

# ACOUSTICS2008/794

## Towards a hierarchically sparse model for audio signals

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In this paper we discuss a major issue that arises when building sparse atomic models for music signals: in which space (/ dictionary) should we represent the signals? Having extremely redundant dictionaries is very informative for the locally most important atoms, but is irrelevant for the detail atoms that represent residual signals. Also, what are the advantages of dictionaries composed of learned atoms (which brings the issue of representativeness) compared to generic dictionaries? We here advocate for non-fixed dictionaries, with a multi-layered hierarchical decomposition: the first layer roughly describes the signal, in an extremely redundant, signal-tailored, structured dictionary. This layer is also very sparse, most of the information being carried by the atoms' parameters, similarly to parametric representations. Subsequent layers give more and more details, increasing the data amount while reducing overcompleteness and structural model constraints. These techniques have obvious applications for audio coding, but are also useful for scalable music data mining. This research is supported by the French ANR (DESAM project).