# Detecting Emotions in Mandarin Speech

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## Abstract

The importance of automatically recognizing emotions in human speech has grown with the increasing role of spoken language interfaces in human-computer interaction applications. In this paper, a Mandarin speech based emotion classification method is presented. Five primary human emotions, including anger, boredom, happiness, neutral and sadness, are investigated. Combining different feature streams to obtain a more accurate result is a well-known statistical technique. For speech emotion recognition, we combined 16 LPC coefficients, 12 LPCC components, 16 LFPC components, 16 PLP coefficients, 20 MFCC components and jitter as the basic features to form the feature vector. Two corpora were employed. The recognizer presented in this paper is based on three classification techniques: LDA, K-NN and HMMs. Results show that the selected features are robust and effective for the emotion recognition in the valence and arousal dimensions of the two corpora. Using the HMMs emotion classification method, an average accuracy of 88.7% was achieved.

**Keywords:** Mandarin, emotion recognition, LPC, LFPC, PLP, MFCC

## 1. Introduction

Research on understanding and modeling human emotions, a topic that has been predominantly dealt with in the fields of psychology and linguistics, is attracting increasing attention within the engineering community. A major motivation comes from the need to improve both the naturalness and efficiency of spoken language human-machine interfaces. Researching emotions, however, is extremely challenging for several reasons. One of the main difficulties results from the fact that it is difficult to define what emotion means in a precise way. Various explanations of emotions given by scholars are summarized in [Kleinginna *et al.* 1981]. Research on the cognitive component focuses on understanding the environmental and attended situations that give rise to emotions; research on the physical components emphasizes the physiological response that co-occurs with an emotion or rapidly follows it. In short,

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