A Diagrammatic Representation of Multiple Regression Model Diagnostics for Teaching and Research

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Abstract

This contribution features a flowchart representing a general procedure for modeling a response variable that is influenced by several explanatory variables. By modeling, the response values can be estimated based on the values of a set of explanatory variables referenced from literature or have priori with the response variable. However, multivariate regression is an intricate statistical procedure and can be intimidating to many, particularly students and some researchers from a non-statistics background. In addition, advances in data collection methods and digital information facilitate the availability of more exploratory variables, thus making the functional forms of regression more complex. Hence, the objective of the proposed flowchart is to visualize the multivariate regression procedure in a sequence of consolidated actions and processes focusing on diagnostics for multicollinearity, goodness-of-fit, and the underlying assumptions of normality, independence, homoscedasticity, and non-autocorrelation for the residuals. The other advantage is that the flowchart emphasizes not only quantitative but qualitative assessments prior to the establishment of a well-specified model. Consequently, the observed and estimated responses are plotted in a single plot, as many are unable to comprehend the discrepancies with the goodness-of-fit and error measures visually. Whether the response variable is best represented as either a linear or non-linear process, a well-specified model is desired to estimate values that match or are closer to the observed responses, producing more accurate outcomes. This flowchart covers the most important multivariate modeling steps and assumptions and, therefore, can be used as guided notes or a part of instructor-prepared handouts to promote active engagement during lectures, for independent study, or while programming related research. To my knowledge, a similar flowchart has yet to be produced. Besides patenting, there is a possibility to develop a fully automated R package for this work.

Keywords: Qualitative assessment, statistical test, multicollinearity, stepwise procedure, flowchart.

TEACHING AND LEARNING POSTER IDEAS
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A DIAGRAMMATIC REPRESENTATION OF MULTIPLE REGRESSION MODEL DIAGNOSTICS FOR TEACHING AND RESEARCH

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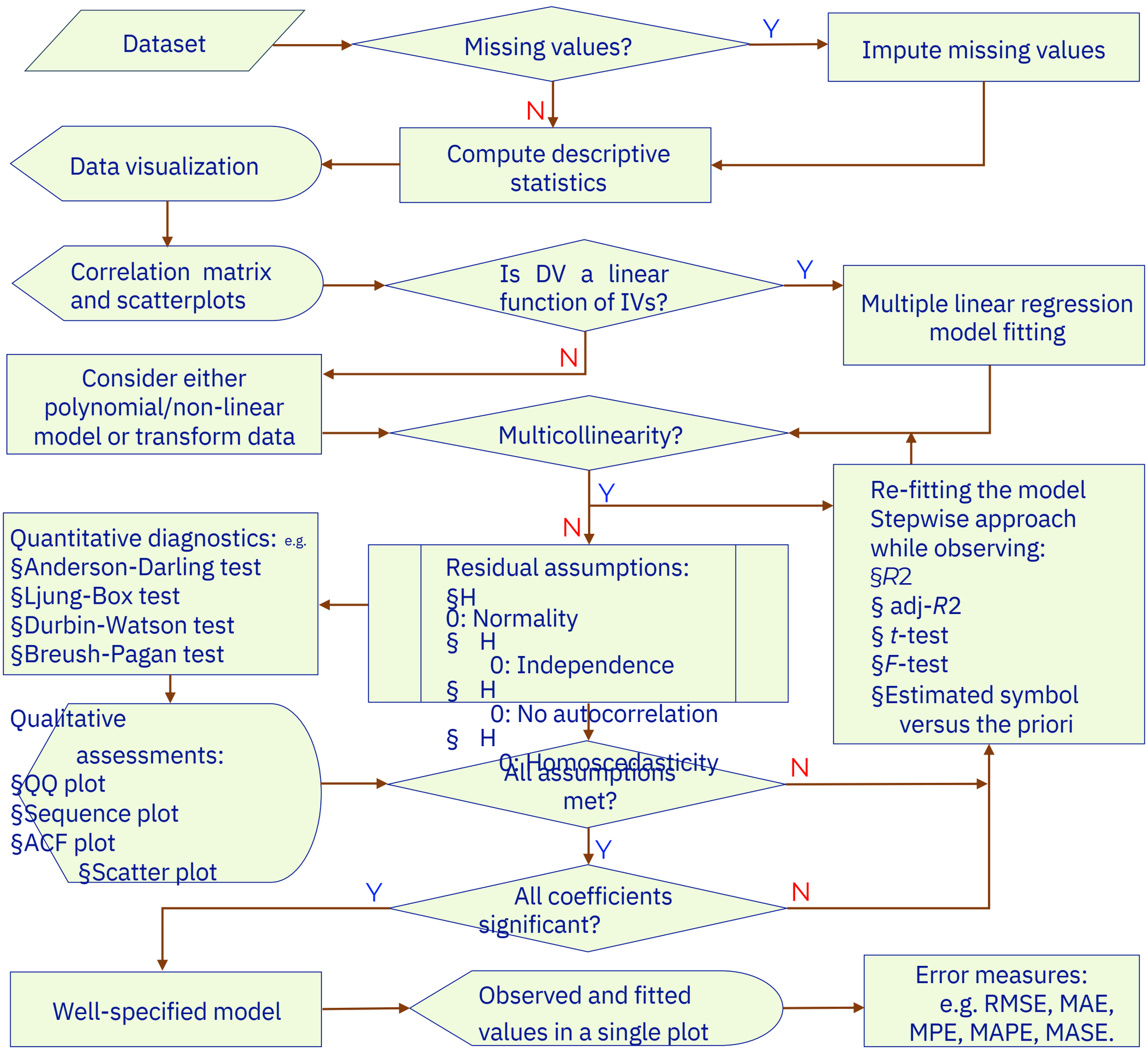

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