



UNIVERSITÀ DEGLI STUDI DELL'AQUILA

CORSI DI INGEGNERIA

A.A. 2017/2018

Scienze dell'informazione geografica (I4I)

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Contenuti del corso (abstract del programma):

Computational geometry. Geographic Space Modeling. Qualitative Spatial Reasoning. Architetture GIS-Web.

Programma esteso:

1. Introduzione alla scienza dell'informazione geografica Definizione Geographical Information Science. Definizione GIS. Dati vettoriali e raster. Ricerca bibliografica. 2. Computational Geometry Art gallery Problem. Proprietà delle triangolazioni. Area of polygons. Segment intersection. Finding diagonals. Triangulation by ear removals. Polygon partitioning. Monotone polygons. Trapezoidalization by plane sweep. Monotone mountains. Convex partitioning. Convex hulls. Gift wrapping. Quickhull. Graham's algorithm. Incremental algorithm. Divide and conquer algorithm. Convex hull in 3D. Voronoi diagrams. Delaunay triangulations. Incremental construction. Fortune algorithm. Delaunay triangulations and 3Dconvex hulls. Voronoi diagrams applications: point location, nearest neighbor graph, maximizing the minimum angle, largest empty circle, minimum spanning tree, traveling salesperson problem. Medial Axis. Medial axis construction. Straight skeletons. Offset curves. Minkowski sums. Motion planning. Morphological operators and applications. Segment-segment intersection. Point-in-polygon: winding numbers, ray crossings. Intersection of convex polygons. Intersection of segments. Intersection of nonconvex polygons. Extreme point of convex polygon Motion planning: visibility graph, Dijkstra algorithm. 3. Geographic Space Modeling Modellazione dello spazio geografico. Entities-Fields. Representation modes: tessellations-vectors. Triangulated Irregular Networks. Constraint data model. Spaghetti-Network-Topological model. Doubly-connected edge list. Winged-edge representation. Spatial data standards. Osservazioni e misure. Scale di misura di Stevens. Tomlin's map algebra. Local-focal-zonal operations. Teorie matematiche per modellare l'indeterminazione. Regions with broad boundaries. Fuzzy sets. Fractal geometry. Rough sets. 4. Qualitative Spatial Reasoning Introduzione al ragionamento qualitativo. Modellazione qualitativa del tempo. Relazioni di Allen. Constraint networks. Path-consistency. Conceptual neighbors. Qualitative models of space. Mereotopology. Region Connection Calculus. Topological relations. Matrix-based formalisms: 4-intersection, 9-intersection, Dimension-Extended method, DE+9IM. Calculus-Based Method. Similarity. Reasoning. Qualitative models for directional relations. Flip-Flop calculus. Double-cross calculus. Orientation relations. Qualitative distances. Orientation for extended objects. Projective relations. 5-intersection model. Visibility models. Frames of reference. Cartographic generalization. 5. Architetture GIS-Web OpenGeo Suite. OGC web services. Java Topology Suite. PostGIS. Spatial Reference Systems. GeoServer. Applicazioni. GML.

QuantumGIS. Geographic Web Applications. pgRouting. 6. Applicazioni Indoor navigation. Visibility. Crowdsourcing. Gamification. Volunteered Geographic Information.

Modalità d'esame:

Seminario su argomenti di ricerca e sviluppo di un'applicazione

Risultati d'apprendimento previsti:

Comprensione delle tecniche di modellazione e degli aspetti computazionali relativi allo spazio geografico

Testi di riferimento:

J. O'Rourke. Computational Geometry in C, 2nd edition. Cambridge University Press.