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A METHODOLOGY FOR SUPPORTING EXPLORATORY RESEARCH ON THE ROLE OF GEO-LOCATION AND BOUNDARIES IN SPATIO-TEMPORAL AND ENVIRONMENTAL STUDIES

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Abstract

The paper brings a methodological contribution useful for supporting the development of predictive models of phenomena and human behaviours in the area of environmental protection with respect for history, geo-location, environment boundaries and considering further applications in defining corresponding stimulating policies by decision makers and management teams. It proposes a handy and easy-to-use technique of deriving spatial variables (e.g. aerial distances to a custom border and belonging or not to a chosen area) starting from real data including respondents' residencies from a survey of Romanian students. The authors used Quantum Geographical Information System (QGIS) and a historical map for recreating the coordinates of this border two programming languages and two categories of algorithms: first for computing a minimum aerial distance to this custom border based on Haversine (HAV) formula and a proposed Point to Points (P2P) approach compared with another one based on the Pythagorean Theorem with corrections depending on the average latitudes using both P2P and P2S (Point to Segments); second for finding the belonging to a chosen / defined area considering the corresponding polygon and the Crossing-Number (CN) approach of solving Point-in-Polygon (PIP) problems. Aerial distance scale derivations for statistical purposes, online query-able map examples for demonstrating the expected spatial alignment of the inputs based on this methodology and execution benchmarks for efficiency reasons have been also provided.

Key words: border studies, GIS, Haversine and Pythagoras, P2P and P2S, PIP

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