CO-307

INTERACTIVE SCALE-DEPENDENT MULTIDIMENSIONAL POINT DATA SELECTION USING ENHANCED POLARIZATION TRANSFORMATION

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Different fields such as Geovisualization, Web mapping or thematic and topographic cartography all need to incorporate a most recog-nizable and faithful representation of the real world by different map objects at different scales. The objective of this work was to enhance the existing point selection method - the Polarization Transformation - to an automatic scale-dependent point data selection method for multidimensional point data sets, which is implemented in an inter-active (Web-) user interface. The method is based on the work of QIAN (2006) who used a polar coordinate system based on the dis-tances and azimuth direction angles of all points to a centre point, which is the point with the largest average distance to all other points. With increasing azimuth all points in the polar coordinate system were combined to a spectrum line. Then Qian set empirically azimuth thresholds whereby all points between the thresholds were selected except the local maxima and local minima. In this work the enhancement now was to change the empirically set threshold with a scale dependent threshold setting and to enhance the method for point data selection in three dimensional space by applying the same polar transformation to all three perspectives, xy, xz and yz. The empirical threshold was replaced by an iterative increasing of the number of thresholds by starting the first threshold between at the point in the spectrum line having the largest distance to its neighbor point. By keeping the local minima and maxima between two thresholds all other points were selected in each perspective. Next all common selected points of the three perspectives were determined. This iteration was repeated until the achieved number of points was selected. In an interactive tool the user can define either the number of to be selected points or the achieved output scale. In the second case the number of points to be kept was calculated based on Töpfer's radical law. Like shown in Fig.1 within an interactive user interface the user can upload a point data set, define either the achieved output scale or the wanted number of points to be selected. Then the determined results using the enhanced polarization ap-proach are shown in 2D or 3D to the user.

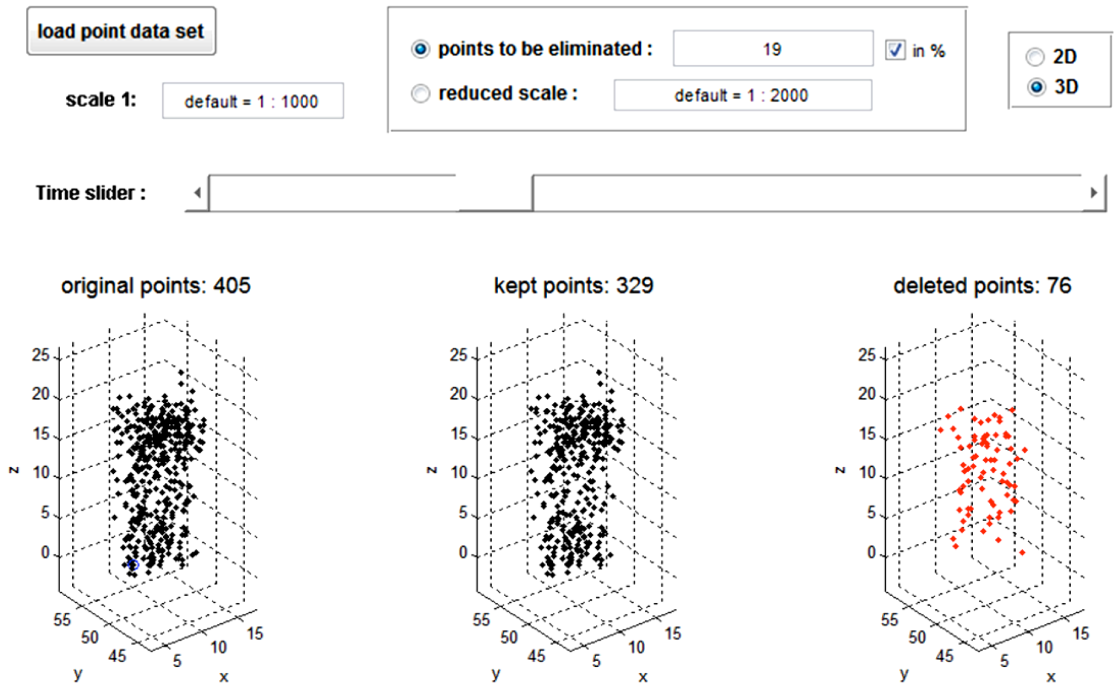

Figure 1 Interactive user interface for point data selection

Benefits of the new method are that in the resulting point selection the global as well as the local characteristics of the spatial point dis-tribution and of the spatial point density are preserved; both for 2D-

and 3D- point data sets. In this work an existing 2D point selection evaluation method for points, based on Voronoi areas, was enhanced for 3D point selection evaluation by using Voronoi volumes. Thus the evaluation verified the similarity of point density and distribution before and after the point data selection.