

## **ASR-based pronunciation metrics for eLearning and eTherapy**

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There is a growing demand for computer-based language learning and speech therapy programs that offer speaking practice because this cannot sufficiently be provided in standard classrooms or face-to-face therapy sessions. Given that the quality of 'automatic speech recognition' (ASR) has gradually improved during the last decades, there have been increasing attempts to use ASR for providing speaking practice and feedback in eLearning and eTherapy. However, learner and pathological speech, often referred to as atypical speech, differs in various ways from (typical) native, non-pathological speech, for instance, with respect to grammar, vocabulary, pronunciation, and dysfluencies. This makes ASR of atypical speech particularly complex and dedicated ASR algorithms often need to be developed for this purpose.

In addition, for pronunciation training pronunciation error detection (PED) algorithms are needed. Many different PED algorithms and metrics have been proposed and tested. Most of them are ASR-based PED metrics, such as 'goodness of pronunciation' (GOP), confidence measures (CMs), log-likelihood ratios (LLRs), etc. but other metrics such as acoustic phonetic classifiers have also been employed. PED algorithms need to be trained and tested, e.g. using appropriate evaluation measures such as precision and recall. Important issues are how to train and evaluate PED algorithms, how to select errors, and then how to optimally use such PE detectors in speech training. For training and evaluation annotated speech data are needed, but usually these are not sufficiently available.

In this talk, I will review some of the most often used algorithms and metrics, their performance and their advantages and disadvantages. I will then present part of the research conducted at our lab on these metrics and their use in eLearning and eTherapy (see, e.g., <http://hstrik.ruhosting.nl/projects/> and <http://hstrik.ruhosting.nl/publications/>).