FORECASTING DAYLIGHT LAMPS WASTE AND WASTE THAT HAS MERCURY IN ITS COMPOSITION GENERATION USING SHORT AND EXTRA SHORT DATA SETS: CASE STUDY OF LITHUANIA

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Abstract

Considering Lithuania's situation on daylight lamps waste and waste that has mercury in its composition generation data it is clear that amounts of these waste declared by Environmental protection agency mainly comes from industry, business and service sectors. Lamp waste that is generated by households often ends up in municipal solid waste flow if not being separated in larger quantities in special collection sites. Since mechanical biological treatment facilities are only beginning to be established in Lithuania it is hard to say what the real amount of daylight lamps waste could be.

The goal of this research is to explore how mathematical modelling methods that were previously used by authors on Lithuania's medical waste generation data will work whilst processing and forecasting daylight lamps waste and waste that has mercury in its composition generation data.

Two developed data sets consist of 10 observations that differs only in the number of independent variables: one includes variables considering household consumption (total 7 independent variables) and other – not (total 4 independent variables). Tests on the performance of artificial neural networks (ANN), multiple linear regression (MLR), partial least squares (PLS), support vector machines (SVM) and four nonparametric regression methods were conducted on the collected data sets.

The best and most promising results were demonstrated by generalized additive (respectively R^2 = 0,97368 and R^2 =0.99938) in both cases. There was also more model that performed with higher than 0,9 coefficient of determination, but other statistical indices weren't as good as previously mentioned methods.

Keywords

Forecasting, daylight lamps, mercury, waste generation, mathematical modelling, generalized additives.