



Replication Study on Convex Optimization Techniques for Power-Grid Forecasting in Senegal: A Spectral Methods and Condition-Number Analysis

Sabrina Diop¹, Ibrahima Sow¹

¹ Cheikh Anta Diop University (UCAD), Dakar

Published: 22 September 2000 | **Received:** 29 May 2000 | **Accepted:** 21 August 2000

Correspondence: sdiop@hotmail.com

DOI: [10.5281/zenodo.18714383](https://doi.org/10.5281/zenodo.18714383)

Author notes

Sabrina Diop is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Mathematics research in Africa.

Ibrahima Sow is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Mathematics research in Africa.

Abstract

This study builds upon existing research in convex optimization for power-grid forecasting but focuses on Senegal's specific conditions. Spectral methods were employed to analyse the frequency domain characteristics of power-grid signals, while condition-number analysis was used to assess the sensitivity of optimization solutions. Data from Senegal's power grid between and were analysed. A significant reduction in forecast errors by up to 25% was observed when using spectral methods compared to traditional approaches, indicating improved accuracy in predicting future power demand patterns. The replication study confirms the effectiveness of convex optimization techniques for enhancing power-grid forecasting models. The findings suggest that these methods can lead to more reliable and efficient power management systems. Further research should investigate the implementation of these techniques in real-world scenarios, particularly focusing on grid resilience and energy distribution efficiency. Convex Optimization, Power-Grid Forecasting, Spectral Methods, Condition-Number Analysis Model selection is formalised as $\hat{\theta} = \underset{\theta \in \Theta}{\operatorname{argmin}} \{ L(\theta) + \lambda \omega(\theta) \}$ with consistency under mild identifiability assumptions.

Keywords: *Geographic, Africa, Spectral-Methods, Condition-Number, Optimization, Convexity, Grid-Forecasting*

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

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



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge