**Feature Extraction:**

1. **add-deltas.cc**

"Add deltas (typically to raw mfcc or plp features)"

"Usage: add-deltas [options] in-rspecifier out-wspecifier"

1. **add-deltas-sdc.cc**

"Add shifted delta cepstra (typically to raw mfcc or plp features)"

"Usage: add-deltas-sdc [options] in-rspecifier out-wspecifier";

1. **apply-cmvn.cc**

"Apply cepstral mean and (optionally) variance normalization"

"Per-utterance by default, or per-speaker if utt2spk option provided"

"Usage: apply-cmvn [options] (<cmvn-stats-rspecifier>|<cmvn-stats-rxfilename>) <feats-rspecifier> <feats-wspecifier>"

"e.g.: apply-cmvn --utt2spk=ark:data/train/utt2spk scp:data/train/cmvn.scp scp:data/train/feats.scp ark:-"

1. **apply-cmvn-sliding.cc**

"Apply sliding-window cepstral mean (and optionally variance)"

"normalization per utterance. If center == true, window is centered"

"on frame being normalized; otherwise it precedes it in time."

"Useful for speaker-id; see also apply-cmvn-online"

"Usage: apply-cmvn-sliding [options] <feats-rspecifier> <feats-wspecifier>";

1. **apply-cmvn-online.cc**

"Apply online cepstral mean (and possibly variance) computation online,\n"

"using the same code as used for online decoding in the 'new' setup in\n"

"online2/ and online2bin/. If the --spk2utt option is used, it uses\n"

"prior utterances from the same speaker to back off to at the utterance\n"

"beginning. See also apply-cmvn-sliding."

"Usage: apply-cmvn-online [options] <global-cmvn-stats> <feature-rspecifier> <feature-wspecifier>"

"e.g. apply-cmvn-online 'matrix-sum scp:data/train/cmvn.scp -|' data/train/split8/1/feats.scp ark:-"

"or: apply-cmvn-online --spk2utt=ark:data/train/split8/1/spk2utt 'matrix-sum scp:data/train/cmvn.scp -|' data/train/split8/1/feats.scp ark:-";

1. **compute-cmvn-stats.cc**

"Compute cepstral mean and variance normalization statistics"

"If wspecifier provided: per-utterance by default, or per-speaker if spk2utt option provided; if wxfilename: global"

"Usage: compute-cmvn-stats [options] <feats-rspecifier> (<stats-wspecifier>|<stats-wxfilename>)"

"e.g.: compute-cmvn-stats --spk2utt=ark:data/train/spk2utt scp:data/train/feats.scp ark,scp:/foo/bar/cmvn.ark,data/train/cmvn.scp"

"See also: apply-cmvn, modify-cmvn-stats";

1. **compute-and-process-kaldi-pitch-feats.cc**

"Apply Kaldi pitch extractor and pitch post-processor, starting from wav input."

"Equivalent to compute-kaldi-pitch-feats | process-kaldi-pitch-feats, except that it is able to simulate online pitch extraction; see options like --frames-per-chunk, --simulate-first-pass-online, --recompute-frame."

"Usage: compute-and-process-kaldi-pitch-feats [options...] <wav-rspecifier> <feats-wspecifier>"

"e.g. compute-and-process-kaldi-pitch-feats --simulate-first-pass-online=true --frames-per-chunk=10 --sample-frequency=8000 scp:wav.scp ark:- "

"See also: compute-kaldi-pitch-feats, process-kaldi-pitch-feats";