Statistical Spectral Estimation and Discriminant Analysis in Bivariate Time Series with an Application to the Speech Recognition of Several People

羅琪,林淑瑛
Applied Mathematics
Engineering
chilo@chu.edu.tw

Abstract

The extension of classical pattern-recognition techniques to experimental time series data is a problem of great practical interest. An important application in engineering is to the problem of discriminating between various voice patterns. Throughout the engineering literature, most approaches assumed very specific Gaussian additive signal and noise models and then developed the discriminant criteria to minimize errors. In general, this requires that we assume prior knowledge of the signal waveforms and spectra under each of the hypotheses, so that discriminant functions can be calculated for an observed time series. In Lo and Yu (2006), they assume the spectra of two speakers are unknown. The estimation and hypothesis-testing problems are formulated in terms of sample spectral densities with sample approximate distributions. Finally, they use frequency domain approximations to the optimum discriminant functions to identify the speech patterns of two speakers. In this research, we extend the above research to the speech recognition of several people. Also, when each person records the voice, the channel will be set as stereo instead of mono. Therefore, each person has two time series (bivariate time series) in one record. Since the bivarate time series are correlated, we also consider the estimations of cross spectrum, phase spectrum and coherency.

Keyword：bivariate time series, spectral estimation, discriminant analysis, speech recognition