Histology to μCT data matching using landmarks and a density biased RANSAC

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The fusion of information from different medical imaging techniques plays an important role in data analysis. Despite the many proposed registration algorithms the problem of registering 2D histological images to 3D CT or MR imaging data is still largely unsolved. In this paper we propose a computationally efficient automatic approach to match 2D histological images to 3D micro Computed Tomography data. The landmark-based approach in combination with a density-driven RANSAC plane-fitting allows efficient localization of the histology images in the 3D data within less than four minutes (single-threaded MATLAB code) with an average accuracy of 0.25 mm for correct and 2.21 mm for mismatched slices. The approach managed to successfully localize 75% of the histology images in our database. The proposed algorithm is an important step towards solving the problem of registering 2D histology sections to 3D data fully automatically.

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