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Abstract: Abstract

This paper presents an optimization model for charging station placement in order to minimize the overall cost by satisfying the charging reliability and quality of service expected by electric vehicle owners/drivers. To better understand and illustrate the problem's complexity, set modeling is used to represent the road network and the electric vehicle driving trajectories. By involving the Euclidean distance, this optimization model also considers the charging reliability as well as the driving range limitation of electric vehicles. The disposable charging time of electric vehicle owners/drivers is reflected by incorporating the new Quality of Service index. The numeric results illustrate the application of the proposed optimization in achieving the minimal cost of charging station locations while also achieving both charging reliability and expected quality of service through the analysis of electric vehicle owners'/drivers' behavior.

Keywords: Electric vehicles; Linear programming; Optimization; Location modeling; Quality of service