NeuralReverberator

AES MATLAB Plugin Student Competition

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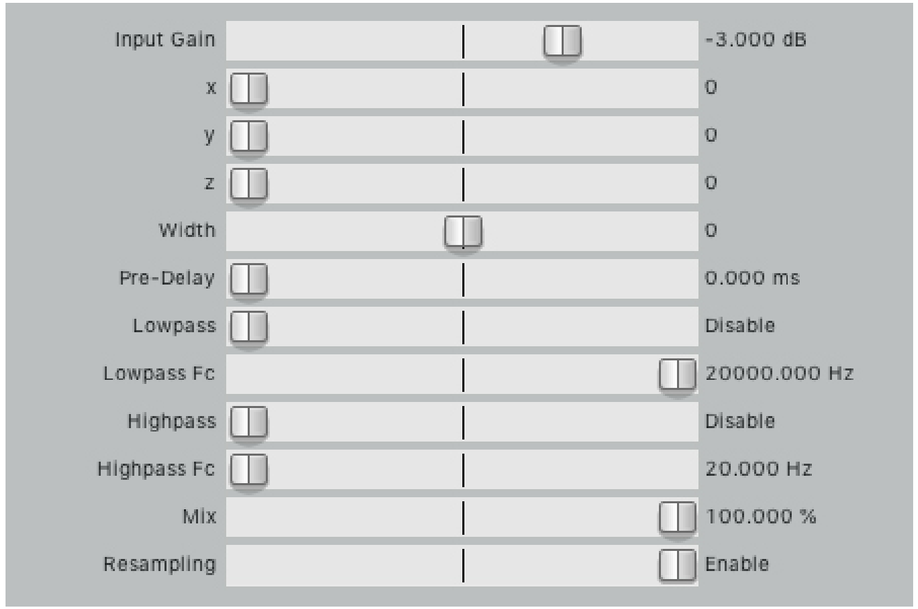
What is it?

