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Adaptive subspace methods for high resolution analysis of music signals

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In the field of music signals analysis, the tonal part of a broad variety of sounds is often represented as a sum of slowly varying sinusoids. The Fourier transform remains a prominent tool for estimating the parameters of this model, due to its robustness and to the existence of fast algorithms. Its main drawback relies in its spectral resolution, bounded by the length of the analysis window.

Subspace-based high resolution (HR) methods are conversely not constrained by this limit, since they rely on the particular geometrical structure of the signal model. Nevertheless, they have been seldom used in audio signal processing, mainly due to their high computational cost. Based on recent advances in the field of subspace tracking, enhanced adaptive algorithms for HR analysis have thus been developed, leading to a high resolution time-frequency representation of the signal, called HR-ogram. The application of these algorithms to music signals, made difficult by the high dynamics and the presence of colored noise, has required the tuning of well-adapted pre-processing techniques. The whole tool is now mature, and allows a high quality separation of the tonal part of various musical sounds.