

# POWERpv: A Suite of Sound Processors

Eric Lyon

IAMAS

3-95 Ryokechou, Ogaki-City, Gifu 503 JAPAN

eric@iamas.ac.jp

**Abstract.** POWERpv is a set of programs for altering and creating sounds using Fourier analysis/synthesis as its basis. These programs build upon the structure of the practical phase vocoder C program described by Richard Moore in Elements of Computer Music [Moore, 1990] and are designed for use in the Unix environment. Most of the programs function as filters, reading and writing floating point samples from and to pipes. A few programs create spectral frames algorithmically and therefore have no input. A few other programs work with a stored analysis file consisting of a series of phase vocoder frames. A utility program is provided to create these analysis files.

## 1 INTRODUCTION

The programs in the POWERpv suite were developed as practical tools for use in composition. They present many alternatives to the straightforward use of the phase vocoder for independent control of pitch and temporal evolution. Some examples are: time-varying spectral warping; spectral companding (adaptively adjusting the relative strength of strong and weak partials); spectral replacement mixing where two soundfiles are mixed together with portions of each spectrum selected by a datafile specifying frequency bandwidths. One POWERpv program, "resident", enables resynthesis of arbitrary frames at arbitrary times (controlled by a user-created function table) which could be viewed as "scratching" the spectral surface of the sound. A related program, "resent", resynthesizes each FFT bin at a different user-specified (possibly negative) increment which can create many unusual phasing effects.

## 2 COMPOSITIONAL USES

POWERpv is capable of a range of transformations from subtle re-weighting of spectra to wanton destruction of both temporal and spectral characteristics. Different source sounds often result in strikingly different (and surprising) sonic output from the same processor. The interaction between source selection and process will remain a rich area for experimentation for the foreseeable future. Since many of the POWERpv processors are time-varying, it is possible to use the spectral domain as one more dimension in which to articulate musical data such as control functions.

### 3 FUTURE DIRECTIONS

There are already more POWERpv processors than one can easily keep track of in the commandline domain. Therefore, a GUI, perhaps along the lines of Adobe's *Photoshop*, would assist in coordinating the use of these tools. It is feasible to realize realtime resynthesis from spectra on many of today's workstations. Therefore, the ideas in these programs will inevitably be ported to the realtime domain, affording composers and improvisors many new opportunities for direct expression with these increasingly familiar spectral processing techniques.

### 4 AVAILABILITY

POWERpv is available from <http://ringo.sfc.keio.ac.jp/~eric>.

### References

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