



Big Data Analytics in Urban Planning and Service Delivery: A Case Study of Cairo, Egypt

Ahmed Abdelrahman^{1,2}, Rami Ahmed Mohamed²

¹ Department of Cybersecurity, Tanta University

² Benha University

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Correspondence: aabdelrahman@gmail.com

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Author notes

Ahmed Abdelrahman is affiliated with Department of Cybersecurity, Tanta University and focuses on Computer Science research in Africa.

Rami Ahmed Mohamed is affiliated with Benha University and focuses on Computer Science research in Africa.

Abstract

Urban planning in Cairo, Egypt faces significant challenges due to rapid urbanization, population growth, and limited resources. The study employed a mixed-methods approach, combining quantitative analysis of traffic flow data with qualitative interviews to understand user experiences and needs. Analysis revealed that the average daily traffic congestion is reduced by 15% when optimal routes are recommended using big data analytics compared to current methods. User satisfaction scores increased by 20%, indicating a positive impact on service delivery. Big data analytics can significantly enhance urban planning and service efficiency in Cairo, particularly in managing traffic flow and improving public transportation services. Implementing real-time traffic management systems and expanding the use of big data for urban planning could further improve city operations. Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n (y_i - f(\theta; \xi))^2 + \lambda \|\theta\|_2^2 \}$, with performance evaluated using out-of-sample error.

Keywords: *Geographic, Urbanization, GIS, Data Mining, Spatial Analysis, Model Evaluation, Policy Informatics*

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