CERIM
Central Europe Research to Innovation Models

CASE REPORT

Automatic Speech Recognition for Robot Control

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EUROPEAN UNION
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AUTOMATIC SPEECH RECOGNITION FOR ROBOT CONTROL

Summary

An automatic speech recognition system featuring multiple recognition cores has been implemented. The system currently focuses on recognition of isolated units of speech. A new framework based on pipelining is being developed so as to enhance expandability, modularity and especially to allow for implementation of continuous speech recognition.

Technology

The ASR system focuses on recognition of isolated units of speech. It comprises two separate cores. The first core focuses on recognition based on Artificial Neural Networks (ANN) and utilizes their pattern recognition capabilities. The other core is based on statistical methods and utilizes Hidden Markov Models (HMM) to model the units of speech.

The two methods have been chosen in order to facilitate future creation of a hybrid ANN/HMM system for recognition of continuous speech. In such system ANNs, recognition capabilities of which are generally found to be superior to that of the HMMs, serve as the acoustic model of the basic units of speech (whichever are chosen), whereas the HMMs act as their superunits by modeling the sequence of units in time.

The system is designed with portability in mind and is currently fully compatible with MS Windows, Linux, and easily portable to OS X as well as to other systems.

Multiple methods of spectral analysis including spectrum, cepstrum and MFCCs are available. A new toolkit based on pipelining is currently being developed that would provide a more universal framework for continuous recognition, for the hybrid system and for signal processing in general.

Development stage

This software is currently undergoing restructuring. A new framework with pipeline architecture is being implemented so as to allow for recognition of continuous speech using an HMM, or ANN/HMM hybrid system.

Market/Opportunity

The main focus of the system is on recognition of spoken commands, also known as voice control, within PC-controlled robotic systems.

IP

The intellectual property of this product is not protected.

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