基于混沌特性的情感语音非线性特征研究

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摘　要：根据语音发声和传播过程中表现出的混沌特性，首先验证了富含不同情感的语音信号是具有混沌特性的.其次采用非线性动力学理论提取了基于情感语音信号混沌特性的的 3 种非线性特征：最小时间延迟、关联维数和最大 Lyapunov 指数.最后，设计了不同的实验验证了非线性特征的识别性能.实验中选用了 Berlin 语音库中的情感语句.采用了支持向量机进行了情感识别，其中参数采用十倍交叉验证获得.最后，对不同的实验结果进行了归纳分析，对比了不同非线性特征用于识别基本情感时的优劣.

关键词：情感语音识别；混沌特性；非线性特征；支持向量机

Nonlinear Feature Etraction of Eotional Speech

Based on Caotic Caracteristics

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Abstract：Based on the chaotic characteristics of speech utterance and propagation, the experiment firstly verifies that speech signals with different emotions have chaotic characteristics. Secondly, the experiment tries to adopt the nonlinear dynamics theory to extract three kinds of nonlinear characteristics which are based emotional speech signal. The characteristics include the minimum time delay, correlation dimension and Lyapunov exponent. Thirdly, designed different experiments to verify the recognition performance of the non-linear characteristics. Furthermore, the experiments have selected emotional statement from Berlin speech database and have used a support vector machine to identify the emotion. And the parameters are obtained by ten-fold cross-validation. Finally, through the summarizes and analyzes of the experimental results from different experiments. Then it compares the relative merits of different nonlinear characteristics which were used to identify the basic emotions.

Key words：emotional speech recognition; chaotic characteristic; nonlinear features; support vector machine

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