

GENERAL ISSUES IN ENVIRONMENTAL NOISE TRACKING FOR ROBUST IN-VEHICLE SPEECH APPLICATIONS: SUPERVISED vs UNSUPERVISED ACOUSTIC NOISE ANALYSIS

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ABSTRACT

In this paper, we present an overview of Environmental Sniffing [1, 2] framework with current extensions to the system. The framework of Environmental Sniffing is focused on detection, classification and tracking changing acoustic environments. Here, we extend the framework to detect and track acoustic environmental conditions which are determined in an unsupervised approach as opposed to the supervised approach employed in [1, 2]. Knowledge extracted about the acoustic environmental conditions is used to determine which environment dependent speech recognizer to use. Critical Performance Rate (CPR), previously considered in [1,2], is also presented. The sniffing framework is compared to a ROVER solution for automatic speech recognition (ASR) using different noise conditioned recognizers in terms of Word Error Rate (WER) and CPU usage. Results are presented in this paper for supervised noise analysis. Results show that the model matching scheme using the knowledge extracted from the audio stream by Environmental Sniffing does a better job than a ROVER solution both in accuracy and computation. A relative 11:1% WER improvement is achieved with a relative 75% reduction in CPU resources.