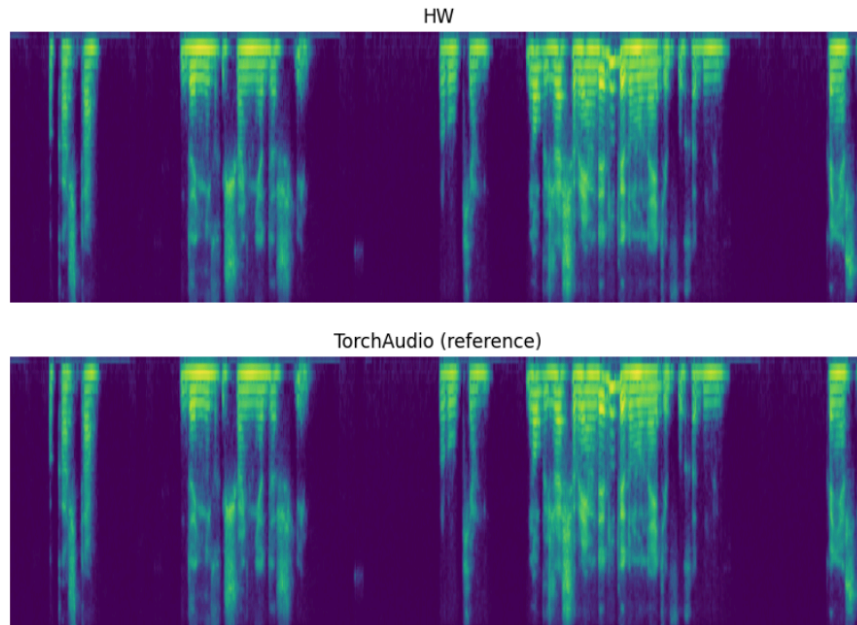


Assignment 1. Digital Signal Processing

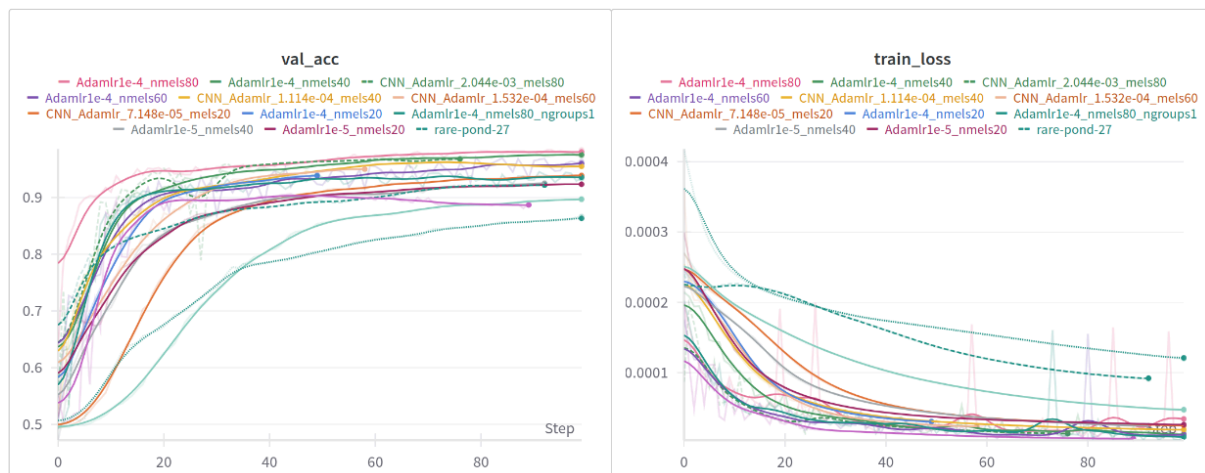
MelSpectrogram

Assignment MelSpectrogram implementation result seems to match the TorchAudio version.



Learning rate optimization

Due to consistency with various tasks and architectures, the Adam optimizer was chosen for this task. To determine a good learning rate a small series of experiments were held within the sensible value range of learning rate from $1e-1$ to $1e-5$. As well, the experiments were held with varying number of mels in MelSpectrogram. While bigger learning rate tended to work better with higher n_mels , the value that was chosen for the following experiments is $1e-4$ due to working as well with lower n_mels . Higher learning rates tended to cause overfitting especially with lower n_mels parameter. The plots for the best 15 runs can be viewed below.



MelSpectrogram n_mels optimization

Higher number of mel filterbanks yielded better results according to experiments, therefore this parameter will be used in further experiments.



Experiments with conv layer n_groups parameter

Increasing the number of groups in a convolutional layer impedes models ability to learn, significantly negatively affecting the model performance as seen on the plots below.



Increasing the `n_groups` parameter of convolution incrementally decreases the number of trainable parameters in the layer as well as number of floating point operations in the same fashion, but does not affect the training time much.

