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### **Abstract**

We propose a new approach to the problem of estimating the hyperparameters which define the inter-speaker variability model in joint factor analysis. We tested the proposed estimation technique on the NIST 2006 speaker recognition evaluation data and obtained 10–15% reductions in error rates on the core condition and the extended data condition (as measured both by equal error rates and the NIST detection cost function). We show that when a large joint factor analysis model is trained in this way and tested on the core condition, the extended data condition and the cross-channel condition, it is capable of performing at least as well as fusions of multiple systems of other types. (The comparisons are based on the best results on these tasks that have been reported in the literature.) In the case of the cross-channel condition, a factor analysis model with 300 speaker factors and 200 channel factors can achieve equal error rates of less than 3.0%. This is a substantial improvement over the best results that have previously been reported on this task.

**Keywords** : Speaker verification, factor analysis