

## Density-based Denoising of Point Cloud

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**Abstract :** Point cloud source data for surface reconstruction is usually contaminated with noise and outliers. To overcome this, we present a novel approach using modified kernel density estimation (KDE) technique with bilateral filtering to remove noisy points and outliers. First we present a method for estimating optimal bandwidth of multivariate KDE using particle swarm optimization technique which ensures the robust performance of density estimation. Then we use mean-shift algorithm to find the local maxima of the density estimation which gives the centroid of the clusters. Then we compute the distance of a certain point from the centroid. Points belong to outliers then removed by automatic thresholding scheme which yields an accurate and economical point surface. The experimental results show that our approach comparably robust and efficient.

**Keywords :** point preprocessing, outlier removal, surface reconstruction, kernel density estimation

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