

A Cognitive Approach to Silent Speech Recognition

Emmanuel Lesser¹ and Charles Jorgensen²

¹University College of Antwerp, Faculty of Applied Engineering, Department Electronics-ICT
Paardenmarkt 92, B-2000 Antwerp, Belgium
eless@iee.org

²Neuro-Engineering Laboratory, NASA Ames Research Center, M/S 269-1
Moffet Field, CA 94035-1000, USA
cjorgensen@mail.arc.nasa.gov

Abstract

Silent speech recognition is the technology used to recognize speech by analyzing EMG signals instead of speech signals. Noninvasive electrodes are placed on the vocal chords region of the subject in order to acquire one differentially amplified channel of EMG biofeedback. The technology was first proposed by Jorgensen et al. [1] and used in a discrete word recognition setup. Later it was picked up by Lesser et al. [2] where the same system setup with minor modifications in the overall implementation succeeded in recognizing discrete multilingual speech. One of the modifications applied was substituting the Conjugate Gradient approach – which was initially used for recognition – by a cognitive approach using a Haikonen Associative Neural Network (HANN).

In this paper we discuss the performance of intelligent systems versus that of conscious systems for specific tasks. More specifically, we analyze the increase in accuracy of our multilingual silent speech recognition implementation when used with HANN. The architecture of the system is extensively covered and a brief overview of the HANN is given. The results generated by the system are analyzed and discussed. Finally, we formulate three conclusions.

References

- [1] Jorgensen, C., Lee, D.D., Agabont, S. Sub Auditory Speech Recognition Based on EMG Signals, *Proceedings of the International Joint Conference on Neural Networks*, July 2003.
- [2] Lesser, E., Schaeps, T. EMG Analysis in Multilingual Speech Applications and the Development of Neural Networks for the Implementation of Conscious Entities in Multimedia and Educational Environments, *University College of Antwerp, Faculty of Applied Engineering*, June 2008.