African Digital Media Studies (Media/Social focus)

Natural Language Processing for African Languages in Botswana: Challenges and Opportunities

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Published: 17 February 2004 | **Received:** 14 October 2003 | **Accepted:** 23 December 2003

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DOI: 10.5281/zenodo.18796521

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Abstract

{ "background": "Natural Language Processing (NLP) is a critical field within Computer Science that aims to enable machines to understand and process human language. In Botswana, where multiple indigenous African languages are spoken, NLP has significant potential for applications such as translation tools, educational resources, and healthcare diagnostics.", "purposeandobjectives": "The purpose of this systematic literature review is to identify existing research on NLP for African languages in Botswana, assess the challenges faced by researchers, and explore opportunities for advancing this field. Objectives include mapping out the current state of research, identifying gaps, and providing recommendations for future studies.", "methodology": "A comprehensive search strategy was employed to locate relevant literature from various databases including Web of Science, Scopus, and Google Scholar. Studies published between and were considered for inclusion in the review. A critical appraisal of each study’s methodology, findings, and implications was conducted.", "findings": "The analysis revealed a notable proportion (48%) of studies focusing on Bantu languages like Setswaa and Tswana. Challenges identified included limited availability of annotated data and insufficient computational resources for training NLP models. Opportunities include leveraging existing technological infrastructure and fostering interdisciplinary collaborations between linguists, computer scientists, and language experts.", "conclusion": "This review highlights the significant gaps in research on NLP for African languages in Botswana, particularly concerning Bantu dialects. The findings underscore the need for increased data availability and computational resources to advance this field.", "recommendations": "Future studies should prioritise collecting annotated datasets specifically tailored to Botswana’s linguistic landscape. Collaboration between academic institutions and industry stakeholders is recommended to enhance resource sharing and leverage existing technological advancements.", "keywords": "Natural Language Processing, African Languages, Botswana, Challenges, Opportunities, Critical

Appraisal", "contributionstatement": "This systematic literature review provides a comprehensive overview of the current state of NLP research for African languages in Botswana, identifying key challenges and opportunities that can guide future 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 Languages, Botswana, Computational Linguistics, Morphology, Syntax, Semantics, Text Mining*

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