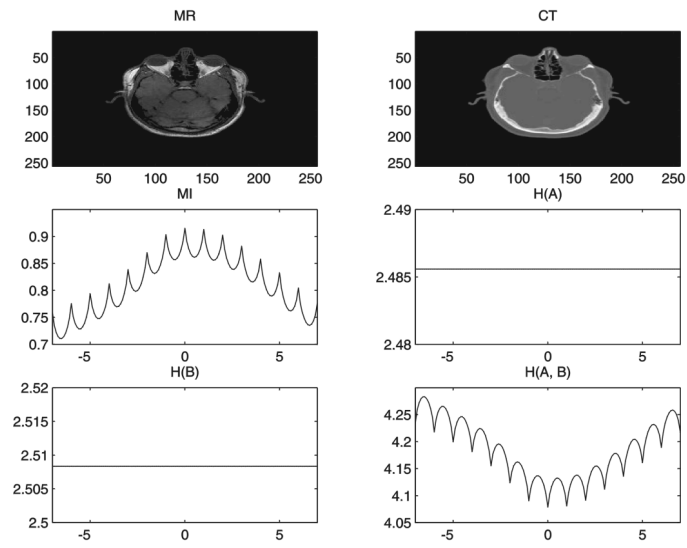
**Figure 1.** Images from different modalities. From left to right: CT, MR, PET, SPECT. Available online at <http://www.isi.uu.nl/Research/Registration/>.



