Task Time Optimization of a Robot Manipulator using Artificial Neural Network and Genetic Algorithm

Abstract

In this paper we have proposed an evolutionary method to optimize the task time of robot manipulators. Tasks can be planned in joint space with respect to robot joints or in Cartesian space with respect to robot end effector under kinodynamic constraints. Genetic algorithm is implemented to optimize the parameters associated with the selected motion trajectory profile. These optimized results were then taken as the training data to train an artificial neural network which is used to obtain task time, velocity, accelerations and torques required by each motor to perform a given task. The method adopted in this study can be applied to any serial redundant or non-redundant manipulator that has rigid links and known kinematic and dynamic models with free motions or motions along specified paths with obstacle avoidance. The robot kinematic and dynamic models and the optimization method are developed in MATLAB.
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Index Terms

Computer Science  
Artificial Intelligence
Keywords
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End effector
Mobile robot