A New Modeling Framework to Minimize Greenhouse Gas Emission in Bi-Objective Multi-modal Transportation Network

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Abstract

With the growing of vehicular populations, transportation is the major cause for the fast growth and high impacts associated with greenhouse gas (GHG) emissions in urban areas. Hence, there is urgent need to concern to air quality and adopt proper energy policy in order to reduce pollution in this sector. This paper presents a bi-objective routing multi-modal transportation network that accounts the travel distance, the amount of GHG emissions, fuel, travel time and their costs with definition of two scenarios. The first scenario is based on governor's goal as an energy policy with the aim of reducing fossil fuel use to reduce GHG emissions, and the second one is based on user's goals considering two objectives of minimization both the travel time and cost. Then, we use the inverse model to convert the optimal path in the first scenario to the optimal one in the second scenario, considering the least variation of coefficients of the objective function by using the absolute value as the measure. In this paper, the contributions are on the inverse model and the first scenario. A small network in a region of Tehran is studied as a real case.

Keywords: ***Multi-modal routing; Bi-objective optimization; Inverse model; Greenhouse gas emissions; Energy consumption.***