
**Abstract**

Despite dramatic recent advances in speech recognition technology, speech recognizers still perform much worse than humans. The difference in performance between humans and machines is most dramatic when variable amounts and types of filtering and noise are present during testing. For example, humans readily understand speech that is low-pass filtered below 3 kHz or high-pass filtered above 1 kHz. Machines trained with wide-band speech, however, degrade dramatically under these conditions. An approach to compensate for variable unknown sharp filtering and noise is presented which uses mel-filter-bank magnitudes as input features, estimates the signal-to-noise ratio (SNR) for each filter, and uses missing feature theory to dynamically modify the probability computations performed using Gaussian Mixture or Radial Basis Function neural network classifiers embedded within Hidden Markov Model (HMM) recognizers. The approach was successfully demonstrated using a talker-independent digit recognition task. It was found that recognition accuracy across many conditions rises from below 50% to above 95% with this approach. These promising results suggest future work to dynamically estimate SNR's and to explore the dynamics of human adaptation to channel and noise variability.