Deep learning driven convolutional reverb plug-in



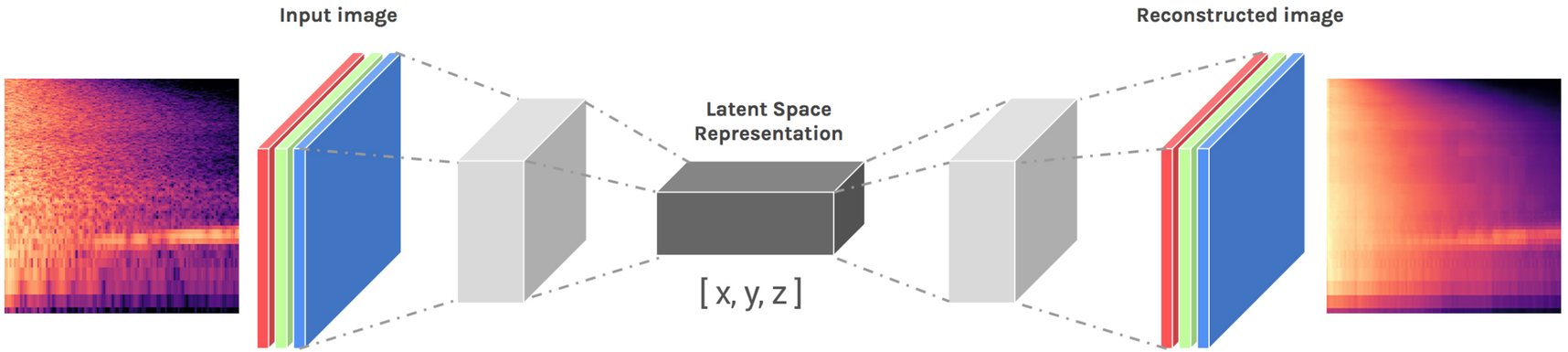
VST plug-in running in REAPER DAW

Convolutional reverb

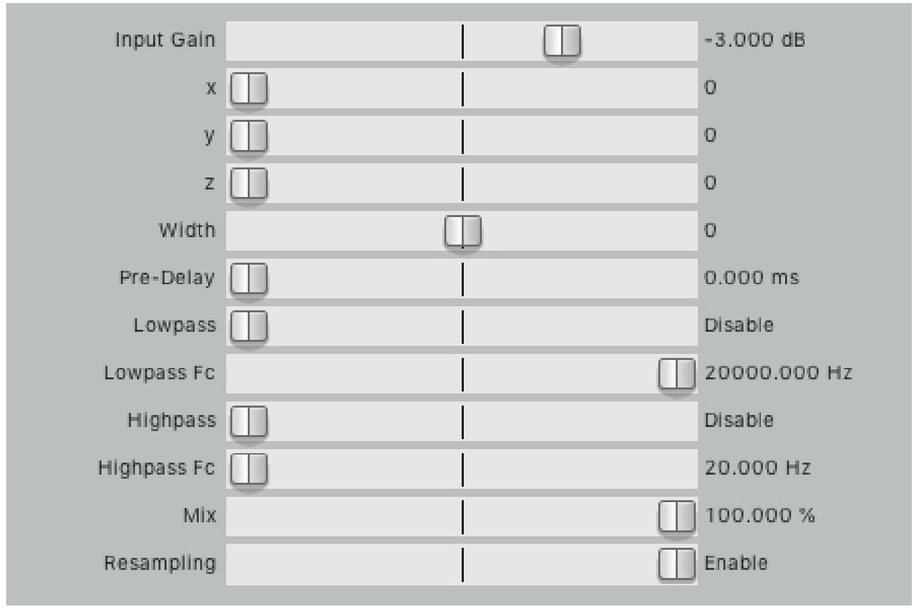
0:00 / 0:08

0:00 / 0:09

Deep Autoencoder



How does it sound?



