



# Matrix Decomposition Techniques for Traffic Flow Optimization in Ghana: Monte Carlo Estimation with Variance Reduction Approach

Kofi Adongo<sup>1</sup>

<sup>1</sup> Noguchi Memorial Institute for Medical Research

**Published:** 19 September 2001 | **Received:** 26 June 2001 | **Accepted:** 15 August 2001

**Correspondence:** [kadongo@aol.com](mailto:kadongo@aol.com)

**DOI:** [10.5281/zenodo.18730342](https://doi.org/10.5281/zenodo.18730342)

## Author notes

*Kofi Adongo is affiliated with Noguchi Memorial Institute for Medical Research and focuses on Mathematics research in Africa.*

## Abstract

Traffic flow optimization in Ghana's transportation systems is crucial for efficient urban planning and management. The study employs matrix decomposition methods to model traffic flows. Monte Carlo simulations are used for estimating the impact of various scenarios, incorporating variance reduction techniques to enhance accuracy. A significant reduction in average travel time by 15% was observed when applying the optimised matrix decomposition models compared to baseline conditions. The proposed method effectively reduces traffic congestion and enhances urban mobility in Ghanaian cities. Implementing these optimization techniques should be considered for future infrastructure development projects in Ghana. Traffic Flow Optimization, Matrix Decomposition, Monte Carlo Estimation, Variance Reduction Model selection is formalised as  $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta) + \lambda \omega(\theta)$  with consistency under mild identifiability assumptions.

**Keywords:** *Matrix Decomposition, Traffic Flow Optimization, Monte Carlo Method, Variance Reduction, Ghana Geography*

## ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

**Email:** [info@parj.africa](mailto:info@parj.africa)

Request your copy of the full paper today!

## SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We welcome your submissions!**

Join our community of African scholars and share your groundbreaking work.

**Submit at:** [app.parj.africa](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge