Development of Arabic Learning Application for Smartphones Using Voice Recognition

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1. Introduction
    This research was conducted to create a smartphone application of language learning with voice recognition technology. The important thing about the application is that we prepare a small recognition dictionary for each training word so that the system recognizes the good pronunciation of native speakers. The selection of words in the dictionary is the key of this research.

2. Development of the application
    The voice recognition module uses the acoustic model which was trained by CMUSphinx[1]. Two sets of experiments were conducted. The first set was to clarify which words should be included in the recognition dictionary. The second set of experiments was to confirm the efficiency of the dictionaries.
    Performing the first experiment we were able to create a smaller dictionary that is good to be used inside smartphone applications. The reason why we chose to use different dictionary for each word was to improve the recognition rate so that the system does not mix up similar voices and to be able to set different challenging levels for learners. While the second experiment we were able to confirm the performance of the final system.
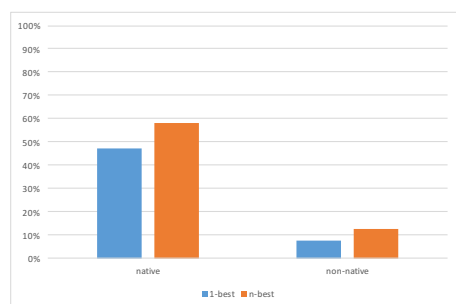
3. Evaluation and dictionary tuning

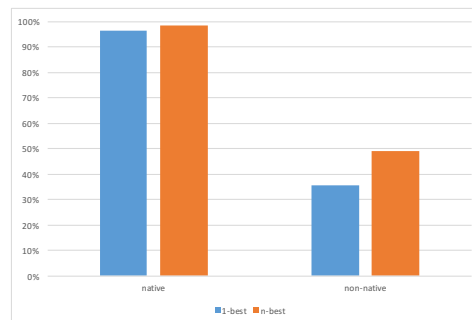fig1: recognition rate of first experiment

fig2: recognition rate of second experiment

Using a dictionary with 12,326 words, the first experiments were conducted and the results were shown in fig1. To make the recognition rate for the native speaker almost perfect, the words which had higher score than the correct word were removed from the dictionary after each experiment. Finally, to reduce the size of the dictionary, irrelevant words were removed randomly.

The second experiments were conducted using the word-dependent small dictionaries. The results were shown in fig2.

4. Conclusion
    In this paper, we succeeded to present a smartphone application. The dictionaries of the application are small in size which is a good match for the smartphones with the limited capacity and resources. It is also word-dependent which has a high recognition rate and also easy to adjust its difficulty level for a harder judgment.

5. References
    [1] CMU Sphinx website,
    http://cmusphinx.sourceforge.net