The Use of Geographically Weighted Regression for Deforestation Analysis: Case Study in Brazilian Cerrado

Authors : Ana Paula Camelo, Keila Sanches

Abstract : The Geographically Weighted Regression (GWR) was proposed in geography literature to allow relationship in a regression model to vary over space. In Brazil, the agricultural exploitation of the Cerrado Biome is the main cause of deforestation. In this study, we propose a methodology using geostatistical methods to characterize the spatial dependence of deforestation in the Cerrado based on agricultural production indicators. Therefore, it was used the set of exploratory spatial data analysis tools (ESDA) and confirmatory analysis using GWR. It was made the calibration a non-spatial model, evaluation the nature of the regression curve, election of the variables by stepwise process and multicollinearity analysis. After the evaluation of the non-spatial model was processed the spatial-regression model, statistic evaluation of the intercept and verification of its effect on calibration. In an analysis of Spearman's correlation the results between deforestation and livestock was +0.783 and with soybeans +0.405. The model presented $R^2=0.936$ and showed a strong spatial dependence of agricultural activity of soybeans associated to maize and cotton crops. The GWR is a very effective tool presenting results closer to the reality of deforestation in the Cerrado when compared with other analysis.

Keywords : deforestation, geographically weighted regression, land use, spatial analysis