Frame Localisation Optical Projection Tomography

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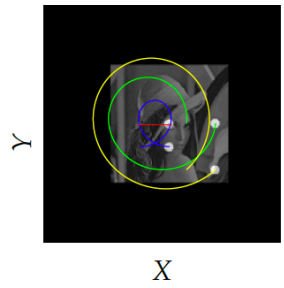
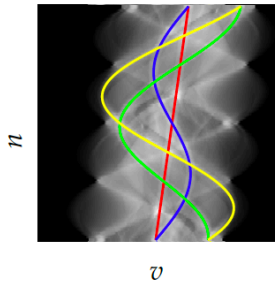
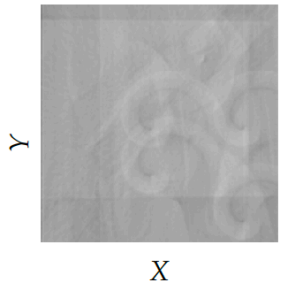
We present a novel tomographic reconstruction algorithm which is robust to mechanical jitter and systematic angular and spatial drift. The algorithm is applied to Optical Projection Tomography which relies on precise mechanical rotation and is less mechanically stable than large scale CT scanning systems, leading to reconstruction artefacts. The algorithm works by using multiple (5+) tracked fiducial beads to recover the sample pose and the image rays are then back-projected at each orientation. The quality of the reconstruction shows an improvement when comparted to the Radon transform, with a significant improvement when a systematic spatial and angular mechanical drift is introduced.



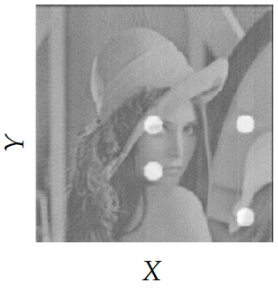
(a) Top down views (X, Y) of the source image with the fiducial paths marked.



(b) Sinugram (v, n) of a sample whose axis of rotation has a systematic drift



(c) Unfiltered reconstruction using a Radon transform.



(d) Filtered reconstruction using the new algorithm.