

REAL-TIME SOUND SIMILARITY RESYNTHESIS BY FEATURES EXTRACTION ANALYSIS

ANONYMOUS

This abstract presents `path~`, a PureData external implementing a corpus-based, concatenative analysis-resynthesis engine. Sound is acquired and resynthesised by a similarity match between audio grains, using a set of audio features extracted offline for sound corpora and in real-time for live input.

The basic idea of this work is to fragment the samples, to perform a feature extraction analysis and to construct k-d tree and an knn list for every grain. In real-time, features are extracted from a live input and the nearest element is found in the tree. Using the knn list, a set of grains is available for the resynthesis.

Two types of fragmentations are possible; the first one is frame-based, i.e. given a frame window `path~` cuts out the samples every frame and performs the analysis; the second one is onset-based, i.e. an onset detection is made and the fragmentations takes cares of gestural nature of grains. We chose a multi-descriptors strategy: the features are a mel frequency cepstral coefficients, a spectral centroid and a time-domain loudness. Using the default parameters, the dimensionality of the feature space, i.e. the number of dimensions that every coordinate has the feature space, is 16, 14 given by the mfcc plus one of the spectral centroid and one of loudness descriptor. However, a fine tuning is possible: the mel spacing can be adjust to increase or decrease the number of coefficients and can be even delete from all the calculations. By default, loudness is a root mean square descriptor; it can be changed in a peak descriptor. We separate the real-time audio thread from a worker thread, where all calculations are performed. Using an atomic compare-and-swap, it's possible to add or change source audio materials without stopping the audio flow.

The main focus is the real-time audio mosaicing. Audio mosaicing refers to the process of reconstructing the temporal evolution of a target sound from fragments taken from a source audio materials. Our interest is the application of this technique to the production of mixed contemporary composition. For this reason, we develop several functions and utilities. For example, a vectorized audio outputs control system, that allows to change the number of outputs; a script-based preset management gives to the computer music designer the possibility to call different configuration and fix them in real-time thanks to a graphical editor. A simple debugger helps finding errors and suggesting the possible variables. All these tools give a great flexibility especially during rehearsals. `path~` can load directly audio files from hard disk and Pd-s array, so analysis can be done even on on-the-fly recorded materials.

Actually, three new pieces involve `path~` in the electronic part.

1. LINK

OSX and Linux binaries and some patches are available from github.com/amurtet/path