

# A New Exploration Method Based on Multi-layer Evidence Grid Map (MLEGM) and Improved A\* Algorithm for Mobile Robots

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An efficient exploration of unknown environments is a fundamental problem in mobile robots. This paper proposes a new exploration method, in this method each specific area in environment is considered as a cell that these cells are represented by 3 abstract layers. The value of each cell in first layer is calculated by range finder's free beams. In other layers, the value of each cell is calculated by visual information, the information is received by other sensors' data and image processing that used in potential filed algorithm. We merge the value of these layers to have a single meaning value. We can use this value in many purposes e.g. finding optimal path for exploration or using this value as reward for learning methods. Then it mixed with a new improved version of A\* algorithm that introduces for first time to find optimal path in unknown areas. This method implemented in official simulator of Virtual Robots League in Robocup competitions and compared with random search method. The simulation result of this method covers more unknown area compared to last methods.

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