Hamilton Institute

Non-negative Sparse Coding of Polyphonic Music Spectra

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Abstract

Methods for spectral basis decomposition, that is, decomposing complex compound audio spectra into a sum of weighted 'basis' spectra that somehow represent the underlying structure of the signal, have increasingly been a subject of attention in recent years.

We present an adaptive spectral basis decomposition system, based on a form of non-negative sparse coding, that tries to develop a sparse, factorial representation of a sequence of short-term Fourier power spectra; that is, it attempts to discover a collection of independent spectral features which can be used to represent the observed spectra in a relatively parsimonious manner. In addition to these well known computational aspects, we introduce a novel multiplicative non-Gaussian noise model derived from a theoretical analysis of the statistics of the power spectra of Gaussian processes.

When applied to recordings of polyphonic piano music, the individual notes are identified as salient features, and hence each short-term spectrum is decomposed into a sum of note spectra; the resulting encoding can be used as a basis for polyphonic transcription. Results are presented for an analysis of a live recording of polyphonic piano music.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 1.00 - 2.00pm (followed by tea/coffee)

Travel directions are available at www.hamilton.ie

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