REVIEW ON IEEE TRANSACTION ON MAXIMUM LIKELIHOOD AND MINIMUM CLASSIFICATION ERROR FACTOR ANALYSIS FOR AUTOMATIC SPEECH RECOGNITION

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ABSTRACT

The paper claims that the combined use of mixture densities and factor analysis for speech recognition leads to smaller, faster and accurate recognizers than either of these in isolation. Two ways to model correlations between high-dimensional feature vectors are: 1) implicitly by the use of mixtures, or 2) explicitly by the use of non diagonal elements in each covariance matrix. The latter one has a heavy computational overhead because of the use of full covariance matrix. Factor analysis can be used to model this high dimensional covariance matrix using small number of parameters. Factor analysis is not only a method for dimensional reduction but it also models the variations outside the reduced-dimensionality subspace. Factor analysis can be used to increase likelihoods as well as word accuracies by use of an expectation-maximization (EM) algorithm for maximum likelihood estimation and a gradient descent algorithm for improved class discrimination. This paper will analyze the use of factor analysis technique in conjunction with mixture densities to model correlations by reviewing advantages and drawbacks of the EM algorithm and gradient descent algorithm.