



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

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Abstract

Natural Language Processing (NLP) has seen significant advancements in Western languages but faces challenges when applied to African languages, particularly those spoken in Morocco. The review draws on a systematic search through academic databases focusing on publications from to present. Studies are evaluated based on methodology, data sources, and outcomes related to NLP applications in Moroccan African languages. A preliminary analysis suggests that while some projects have successfully adapted NLP techniques for Berber languages, there is a significant lack of comprehensive resources such as pre-trained models and benchmark datasets tailored specifically for these languages. The review underscores the necessity for developing localized NLP tools to address linguistic diversity in Morocco's African language communities. Investments should be directed towards creating annotated corpora, fostering collaboration between linguists and technologists, and promoting research that bridges the gap between theoretical understanding and practical implementation. Model estimation used $\hat{\theta} = \operatorname{argmin}_{\theta} \{ \sum_{i=1}^n \text{loss}(y_i, f_{\theta}(\xi_i)) + \lambda \|\theta\|_2^2 \}$, with performance evaluated using out-of-sample error.

Keywords: *African languages, Computational linguistics, Data scarcity, Machine learning, Morphology, Text classification, Syntax analysis*

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