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Identification of Gender from the Shortest Speech using Hybrid and Optimised Spectral Features using Machine Learning Model

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Abstract

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Abstract:
Amidst the contemporary tapestry of technological progression, the realm of speech processing assumes a paramount position, its significance underscored across a myriad of applications. Notably, gender identification from speech data emerges as a salient focal point within this domain, serving as a beacon of innovation and challenge alike.. This task holds particular import in domains such as criminal justice, where swift identification of a speaker's gender from recorded conversations can significantly expedite investigative processes. Our study delves into this imperative, specifically targeting gender identification within the context of the Telugu language-a linguistically rich Dravidian language widely spoken in South India. Navigating this terrain requires the deployment of sophisticated statistical models, including the Gaussian Mixture Model (GMM) and the Hidden Markov Model (HMM), tailored to discern gender nuances from Telugu speech samples. At the core of our methodology lies the development of a meticulously curated dataset, finely attuned to the linguistic intricacies of Telugu. Employing advanced feature extraction techniques such as Mel Frequency Cepstral Coefficients (MFCC), derivatives thereof, and Zero Crossing Rate (ZCR), this work endeavor to encapsulate the subtle nuances inherent in gender-specific speech patterns within Telugu. Furthermore, to enhance classification accuracy, we harness Principal Component Analysis (PCA) to distill feature sets while retaining discriminatory power. This work underscores the efficacy of our approach, showcasing tangible improvements in gender classification accuracy across both original and reduced feature sets. Through meticulous comparative analyses, this work elucidates the efficacy of diverse feature extraction methodologies, providing insights into optimal strategies for gender identification within Telugu speech datasets. In essence, our research not only advances the frontier of gender identification met...

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I. Introduction

Telugu, an esteemed Dravidian tongue, occupies a revered niche in the cultural mosaic of South India, adorned with a profound linguistic legacy and a tapestry of heritage. Despite considerable scholarly attention devoted to language identification within Telugu, a glaring lacuna persists concerning dialect identification-a lacuna this paper endeavors to redress. Dialects within Telugu, each characterized by its distinct linguistic nuances spanning pronunciation, grammar, and vocabulary, se[   ]guistic diversity. In contemporary contexts, the exigency of gender identificat[   ]paramount importance, particularly within the domain of law enforcement agencies [1]–[6]. This application emerges as a potent tool in expediting criminal investigations, facilitating prompt and accurate determination of suspect genders through the analysis of call recordings. Consequently, the capability to discern gender from speech data becomes indispensable in

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