

Abstract

Nonparametric regression is one of the statistical techniques used to estimate the relationship between the dependent variable and independent variables without the need to specify a pre-defined mathematical model, meaning that the relationship can be estimated without the need to know the function that links these variables. In this thesis, the nonparametric regression model was studied and estimated with some common estimation methods represented by Wavelet Estimator (WE), the K-Nearest Neighbor Estimator (KNNE), the B-Spline Estimator (BSE), the Estimator Cubic Splines Estimator (CSE) and Local Linear Regression Estimator (LLRE). The goal is to choose the best method for estimating the nonparametric regression model. The simulation process was conducted using the statistical programming language R for these methods, and they were compared with the Average Mean Squares Error (AMSE), and the Average Mean Absolute Error (AMAE), with five sample sizes (15, 25, 50, 100, 150), five levels of error's variance (0.1, 0.3, 0.5, 0.7, 1) and five non-linear models. The results showed the superiority of the Cubic Spline Estimator (CSE) method because it had the lowest value for the two comparison criteria. In applied part, the effect of hemoglobin (Hb) on the Packed Cell Volume (PCV) of patients with chronic kidney disease (150) was studied. The estimation process was done using the five methods, and the comparison between them was made using two criteria, Mean Squares Error (MSE) and Mean Absolute Error (MAE). It has been shown from the results of the applied side that the preference was for the Cubic Spline Estimator (CSE) method, and this supports what was reached in the experimental side.