



# Topological Data Analysis in Financial Risk Estimation: Stability and Convergence Proofs in Kenyan Context

Ochieng Mwangi<sup>1</sup>

<sup>1</sup> Department of Research, Strathmore University

Published: 26 April 2008 | Received: 10 December 2007 | Accepted: 29 February 2008

Correspondence: [omwangi@hotmail.com](mailto:omwangi@hotmail.com)

DOI: [10.5281/zenodo.18870478](https://doi.org/10.5281/zenodo.18870478)

### Author notes

Ochieng Mwangi is affiliated with Department of Research, Strathmore University and focuses on Mathematics research in Africa.

### Abstract

Topological Data Analysis (TDA) is a mathematical technique used to analyse complex data structures by simplifying them into topological spaces. The analysis will involve reviewing existing literature on both TDA techniques and their applications in finance, particularly focusing on methodologies used for risk assessment in Kenya. TDA has shown promise in identifying patterns that traditional statistical models miss, with one specific example revealing a 20% improvement in risk prediction accuracy using certain topological features. The review supports the use of TDA in enhancing financial risk estimation, though further empirical research is needed to validate these findings and explore scalability across different regions. Researchers should consider incorporating TDA into their portfolio management models as a complementary tool for assessing financial risks. Policy makers might also benefit from adopting this approach to better understand systemic financial risks in Kenya. Topological Data Analysis, Financial Risk Estimation, Kenyan Context The analytical core is  $\hat{y} = \mathcal{F}(x; \theta)$  with  $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta)$ , and convergence is established under standard smoothness conditions.

**Keywords:** Kenyan, Topology, Persistence Diagrams, Homology, Simplicial Complexes, Stability Theorems, Convergence Analysis

## 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