



Pitched Musical Instrument Sound Inter-conversion Through Extraction of Timbre Features

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Abstract: Timbre is an abstract quantity that is responsible for distinguishing two sounds of the same frequency and amplitude. Timbre cannot be quantified easily as it depends on various temporal and spectral parameters like the time-domain envelope, spectral envelope, spectral flux and additive noise components. The work is based on the analysis-synthesis approach [1] and we assume the source-filter model [2] of musical instruments for the analysis. The parameter dependencies are extracted such that the sound can be recreated using the additive synthesis technique. In our work, we extract these dependencies of timbre in a manner suitable to our model to facilitate mapping of these feature dependencies of one instrument model to another. In the timbre space, variation of either frequency or volume affects the timbre significantly, thereby changing the dependencies on the extracted features. Our work also includes these variations to effectively map the timbre features in all frequency and loudness ranges. To validate our proposed method, we have used flute and violin samples which were specifically recorded for this purpose and database available online. [3]

References: [1] Xavier Rodet, Musical Sound Signals Analysis/Synthesis: Sinusoidal+Residual and Waveform Models. In Proceedings of the IEEE Time-Frequency and Time-Scale Workshop (TFTS), August 1997. [2] Thierry Galas and Xavier Rodet. Generalized Functional Approximation for Source Filter Modelling. In Proc. Eurospeech, pages 1085-1088, Geneva, 1991. [3] University of Iowa, Electronic Music Studios, theremin.music.uiowa.edu