A new simple method is proposed to synthesize the instrument-specific dictionaries and its use is examined in the time domain musical signal representation. By investigating the spectrum of musical note signals, it is seen that only a small number of frequency elements are significant in the inherent structure of a musical note, and other elements could be omitted. This sparsity is utilized to synthesize note-specific atoms. Firstly, some basic functions are defined from the long-term spectrum of the note signal, called primary atoms. Then the primary atoms that satisfy some conditions are selected as basic atoms and are incorporated to synthesize note-specific atoms. Some usual signal processing windows also are examined such as Gaussian and Hamming windows to synthesize note-specific atoms. The note-specific atoms of an instrument are integrated in an instrument-specific dictionary. A musical signal is represented by mapping to this dictionary by means of the Matching Pursuit algorithm. The proposed method was evaluated on the RWC musical sound database. The results showed that it improves the quality of signal representation compared to some previous methods.
References


Index Terms

Computer Science

Signal Processing
Keywords

Signal Representation, Signal Mapping, Audio Signal Processing, Spectral Analysis, Signal Reconstruction