



Indigenous Knowledge Systems Integration into AI Development in Senegal: A Framework for West African Contexts

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Abstract

Indigenous Knowledge Systems (IKS) in Senegal are rich sources of traditional wisdom, practices, and knowledge that have been developed over centuries, providing a unique perspective on environmental management, health care, and agricultural productivity. A mixed-methods approach was employed, combining qualitative interviews with stakeholders and quantitative data analysis on existing AI projects in Senegal. A thematic analysis of the interview transcripts identified common themes related to IKS and AI application needs. The analysis revealed that traditional ecological knowledge can significantly enhance AI models for predicting crop yields under changing climate conditions, improving accuracy by up to 20% compared to conventional methods. This study concludes that integrating IKS into AI development not only preserves cultural heritage but also enhances the practical utility of AI solutions in addressing local challenges. Recommendation for policymakers includes developing a national database of indigenous knowledge, establishing partnerships between traditional healers and tech developers, and conducting regular updates to ensure relevance and efficacy. Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \sum_{i=1}^n (y_i - f(\theta(\xi)))^2 + \lambda \|\theta\|_2^2$, with performance evaluated using out-of-sample error.

Keywords: *African GIS, Cultural Analytics, Ethnobotany, Geospatial Technology, Indigenous Knowledge Systems, Participatory Mapping, Spatial Data Analysis*

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