Isolation Of Individual Tracks From From Polyphonic Music

In our program, we extract individual tracks of music based on a system similar to that shown in Figure 1.

- First, the audio signal is transformed to the frequency domain via a Fourier Transform.

- Then, after a Singular Value Decomposition, Indepdent Component Analysis (ICA) is performed. ICA assumes that, given a vector x of measured signals, a vector s of pure source signals, and a matrix A of mixing constants, x = A*s; that is, each signal is a linear combination of source signals. The goal of ICA is to invert A so that s can be retrieved, i.e.: A^-1 * x = A^-1*A*s -> A^-1*x = s.

- Third, those individual components are classified. In figure 1, they are separated into percussive and harmonic components. In our project, we plan to take a more general approach and classify other instruments besides purely drums.

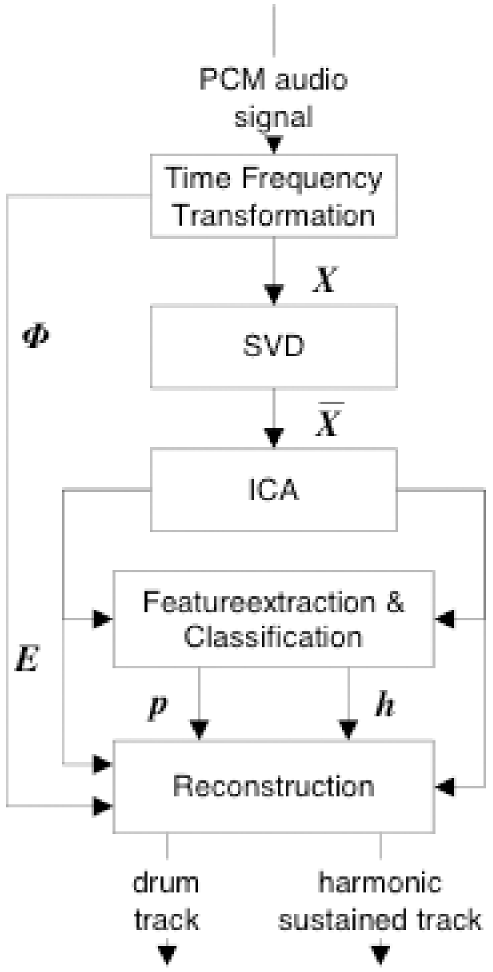

Figure 1: System overview

- Finally, after the classification, the separated components are recombined and sent back to the time domain using an inverse Fourier Transform, resulting in the separated musical tracks.

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