African Pure Mathematics Quarterly (Pure Science)

Graph-Theoretic Analysis for Financial Risk Estimation in Senegal: Stability and Convergence Proofs

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Published: 07 April 2000 | **Received:** 11 January 2000 | **Accepted:** 27 February 2000

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DOI: 10.5281/zenodo.18714416

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Abstract

Graph theory has been applied in various fields for risk assessment. This study extends such applications to financial risk estimation within Senegal. A novel approach integrates graph theory with financial data from Senegal. Stability analysis and convergence proofs are established using mathematical principles. Graphs representing financial transactions exhibit stable behaviour over time, confirmed by a convergence theorem that ensures the model's consistency across different scenarios. The findings reinforce the application of graph-theoretic methods in financial risk assessment, providing robust models for Senegalese financial institutions. Further research should explore the scalability and applicability of these models to broader regions and incorporate real-time data for enhanced accuracy. Graph theory, Financial Risk Estimation, Stability Analysis, Convergence Theorem, Senegal The analytical core is $\hat{\{} y \} t = mathcal \{ F \} (xt ; \theta)$ with $\hat{\{} \theta \} = argmin_{\theta} L (\theta)$, and convergence is established under standard smoothness conditions.

Keywords: *Sub-Saharan, Network Science, Graph Algorithms, Stability Theory, Convergence Analysis, African Mathematics, Network Topology*

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