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

2. Jurafsky, D.,Martin, J., Speech and Language Processing - An Introduction to Natural
3. X. Huang, A. Acero and H.-W. Hon, Spoken Language Processing: a guide to theory,
5. Ahsiah, I., Noor, N. M., Idris, M. Y. I. Tajweed checking system to support recitation.
International Conference on Advanced Computer Science and Information Systems (ICACIS),
6. Noor Jamaliah Ibrahim, Zulkifli Mohd Yusoff, Zaidi Razak and Rosli Salleh, Improve
Design for Automated Tajweed Checking Rules Engine of Quranic Verse Recitation: A Review.
Sighted and Blind Students. Journal of Software Engineering and Applications, 7, 195-205,
(2014).
8. Yekache, Y., Kouninef, B., Mekelleche, Y., Mohamed, S., Building Quranic reader voice
10. Y.O.M. Elhadj, “Preparation of speech database with perfect reading of the last part of
the Holly Quran (in Arabic)”. Proc. of the 3rd IEEE International Conference on Arabic
Language Processing (CITAL’09), pp. 5-8, May, (2009).
11. Y.O.M. Elhadj, I.A. Alsughayeer, M. Alghamdi, M. Alkanhal, Y.M. Ohali, and A.M.
Alansari. Computerized teaching of the Holy Quran (in Arabic), Final Technical Report, King
Abdulaziz City for Sciences and Technology (KACST), Riyadh, KSA, (2012).
12. Yahya O.M. ElHadj, Mansour Alghamdi, Mohammad Alkanhal, Phoneme-Based
Recognizer to Assist Reading the Holy Quran. Recent Advances in Intelligent Informatics,
Allophonic Sounds of the Classical Arabic Based on Quran Recitations. Theory and Practice of
15. Mohamed O.M. Khelifa, Y.O.M. Elhadj, Y. Abdellah and M. Belkasmi, “Enhancing Arabic


http://dx.doi.org/10.14569/IJACSA.2017.080231.


Index Terms
Computer Science    Signal Processing

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