**Figure 2.** Example of a multimodal visualization. Available online at <http://www.isi.uu.nl/Research/Registration/>.

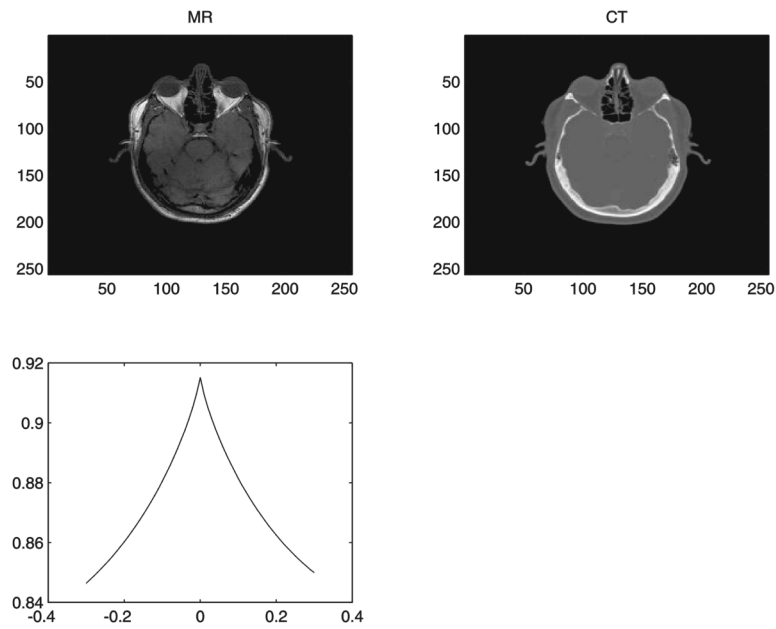


**Figure 3.** PV interpolation.

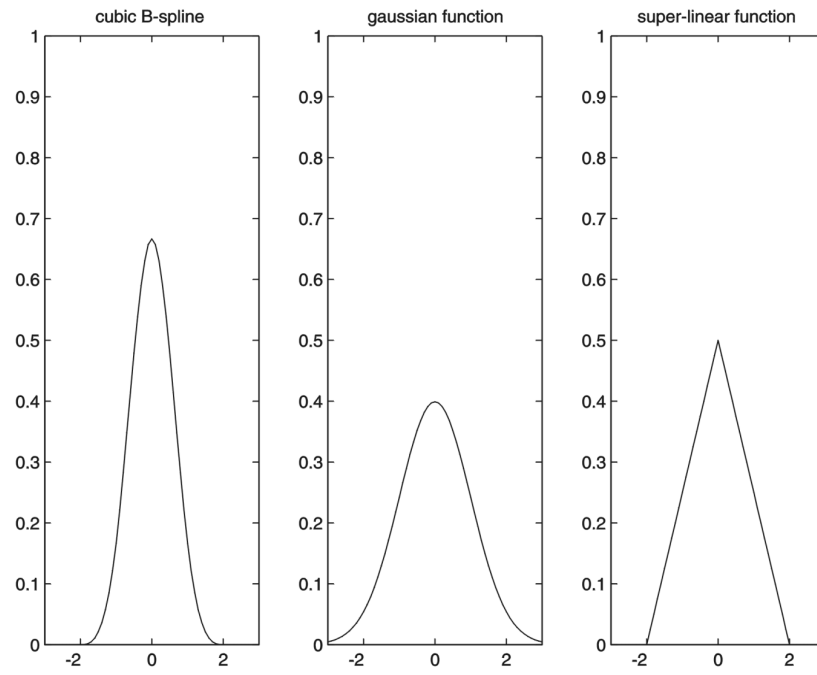


**Figure 4.** The mutual information value of a pair of multimodal images. Row 1 contains a pair of MR/CT images. (Available online at <http://www.isi.uu.nl/Research/Registration/>). Rows 2 and 3 show the mutual information (MI), marginal entropies ( $H(A)$  and  $H(T(B))$ ) and joint entropy ( $(H(A, T(B)))$ ) values as functions of translations  $t$  (up to  $\pm 7$  pixels).

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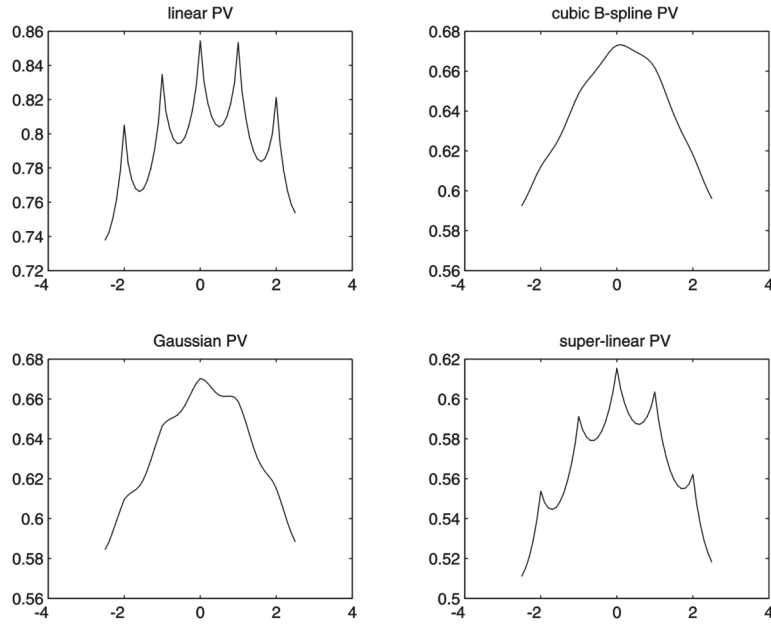


**Figure 5.** Row 1 contains a pair of MR/CT images. From the homepage of the Image Science Institute, Department of Medical Imaging. Available online at <http://www.isi.uu.nl/Research/Registration/registration-frame.html> Row 2 shows the mutual information (MI) value as a function to rotations ( $\pm 20^\circ$ ).



**Figure 6.** Three interpolation kernels. Left: cubic B-spline function. Middle: Gaussian function. Right: superlinear function.

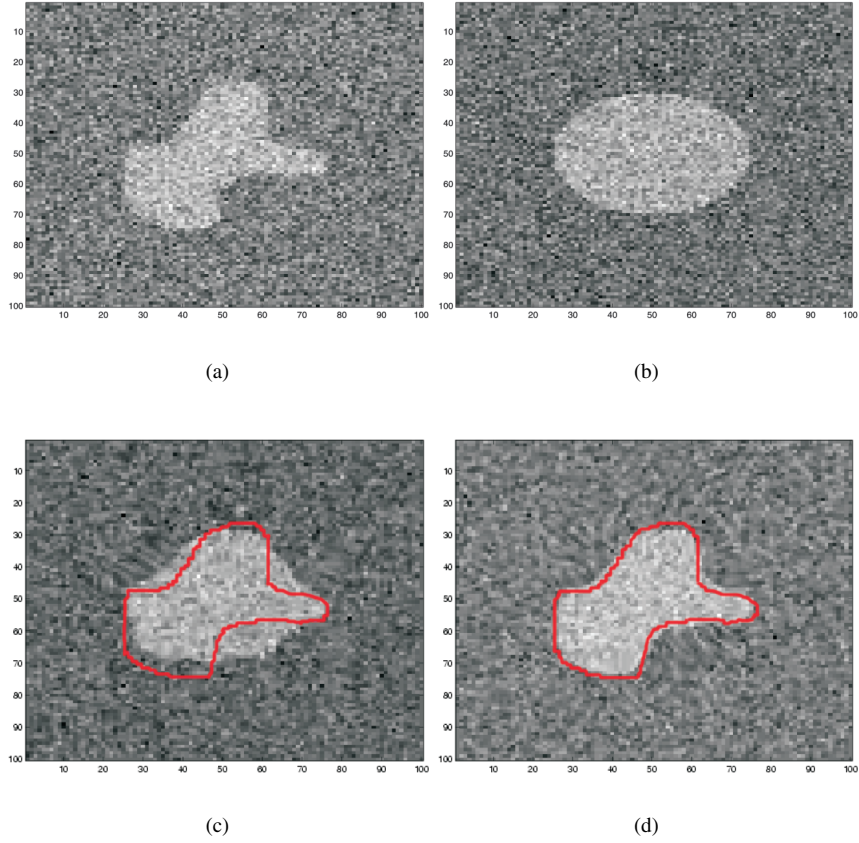
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**Figure 7.** Mutual information responses with respect to translations along the  $x$ -axis. Left-top: values for bilinear interpolator. Right-top: for cubic B-spline function. Left-bottom: for Gaussian function. Right-bottom: for superlinear function.

