

Title:

Multiscale Geometric Analysis for 3-D Catalogues

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Technical Report number (Dept. of Statistics, Stanford, Univ.):

2002-15

Date:

July 2002

Abstract:

We have developed tools for analysis of 3D volumetric data which allow sensitive characterizations of filamentary structures in 3D point clouds. These tools rapidly compute multiscale X-ray transforms of the data volume. Subcubes of varying locations and scales are extracted from the data volume and each is analyzed by integrating along a strategically chosen set of line segments covering all different orientations. The underlying motivation is that point clouds with different degrees of filamentarity will lead to multiscale X-ray coefficients having different distributions when viewed at the right scale. The multiscale approach guarantees that information from all scales is available; by extracting the information from the transform in a statistically appropriate fashion, we can sensitively resolve differences in details of the filamentarity. We will describe the algorithm and the results of comparing different simulated galaxy distributions.