CS 6319: Computational Geometry

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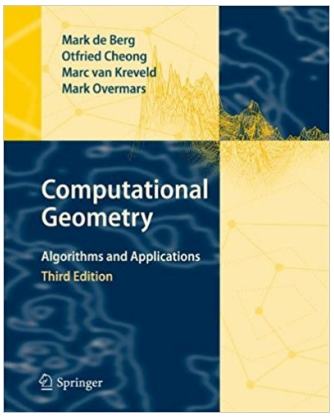
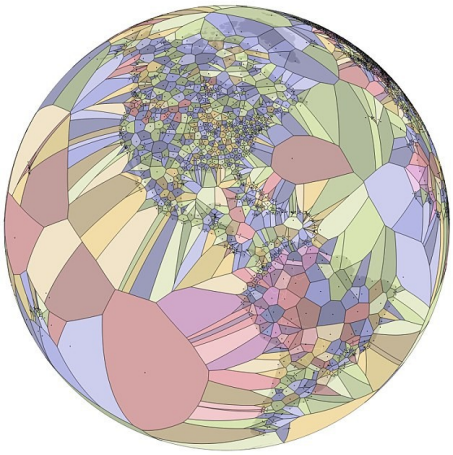
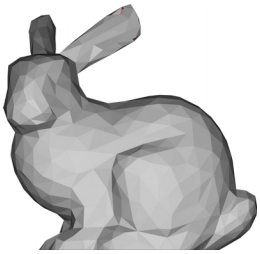
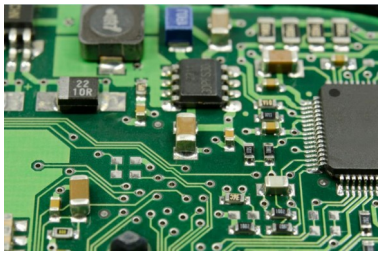
Computational geometry is a field of study devoted to the development of efficient algorithms for problems which can be stated in geometric terms, and plays a key role in many application domains, including computer graphics, virtual reality, geographic information systems, robotics, databases and data analysis, and more.

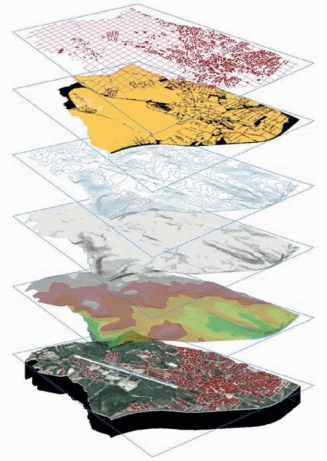








Geometry is readily apparent for data sets arising from our physical three dimensional world, but is also present for data sets which can be represented as feature vectors in higher dimensional space, in areas such as machine learning and databases. Viewing problems through a geometric lens allows us to apply the vast array of geometric tools which have been well developed over time due to our natural geometric intuition, in order to develop more efficient algorithms and extract key features from the data.



This course will cover basic computational geometry topics, such as computing convex hulls, computing Voronoi diagrams and Delaunay triangulations, motion planning, and the main methods for developing geometric algorithms. We will also discuss various geometric data structures for point location and range searching, some geometric approximation algorithms, and topics related to high dimensional data analysis. Topics are selected for their practical motivation.