Roberto Carli
Alessandro Yamhure

A Digital Harmonizer / Chord generator

ABSTRACT

We are planning to design a device that is able to analyze a pitched audio input (musical instruments, voice) and transform in real-time the note produced into several kinds of chords. We would obtain this result by determining the tonic frequency (pitch) of the note produced, and subsequently compressing the sound signal by an appropriate fractional ratio, so as to transform it into the “third” or the “fifth” of the chord while maintaining its tonal characteristics. Several modified signals will be summed to the original signal in order to produce a chord.

The project will be divided in two parts. An analysis module will perform FFT (Fast Fourier Transform) on the input signal in order to determine its tonic frequency ω. The module will then take one wavelength of the input signal and feed it to several pitch shifting modules.

A pitch shifting module will take a characteristic wavelength and will have its own compression parameter. The module will output a wave compressed by the compression parameter, which will correspond to a fixed degree of the chord, for example a parameter of 2 will produce the sound one octave higher.

Eight switches will control which modules shall be activated, so as to determine which kind of chord the machine will output.

Roberto Carli
Alessandro Yamhure

10/29/05

MUSIC TRANSCRIPTION

Abstract

We are aiming at a digital system that will allow musicians to pick a tempo and play their instruments (or sing through a microphone) into the system and get a transcription of the notes played on the screen. Moreover, the system will convert the music played or sung into the appropriate sheet music. We aim to implement this for simple pieces of music that are of limited rhythmical complexity.

Two main modules are involved. The first is the *input analysis* module which will take in the note played at any given time and detect the pitch and duration of the note in units of "beats". A pitch detector will calculate the pitch of the note and a counter will detect its duration by counting up to a change in pitch.

The pitch and duration outputs of the *input analysis* serve as the inputs to the *sheet music display* module. This takes the input data and converts it into the corresponding sheet music on the computer screen. The output consists of proper staff lines and notes whose images will be stored in memory and correctly retrieved by the system.