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An Integration of Genetic Algorithm and Particle Swarm Optimization to Forecast Transport Energy Demand

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Abstract : Transport energy demand is vital for the economic growth of any country. Globalisation and better standard of living plays an important role in transport energy demand. Recently, transport energy demand in Mauritius has increased significantly, thus leading to an abuse of natural resources and thereby contributing to global warming. Forecasting the transport energy demand is therefore important for controlling and managing the demand. In this paper, we develop a model to predict the transport energy demand. The model developed is based on a system of five stochastic differential equations (SDEs) consisting of five endogenous variables: fuel price, population, gross domestic product (GDP), number of vehicles and transport energy demand and three exogenous parameters: crude birth rate, crude death rate and labour force. An interval of seven years is used to avoid any falsification of result since Mauritius is a developing country. Data available for Mauritius from year 2003 up to 2009 are used to obtain the values of design variables by applying genetic algorithm. The model is verified and validated for 2010 to 2012 by substituting the values of coefficients obtained by GA in the model and using particle swarm optimisation (PSO) to predict the values of the exogenous parameters. This model will help to control the transport energy demand in Mauritius which will in turn foster Mauritius towards a pollution-free country and decrease our dependence on fossil fuels.

Keywords : genetic algorithm, modeling, particle swarm optimization, stochastic differential equations,transport energy demand
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