0:00 / 0:09

Dry

0:00 / 0:09

Short reverb

0:00 / 0:09

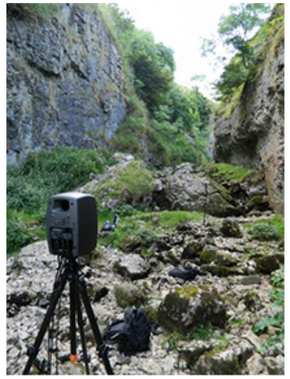
Long dark reverb

0:00 / 0:09

Strange delay

Dataset

~2,000 impulse responses







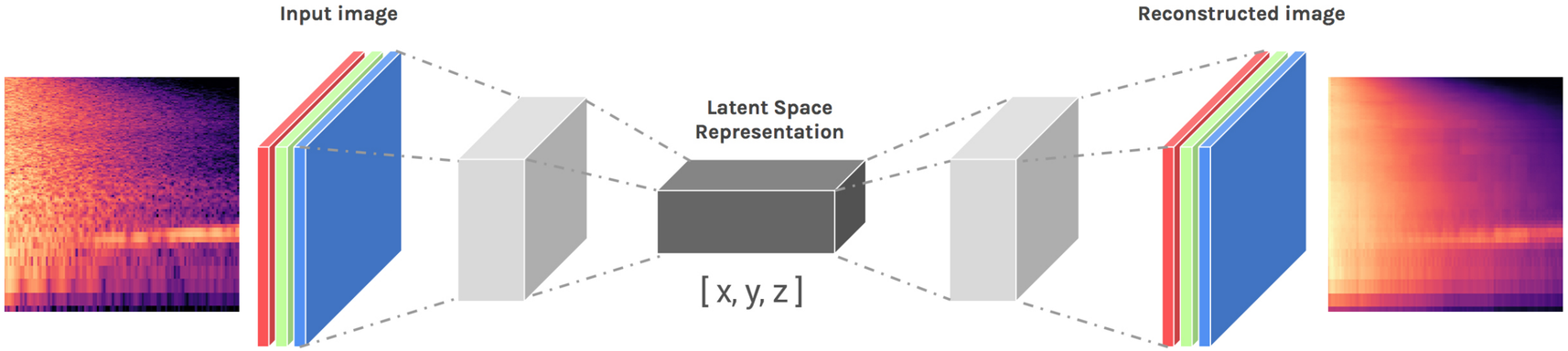
Truncated to 2 seconds in length

Downsampled to 16 kHz

Open AIR Library, Greg Hopkins, C4DM, and others

Autoencoders

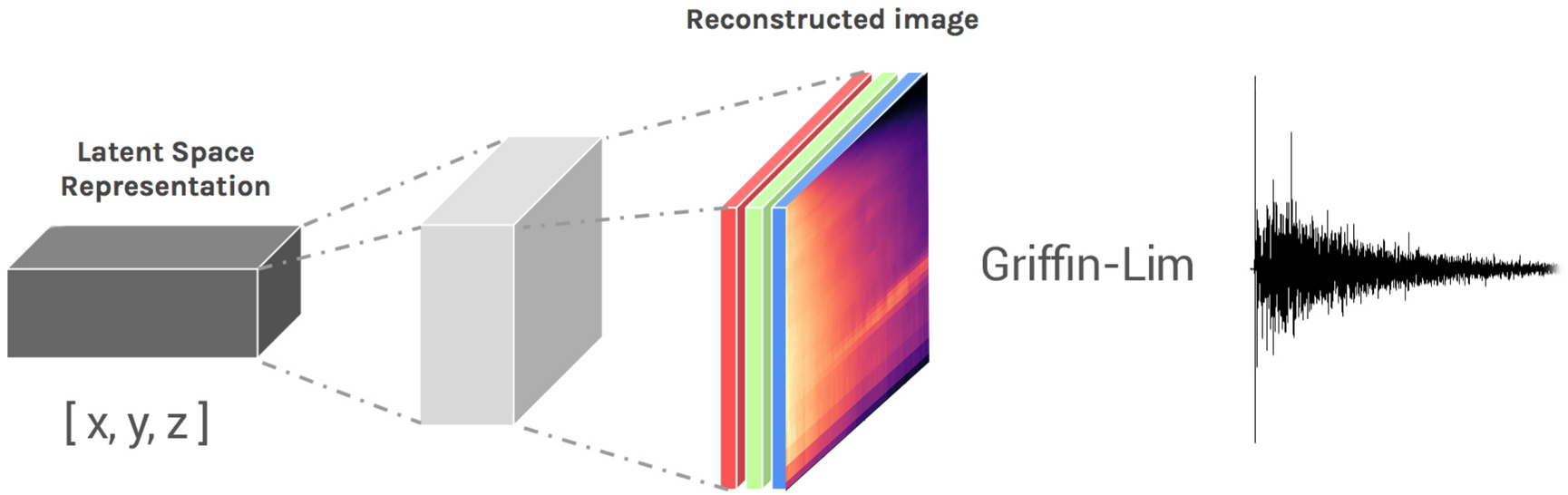
Spectral Autoencoder



0:00 / 0:02

0:00 / 0:02

Phase Reconstruction

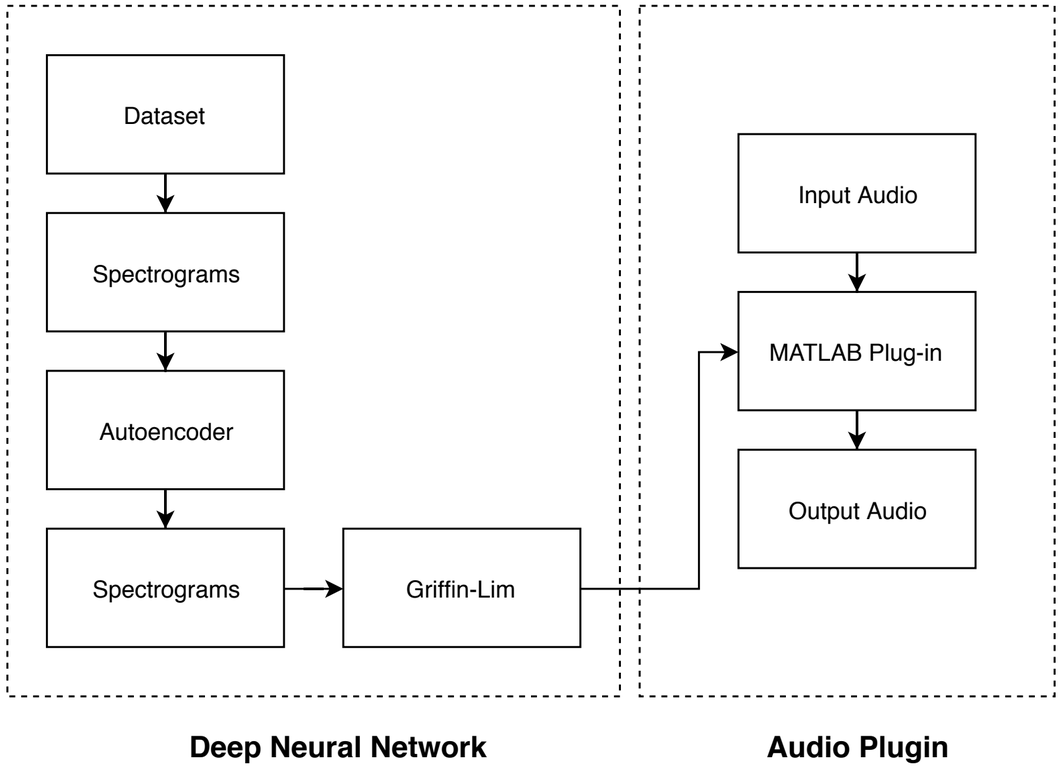


Signal estimation from modified short-time Fourier transform

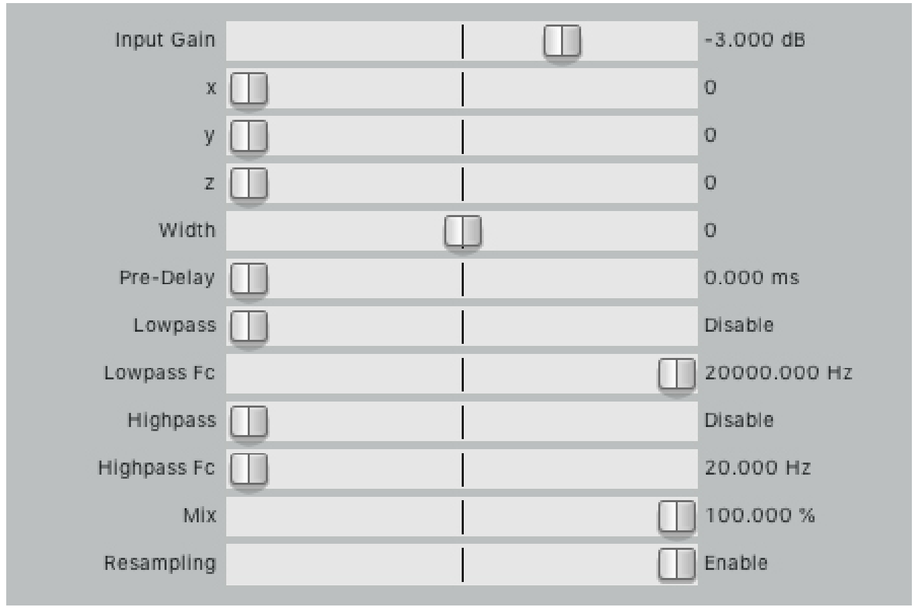
D. Griffin and Jae Lim

MATLAB Plug-in

Architecture



Signal Processing



