

Hidden Markov Model and application in building speech recognition systems

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Abstract: This thesis explores the application of Hidden Markov Models (HMMs) for constructing a Vietnamese speech recognition system. While HMMs have been successfully employed for speech recognition in widely spoken languages, their adaptation to Vietnamese presents unique challenges due to the language's tonal nature and specific phonetic structures. This research proposes a robust framework that integrates HMM-based acoustic modeling with a tailored language model to handle Vietnamese tonal variations and syllable segmentation. The system is trained on a curated corpus of Vietnamese speech, utilizing Mel-Frequency Cepstral Coefficients (MFCCs) for feature extraction. Experimental results demonstrate that the proposed HMM architecture achieves competitive recognition accuracy, effectively distinguishing between homophones differentiated by tone. The findings validate the efficacy of HMMs for Vietnamese speech recognition and provide a foundation for developing practical voice-controlled applications and assistive technologies within the Vietnamese linguistic context.

Keywords: Hidden Markov Model, speech recognition, acoustic modeling, machine learning