Boğaziçi University
Electrical & Electronic Engineering
Fall 2003 EE 473 Digital Signal Processing
Term Project Proposal

Project Title:

Speaker-Independent Isolated-Word Speech Recognition Based On Hidden Markov Models

Project Members:

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Problem Statement

Although the amount of information we get visually is enormous, speech is the most natural way of two-way communication. Speech is the fastest and the most immediate way of expressing ourselves. This central role of speech made speech processing one of the most fruitful applications of signal processing field.

Speech processing can ease human-machine communication so that even computer-illiterate people can profit from the state-of-the-art technological devices.

In this project, we will develop a speaker-independent isolated-word speech recognition system based on Hidden Markov Models (HMM).

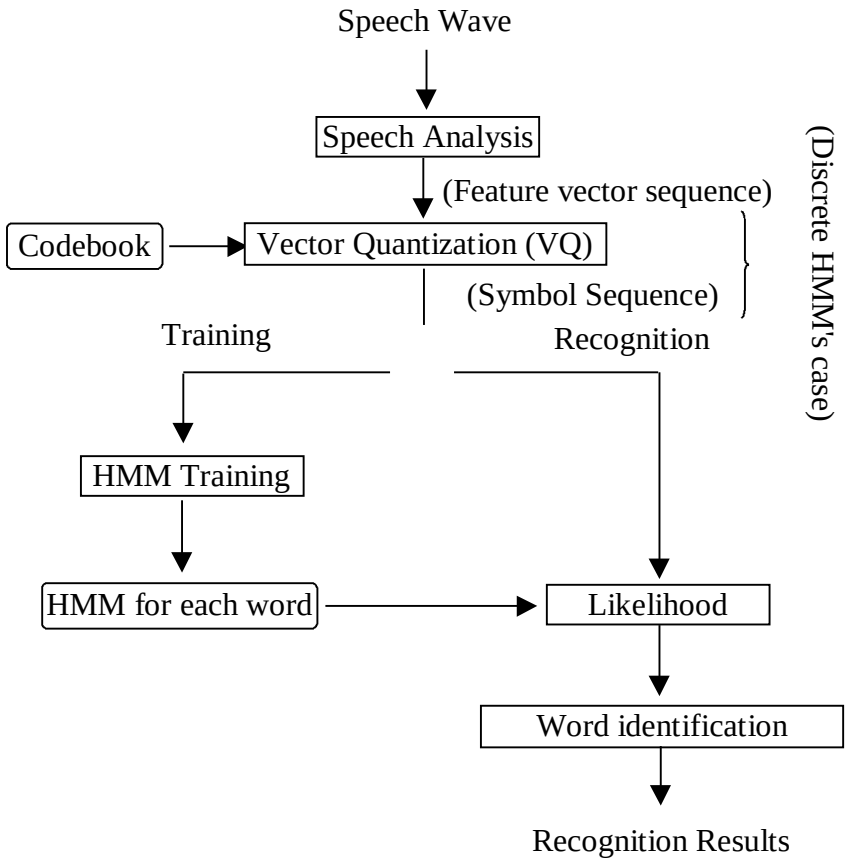
Introduction

Speech recognition is a field in which theory can be applied to real systems to a great extend through computers or microcomputers. The complexity of the theory behind speech recognition applications may prevent us to grasp every detail of the speech recognition methods, however there is a number of useful resources which can help us to determine the most successful algorithms (e.g. Rabiner 1989 and Furui 2001). Implementing speech recognition using a digital signal processor is a further goal which is beyond the scope of this project. However, the high-level programming language implementation will be realized taking the limitations of real-time signal processing into account (Ackenhusen 1999). Additional resources, either cited below or to be found later such as the articles in IEEE's various journals about signal and/or speech processing, may help us fine tune the speech recognition system.

Methodology

The block diagram below depicts the general structure of a word recognizer based on HMM (Furui 2001). A more specific block diagram for isolated word HMM recognizer is given by Rabiner (1989) that is also cited by Furui (2001). That block a diagram specifies LPC analysis as the speech analysis method. Since we have a simple speech recognition system based on LPC analysis at hand, initial stage of implementing the new system will be somewhat easier. Rabiner (1989) lists a number of algorithms for realization of speech

recognition systems based on HMM. We will be using a relatively simpler method, namely, discrete HMM method, in our project. The stages of implementation are shown in the block diagram below.



Time Schedule

The project is due the last week of December 2003. A project progress report may be prepared towards the middle of November.

References

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