Latent Space

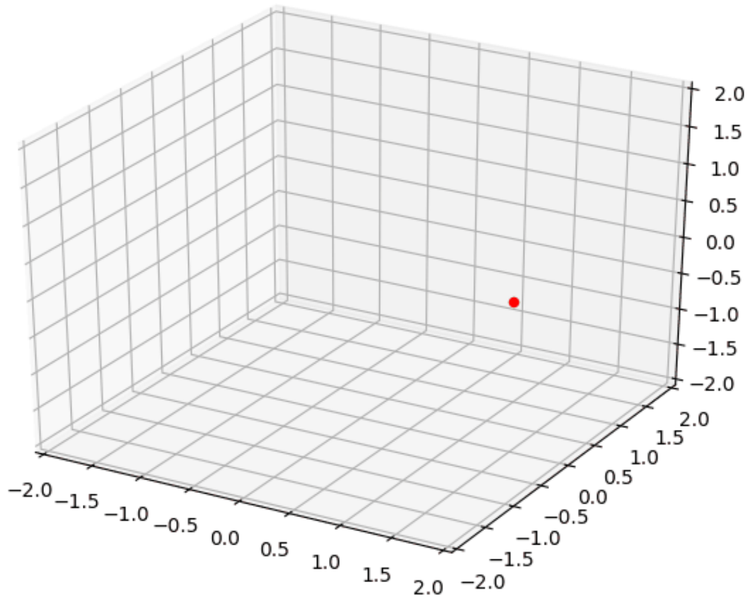
Stereo Width

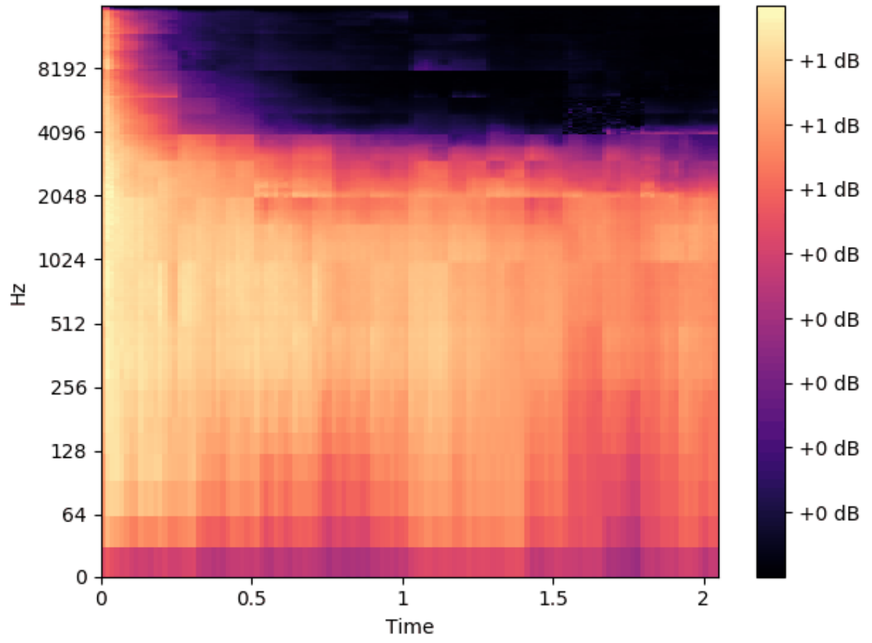
Pre-Delay

Filtering

Resampling

Latent Space





Stereo Width

Autoencoder trained on mono impulse responses

Width control uses different impulse responses for Left and right channel

dsp.FrequencyDomainFIRFilter System object

Pre-Delay

Delay the onset of the reverb signal

dsp.VariableFractionalDelay System object

Filtering

Second order highpass and lowpass filters

filter() function

Resampling

Impulse responses generated at 16khz sampling rate

Allows resampling to 32kHz, 44kHz, 48kHz, and 96kHz

dsp.FIRRateConverter

Future Directions

