

## Path Planning in Unknown Environments by Optimal Transport

We introduce a graph-based, potential-guided path planning algorithm for robot control in unknown environments, that is, some of the obstacles or constraints stay unknown unless the robots traverse close enough to those configurations. Inspired by the optimal transport theory, our method generates a graph connecting the initial and target configurations, and then finds a path on the graph using the limited known information of the environments. The graph and path are updated iteratively when newly encountered obstacle information becomes available. The proposed method is a deterministic procedure proven to be complete, meaning it is theoretically guaranteed to find a feasible path, when exists, in a finite number of iterations. It is scalable to high dimensional problems. In addition, our method does not search the entire domain for the path, instead, the algorithm only explores a sub-region that can be described by the evolution of the Fokker-Planck equation.