Strategies for Implementing an Optimal ASR System for Quranic Recitation Recognition

Abstract

With the help of automatic speech recognition (ASR) techniques, computers become capable of recognizing speech. The Quran is the speech of Allah (The God); it is the Holy book for all Muslims in the world; it is written and recited in Classical Arabic language, the language in which it was revealed by Allah to the Prophet Muhammad. Knowing how to pronounce correctly the Quranic sounds and correct mistakes occurred in reading is one of the most important topics in Quranic ASR applications, which assist self-learning, memorizing and checking the Holy Quran recitations. This paper presents a practical framework for development and implementation of an optimal ASR system for Quranic sounds recognition. The system uses the statistical approach of Hidden Markov Models (HMMs) for modeling the Quranic sounds and the Cambridge HTK tools as a development environment. Since sounds duration is regarded as a distinguishing factor in Quranic recitation and discrimination between certain Quranic sounds relies heavily on their durations, we have proposed and tested various strategies for modeling the Quranic sounds’ durations in order to increase the ability in distinguishing them properly and
thus enhancing their overall recognition accuracy. Experiments have been carried out on a particular Quranic Corpus containing ten male speakers and more than eight hours of speech collected from recitations of the Holy Quran. The implemented system reached (99%) as average recognition rate; which reflects its robustness and performance.

References

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Index Terms

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Quranic recitation, Quranic sounds, Classical Arabic Language, Hidden Markov models, Hidden semi-Markov Models, Duration modeling.