

Estimating Fuzzy Linear Regression Model for Air Pollution Predictions in Baghdad City

Suhaila Najma Alsoltany and Iftikhar Abdulhamed Alnaqash
Department of Mathematics, College of Education, University of Al-Mustansiriyah.
Department of Statistic, College of Economic and Administration,
University of Al-Mustansiriyah.

Abstract

Regression analysis is one of the basic tools of scientific investigation of functional relationship between dependent and independent variables. For many years linear regression models have been used in almost every field of science. The purpose of regression analysis is to explain the variation of dependent variables in terms of the variation of explanatory variables, residuals are assumed to be due to random errors, however the residuals are sometimes due to the indefiniteness of the model structure or imprecise observations, the uncertainty in this type of regression model becomes fuzziness, not random.

The aim of this paper is to study and apply the method of estimation fuzzy linear regression parameters using fuzzy data collected from (145) sample in three stations (Andalus square, jadiriya, alawi) in Baghdad city every day. In order to measure the concentrations of airborne stuck which represents the response variable, and also the most important air pollutants, namely, (lead, zinc, copper, iron, nickel, chromium, cadmium) as independent variables the main result identifies the best techniques to estimate the fuzzy linear regression parameters for this data and calculates the expected value of the concentrations of airborne stuck in Baghdad city for the next years.

Keywords: fuzzy data, fuzzy regression, regression analysis, air quality.

1-Introduction

For many years the efforts of humans focus on fighting air pollution caused by its group of activities and effectiveness in life, where it is difficult for humans even to use all their available capacity to control the natural phenomena that will cause change in the air quality and its pollution. These efforts may be successful in mitigating the negative effects of these phenomena. The basic goal of science is a permanent quest for knowledge and interpretation of the phenomena and different relationships between them, through studies of the variables presented in these phenomena and the interference between their effects.

Classical regression analysis is helpful in certifying the probable form of the relationship between variables, and usually the basic objective is to predict or estimate the value of one variable corresponding to a given value of another variable. Residuals are assumed to be due to random errors. In many world problems observation can be described only in fuzzy data. This type of data is easy to find in natural language, social science, psychometrics, environments, and econometrics etc.), fuzzy

set theory provides a means for modeling such data utilizing fuzzy membership functions. Fuzzy regression deals with fuzzy data; regression is based on probability theory whereas fuzzy regression is based on probability theory & fuzzy set theory [1].

The concept of fuzziness in regression analysis leads us to the fuzzy linear regression (FLR) models [4]. In general, the estimation problems of fuzzy uncertainty of dependent variables with the fuzziness of the response function (regression coefficients) are considered as the parameter estimations of (FLR) models. Methods of estimating the parameters of fuzzy linear regression models can be roughly divided into two categories. The first is the adoption of Tanaka et al. approach (1982) [6], they formulated a linear regression model with fuzzy response data, crisp predictor data and fuzzy parameters as a mathematical programming problem (LP) under two limitations: an appropriate degree model and the degree of uncertainty. Then they solve this problem. The second is based on a least squares fuzzy approach. Diamond [3] proposed the fuzzy least squares approach to