SPACE EXPLORATION SYMPOSIUM (A3)
Poster Session (P)

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PATH PLANNING AND REPLANNING FOR LUNAR ROVER BASED ON IMPROVED ANT COLONY ALGORITHM

Abstract

The effectiveness of path planning and path replanning for lunar rover using improved ant colony algorithm is explored in this paper. For the purpose of avoiding falling into local optimum and preventing iterative stagnant, this paper describes a new algorithm named stochastic self-adaptive ant colony algorithm to improve the basic ant colony algorithm. Based on the improved ant colony algorithm, the approaches of static 2D path planning and 2D path replanning for lunar rover are presented in this paper. Aiming at improving the speed of the algorithm and simplifying the objective function of traditional path planning, this paper presents a principle of eliminating the navigation points by using mathematical geometric method. In addition,this paper introduces a new approach called line stretching and B2 spline hybrid method to smooth the paths searched by the ant colony. Finally, some constrast emulators are designed, and the results demonstrate that the improved ant colony algorithm can overmatch the basic ant colony algorithm in path planning and the improved ant colony algorithm has strong adaptability in lunar rover's path replanning.