



NLP in African Languages: Challenges and Opportunities in Malawi Context

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Abstract

Natural Language Processing (NLP) has been pivotal in advancing computational linguistics, enabling machines to understand and process human language. However, its application in African languages remains underexplored, especially in specific contexts such as Malawi. A mixed-methods approach was employed, integrating qualitative interviews with quantitative data analysis techniques. This included surveying local stakeholders about their experiences with existing NLP tools and conducting experiments to evaluate the accuracy of various algorithms in handling African languages. The findings revealed that while there is significant interest from Malawi's tech sector in leveraging NLP for language services, current technologies are often inadequate due to a lack of specialized resources and expertise. For instance, only 20% of the surveyed respondents reported using NLP tools effectively for African languages. The study underscores the urgent need for tailored solutions that address these technological gaps. Specifically, there is a strong recommendation for increased investment in research and development to create more robust NLP models suitable for Malawi's diverse linguistic landscape. To achieve this, initiatives should focus on capacity building through training programmes and collaboration with international partners who have experience in developing NLP solutions for African languages. Additionally, the establishment of a regional centre dedicated to advancing language technology would be beneficial. Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{Vert}^2$, with performance evaluated using out-of-sample error.

Keywords: *African Geographic Linguistics, Computational Linguistics, Machine Learning, Semantic Analysis, Text Mining, Corpus Linguistics, Multilingual Systems*

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