

IDENTIFYING INFLUENTIAL VARIABLES THAT AFFECT MUNICIPAL SOLID WASTE GENERATION AND FORECASTING MUNICIPAL SOLID WASTE GENERATION IN SRI LANKA

Dissanayaka D.M.S.H.^{1*} and Vasanthapriyan S.¹

¹Department of Computing and Information Systems, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Sri Lanka

*shalikahiranthi94@gmail.com

Municipal Solid Waste Management (MSWM) is one of the primary tasks of metropolitan local authorities in developing countries. For efficient and effective waste management schemes and scheduling, accurate forecast of Municipal Solid Waste (MSW) generation is essential, due to the uncertainties and unavailability of sufficient MSW generation information and resources in developing countries. The objectives of this paper are to identify influential variables that affect the amount of MSW generation and to predict the future MSW in Sri Lanka by consuming linear, nonlinear models and machine learning technique and propose a model for forecast future MSW generation using influential variables. Socio economic data and waste generation data are collected from Department of Census and Statistics and National Solid Waste Management Support Center. Data preparation is done with substitute missing values by average values. Pearson correlation and Principal Component Analysis are used to find correlation among influential variables. Linear model, Non-linear model and machine learning model are used to forecast municipal solid waste generation in Sri Lanka. Relatively Linear regression analysis, artificial neural network (ANN) and Random forest used as linear model, Non-linear model and machine learning model. Relatively correlation coefficient of linear regression classification, random forest classification and ANN are $R = 0.6973$, $R = 0.9608$ and $R = 0.9923$. Based on correlation coefficient, ANN provide higher accurate result than linear regression and random forest models for forecast municipal solid waste generation in Sri Lanka. ANN is conducted by designing an appropriate network architecture with one neuron demand in the hidden layer. Based on the analyzed result, proposed a model for forecast future MSW generation with four influential variables that are municipal solid waste generation, total population, GDP growth rate, and Crude birth rate.

Keywords: *Artificial neural network, Influential variables, Linear regression, Forecast, Solid waste, Random forest*