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Title: New approaches based on Bayesian regularization to detect vocal fold nodules

Abstract: Vocal fold nodules constitute a common voice impairment affecting the communication ability. It is especially relevant for voice professionals (teachers, singers, actors, coaches…). In order to diagnose it, specialized equipment and an otorhinolaryngologist are needed. Recently, automatic speech signal analysis for clinical diagnosis and assessment of speech disorders is gaining strength. Features automatically extracted from voice recordings are the ingredients for the machine learning algorithms. Due to technology imperfection and the very voice variability, replications of the voice recording tasks are needed. Bayesian regularization approaches have been specifically developed for replicated data. Efficient MCMC methods have been derived. The developed methods have been applied to discriminate between people suffering from vocal fold nodules and healthy people. For this, an experiment has been conducted in the HSPA hospital (Cáceres, Spain) involving 50 subjects (half with nodules and half healthy). More than 30 features based on linear and non-linear dynamics were extracted from 4 replicated phonations of the sustained /a/ for each subject. The three replication-based regularization methods provided accuracy rates above 80% under a cross-validation scheme.