Big Data Analytics in Urban Planning and Service Delivery in Cairo: A Systematic Review from an African Perspective

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Abstract

This study addresses a current research gap in Computer Science concerning Big Data Analytics for Urban Planning and Service Delivery in Cairo, Egypt in Egypt. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured review of relevant literature was conducted, with thematic synthesis of key findings. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Big Data Analytics for Urban Planning and Service Delivery in Cairo, Egypt, Egypt, Africa, Computer Science, systematic review This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Cairo, Geographic Information Systems (GIS), Data Mining, Machine Learning, Spatial Analysis, Urban Informatics, Network Analysis*

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