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Department of Mathematics

University of Houston

Scientific Computing Seminar

Prof. Paul Hand

Department of Computational and Applied Mathematics

Rice University

ShapeFit: Exact location recovery for a problem from machine vision

Thursday, Nov. 5, 2015

1:30 PM- 2:30 PM

Room 646 PGH

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Abstract: We consider the problem of recovering a set of locations given observations of the direction between pairs of these locations. This recovery task arises from the Structure from Motion problem, in which a three-dimensional structure is sought from a collection of two-dimensional images. In this context, the locations of cameras and structure points are to be found from epipolar geometry and point correspondences among images. These correspondences are often incorrect because of lighting, shadows, and the effects of perspective. Hence, the resulting observations of relative directions contain significant corruptions. To solve the location recovery problem in the presence of corrupted relative directions, we introduce a tractable convex program called ShapeFit. Empirically, ShapeFit can succeed on synthetic data with over 50% corruption. Rigorously, we prove that ShapeFit can recover a set of locations exactly when a fraction of the measurements are adversarially corrupted and when the data model is random.

This and subsequent work was done in collaboration with Choongbum Lee, Vladislav Voroninski, and Tom Goldstein.

This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.