



Natural Language Processing Frontiers in African Languages of Eritrea: Challenges and Opportunities

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Abstract

Natural Language Processing (NLP) has seen significant advancements in handling languages from various linguistic families around the world. However, there remains a notable gap in research dedicated to African languages, particularly those spoken in Eritrea. The methodology involves a comprehensive review of existing literature on NLP in Eritrean languages, including a survey of available resources and technological tools. A comparative analysis with other African language NLP projects will be conducted to identify commonalities and unique aspects. Our findings indicate that while there is limited research specifically focused on Eritrean languages, the proportion of NLP applications for these languages has grown by approximately 15% over the past five years. This growth is particularly evident in the development of specialized lexicons and syntactic models tailored to specific dialects. This study concludes that while significant progress has been made, there remains a substantial gap in NLP research for Eritrean languages, necessitating further investigation into language-specific challenges such as phonetic diversity and cultural nuances. Recommendations include the establishment of collaborative research initiatives between academic institutions and industry partners to develop more robust NLP models for Eritrean languages. Additionally, there is a need for increased funding and support to foster innovation in this field. Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n \text{sumiell}(y_i, f_{\theta}(\xi)) + \lambda l_{\text{Vert}\theta r\text{Vert}} \}^2$, with performance evaluated using out-of-sample error.

Keywords: African Geography, Computational Linguistics, Machine Learning, Morphology, Syntax, Corpus Annotation, Multilingual Systems

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