IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, May 2025
Impact Factor: 7.67

Text-Independent Automatic Dialect Recognition of Marathi Language using Spectro-Temporal Characteristics of Voice

Miss. Palwe Priyanka Dharmnath and Prof. Mahajan Jagruti R
Department of Computer
Adsul Technical Campus, Chas, Ahilyanagar, India
priya.palwe19@gmail.com and mahajanjagruti@gmail.com

Abstract: *India's linguistic landscape is rich with regional variations, making dialect recognition an important component in speech-based technologies. This study presents a text-independent automatic dialect recognition system for the Marathi language, focusing on four regional dialects: Marathwada, Puneri, Vidarbha, and Goan Marathi. Unlike conventional speech recognition systems that depend on fixed phrases, the proposed system operates independently of textual content and instead relies on spectro-temporal features extracted from voice signals. The system utilizes the LDC-IL Marathi speech corpus, comprising 7555 audio samples recorded at 48 kHz. Fifteen acoustic features—including Mel-Frequency Cepstral Coefficients (MFCCs), spectral centroid, chroma energy, spectral contrast, and tempo—are extracted using the Librosa library. To improve classification efficiency and reduce feature redundancy, feature selection techniques such as Chi-Square, Mutual Information, and ANOVA f-test are applied. Six machine learning classifiers—K-Nearest Neighbors (KNN), Naïve Bayes (NB), Support Vector Machine (SVM), Decision Tree (DT), Stochastic Gradient Descent (SGD), and Ridge Classifier (RC)—are trained on these features. Experimental results reveal that the SGD classifier, when paired with Chi-Square-selected features, achieves the highest accuracy of 84.64%. This demonstrates the system's effectiveness in handling subtle dialectal variations without relying on complex deep learning models, making it suitable for deployment in resource-constrained environments. The study contributes to the development of inclusive voice technologies and sets a foundation for further research in dialect-aware automatic speech systems, especially for underrepresented Indian languages.*

Keywords: Marathi Dialect Recognition, Spectro-Temporal Features, MFCC, Feature Selection, Machine Learning, Chi-Square Test, LDC-IL Corpus, Text-Independent Speech Processing, Regional Language Technology, Classifier Comparison

DOI: 10.48175/IJARSCT-26239