Single Pixel Resolution Optical Flow for Low-rank Flow Fields[1]

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— Single pixel resolution optical flow for quasi-steady fluid motion is proposed, while the conventional methods have been smoothed temporally or spatially. The proposed method does not use any spatial or temporal smoothing but utilizes the prior information that the fluid fields can be expressed by low-rank dataset. The new objective function with the restriction of low-rank approximation is formulated and solved by fast iterative shrinkage thresholding algorithm (FISTA) and randomized singular value decomposition (rSVD). The use of both FISTA and rSVD help us to speed up to solve the optimization problems. This algorithm gives us the single-pixel resolution flow fields form the pair images of flows, such as particle images. In the presentation, the details of objective functions and the results of numerical experiments will be reported.

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