African Remote Sensing Applications
(Environmental/Earth Science Methodology)

Indigenizing AI Development through Indigenous Knowledge Systems in West Africa: A Case Study from Egypt

Amira Elgendi[1], **Amina Almassoudi**[2,3], **Hussein Abulreesh**[4], **Khalid Sharafat**[1,2]

[1] Suez Canal University

[2] Helwan University

[3] Department of Data Science, Suez Canal University

[4] Cairo University

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Correspondence: aelgendi@hotmail.com

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Author notes

Amira Elgendi is affiliated with Suez Canal University and focuses on Computer Science research in Africa.
Amina Almassoudi is affiliated with Helwan University and focuses on Computer Science research in Africa.
Hussein Abulreesh is affiliated with Cairo University and focuses on Computer Science research in Africa.
Khalid Sharafat is affiliated with Suez Canal University and focuses on Computer Science research in Africa.

Abstract

Indigenous Knowledge Systems (IKS) in West Africa have a rich history of traditional ecological knowledge that can be harnessed for sustainable development challenges. The methodology involves data collection from traditional ecological knowledge databases, machine learning model training using Python, and validation through cross-validation techniques. A novel hybridization algorithm was developed to combine IKS insights with AI models. A preliminary analysis revealed a significant improvement ($p < 0.05$) in accuracy by integrating local environmental data into the AI models, indicating that incorporating indigenous knowledge enhances predictive capabilities. The findings suggest potential for using hybrid AI-Indigenous Knowledge Systems to improve environmental monitoring and management in West African regions. Future research should expand validation across multiple datasets and explore policy implications of such integrated systems. AI, Indigenous Knowledge Systems, Machine Learning, Environmental Monitoring, Egypt Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *African geography, Indigenous Knowledge Systems, Machine Learning, Data Co-Creation, Ethnobotany, Cultural Analytics, Digital Humanities*

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