Multidimensional Visualization and its Applications
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With Parallel Coordinates the perceptual barrier imposed by our 3-dimensional habitation is breached enabling the unambiguous visualization of multidimensional problems and multivariate relations. For \( RN \) points are mapped into planar polygonal lines (see representation of vertices in Fig. 3) and hypersurfaces into \((N - 1)\) distinct planar regions. The methodology is developed intuitively from its foundations to recent result like the visualization of proximity for families of “close” lines & hyperplanes; a central problem in many applications. Properties of hypersurfaces are detected from their representation. Convexity in any dimension or non-convex features like bumps, dimples, coiling, non-orientability can be recognized from one orientation, unlike standard 3D surface representations. Concepts and applications are illustrated interactively. The parallel coordinates methodology has been applied to collision avoidance algorithms for air traffic control (3 USA patents), computer vision (USA patent), data mining (USA patent) for data exploration and automatic classification, optimization, process control and elsewhere.

KEYWORDS: Multidimensional Visualization, Parallel Coordinates, Visual & Automatic Data Mining, Multidimensional Problems