Masters Thesis
Defense

Automatic Transcription of Polyphonic Musical Signals with Linear Matching Pursuit

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Abstract: The Harmonic Matching Pursuit (HMP) algorithm has ordered promising results in the au- tomatic transcription of audio signals. It works by decomposing the given signal into a set of harmonic atoms, and then grouping those atoms into individual notes. HMP has shown very promising results, but more research has been needed for one case: when multiple notes with rational frequency relation are played simultaneously. This situation is called the overlapping partial problem, and it is very common in music, occurring in intervals such as major thirds, perfect fourths, and perfect fifths. A few solutions have been proposed to handle this over- lapping partial problem by performing post-processing on the output of HMP (notably HMP with Spectral Smoothness (HMP SS)). In this paper, I propose an algorithm called Linear Matching Pursuit (LMP) to solve the overlapping partial problem of automatic note detection, which uses new heuristics to solve the problem with no post-processing required. LMP's run- time is independent of the number of notes present in a given audio signal, unlike HMP. My experiments show that LMP offers an improvement upon the accuracy of the HMP algorithm, though not to the extent of HMP SS, and is very robust in runtime with respect to polyphony.

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