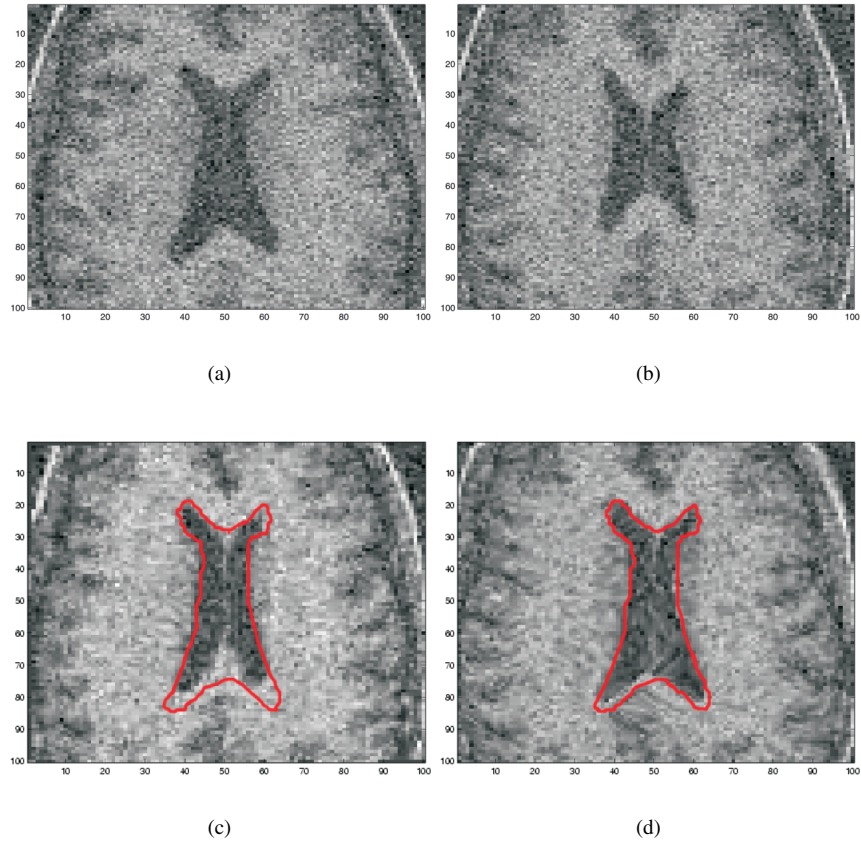


**Figure 8.** Example of the registration results. The left-most is the reference CT image; the middle is the floating MR image prior to registration, and the right-most is the MRI after registration. Images were obtained from the homepage of the Image Science Institute at the University of Medical Center Utrecht, and are available online at <http://www.isi.uu.nl/Research/Registration/registration-frame.html>.



**Figure 9.** Registration results for image set 1. First row: (a) the fixed image, (b) the moving image. Second row: registration result of (c) using the Demons algorithm, and (d) using our segmentation-guided registration model. The edge map from the fixed image is superposed.

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**Figure 10.** Registration results for image set 2. The images were obtained from the Davis-Mills Magnetic Resonance Imaging and Spectroscopy Center (MRISC) at the University of Kentucky. First row: (a) fixed image, (b) moving image. Second row: registration result of (c) using the Demons algorithm, and (d) using our segmentation-guided registration model.