Evaluation of Scale Invariant Feature Transform (SIFT) algorithm for the improvement of tilt-series alignment in electron tomography

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Despite the high performance achieved in goniometers-control for tomographic tilt series recording, image alignment is mandatory to obtain accurate reconstructions. In addition, due to the high resolution currently expected from tomograms, the existing alignment methods (based on cross-correlation, fiducial-markers and landmarks) needs to be improved. Among the alternative methods presently proposed to align images, Scale Invariant Feature Transform (SIFT) [1] has demonstrate its performance for the detection of common features occurring in several images. SIFT have been successfully used for panoramic stitching [2], object detection [1] and proposed as a method for image alignment in electron tomography [3]. We have implemented this algorithm in TomoJ [4] and evaluated its performance on data from different transmission electron microscopy (TEM) acquisition methods (TEM, EFTEM, STEM, and Cryo-TEM). We will present here the results obtained validating the use of SIFT on the different acquisition modes.

References:

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