Latent space arithmetic

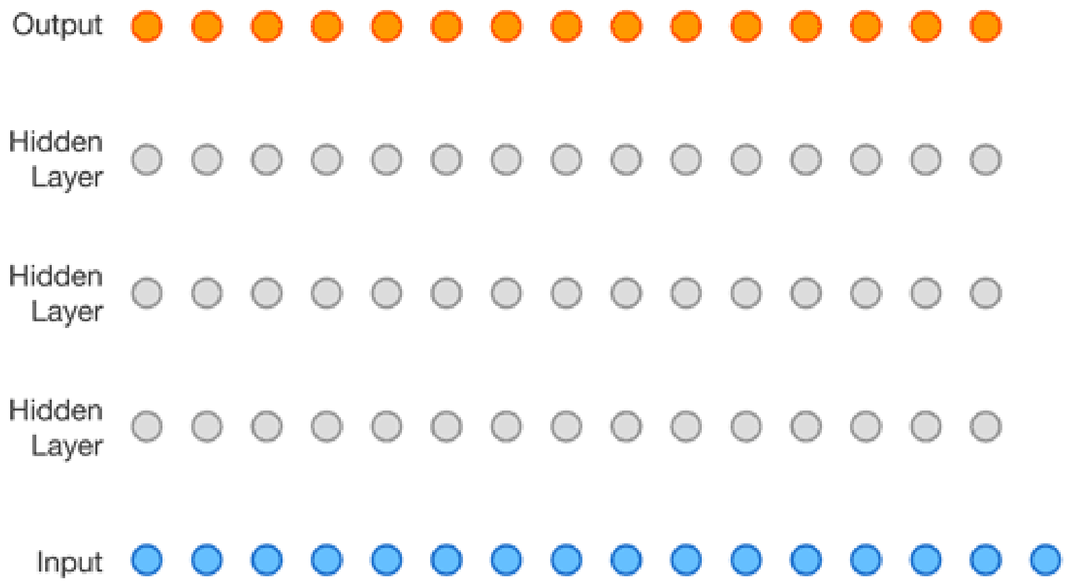
Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks

Alec Radford, Luke Metz, Soumith Chintala

Impulse response parallel



WaveNet autoencoder architecture



WaveNet: A Generative Model for Raw Audio

Aaron van den Oord, Sander Dieleman, Heiga Zen, Karen Simonyan, Oriol Vinyals, Alex Graves, Nal Kalchbrenner, Andrew Senior, Koray Kavukcuoglu

Thank you!

Code, trained models, and VST builds available on GitHub
https://github.com/csteinmetz1/NeuralReverberator

More details on blogpost
http://www.christiansteinmetz.com/projects-blog/neuralreverberator

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