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Bayesian formant tracking using conditionally linear Gaussian models

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Formants play a central role in the perception and analysis of speech. In this presentation we describe Bayesian approaches to estimating vocal tract resonances from speech waveforms, formulated as a statistical model-based tracking problem. In particular, approaches by Deng and colleagues have shown the promise of an extended Kalman filtering approach based on a robust linearization of the formant-to-cepstrum map. We describe recent extensions to model inter- as well as intra-formant correlation, and detail efficient inference schemes that preserve conditional Gaussianity. A database of formant trajectories provides a notion of ground truth by which estimator performance can be evaluated, and which demonstrates the efficacy of our approach relative to contemporary benchmark tools for formant analysis.