# [Proporsal-2]: Geodesic Motion Planning

*[Geometry-Aware Coverage Path Planning for Depowdering on Complex 3D Surfaces]*

#geometry-aware #geodesic #voronoi-tesellation #coverage-path #visual-coverage

Coverage path planning is the problem of finding a path that passes through all points in a given domain, minimizing the path is a requirement whereas overlapping paths are sometimes allowed. The related paper focuses on 3D domain coverage, where the domain is a complex 3D surface.

The method starts with the computation of the voronoi tesselation of the given model, which is in the form of triangle meshes and corresponding normal vectors. Computational costs are lowered using simpler distance definitions such as $l_1$ norm in this step. Coverage is determined using the geodesic metric which is a way of distance measurements, then the problem is simplified by dividing the model into subgraphs and finding the shortest path in each subgraph. Lastly, the coverage path is determined by connecting the shortest paths in each subgraph. The method is travelling salesman problem (TSP) based, which is a well-known NP-hard problem. The paper proposes a greedy algorithm to solve the TSP problem, which is a simple and fast solution.

After the path is found, more processing is applied to alter the trajectory in a more guaranteed way, which is also on purpose of the defined task.

The important aspects of this paper consist of having involved many different algorithms such as voronoi tesselation, TSP, dijkstra's algorithm and 3-opt algorithm along with the working on 3D mesh models which are more physical abstractaions of the real world. Lastly, the involement with the mathematical understanding in terms of geodesic norms and efficient computation of overlapping features are useful for the future work.

[1] Geometry-Aware Coverage Path Planning for Depowdering on Complex 3D Surfaces
[2] Fisher Information Based Active Planning for Aerial Photogrammetry

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2023-11-19