This study investigates the applicability of multilinear regression (MLR), adaptive neural-based fuzzy inference system (ANFIS) and artificial neural networks (ANN) methods from data-driven techniques in estimation of the dissolved oxygen (DO), which is an important parameter in water quality, aquatic life, efficient water management and health care planning studies. The measured parameters covering 21 years of sample data for the years 1991-2011 in the Tai Po River, Hong Kong, were used to develop the models. The input parameters used to estimate DO are chloride (Cl), pH value (pH), electrical conductivity, temperature (Temp), nitrite nitrogen (NO₂-N), nitrate nitrogen (NO₃-N), ammonia nitrogen (NH₄-N) and total phosphorous (T-P). The performance of the developed models was evaluated through the three performance criteria: correlation coefficient, root mean square error and the Nash–Sutcliffe efficiency coefficient. When the results of the developed models were compared with DO measurements using performance criteria, the ANN model shows better performance than the MLR and ANFIS models in estimation of DO concentration. Also, a sensitivity analysis was carried out to evaluate the relative importance of the input parameters in estimation of the DO. The most effective input parameters are determined as Cl, Temp, NO₃-N, NO₂-N, NH₄-N and T-P parameters, respectively. Furthermore, the pH variable has the least contribution on the ANN model.