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Abstracts

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Continuous Speech Phoneme Recognition Using Dynamic Artificial Neural Networks

József Domokos and Gavril Toderean

Phoneme classification and recognition is the first step to large vocabulary continuous speech recognition. This step represents the acoustic modeling part of such a system.

The state-of-the-art acoustic modeling systems use hidden Markov models (HMM’s) for each phoneme to be recognized. These models must be trained using a large amount of transcribed training data and then evaluated in order to get the model with maximum likelihood conditioned by an input observation vector.

In hybrid speech recognition systems phoneme recognition is made by artificial neural networks (ANN’s). There are some examples in the literature that proves the advantage of the connectionist systems over HMM’s and that HMM’s are just a particular case of a Multi Layer Perceptron (MLP) in a Bayesian framework.

Some of our first experiments for phoneme classification using ANN’s are presented in detail in previous papers. We have used MLP’s with 1 and 2 hidden layers and Mel Frequency Cepstral Coefficients (MFCC) with their first and second order time differences (delta and acceleration) for phoneme classification using TIMIT and OASIS Numbers continuous speech databases. We have also used contextual information to improve classification results. The MLP networks are static networks and they can not take in account the temporal characteristics of speech. They have fixed number of inputs and are not suitable for phoneme recognition.

There are other type of neural networks, so called dynamic ANN’s - for example Time-Delay Neural Networks (TDNN) and Recurrent Neural Networks (RNN) - that provides better results for phoneme recognition. The main objectives of this paper are investigation of these networks and the development of a phoneme recognizer application using dynamic ANN’s for both TIMIT and OASIS Numbers databases.
Therefore in the paper there are presented two types of TDDN's: Focused Time-Delay Neural Networks (FTDNN) and Distributed Time-Delay Neural Networks (DTDNN) respectively, and one RNN: the Layer-Recurrent Neural Network (LRNN). There are also presented the phoneme classification experiments and the results for the two databases. Finally some conclusions are drawn based on the experimental results.

Inequalities and Subclasses of Analytic Functions in the Complex Unit Disc

Eugen Drăghici

Let $\Delta$ be the complex unit disc and $A$ the class of all analytic functions $f \in \Delta$, which satisfy the conditions $f(0) = f'(0) - 1 = 0$. In the paper we will find some inequalities concerning expressions of $f \in A$ and of some of its derivatives (such as: $\text{Re}\sqrt{f'(z)}$, $\text{Re}zf'(z)/f(z)$ and others, more general) in the case when $f$ has certain geometric properties (such as: $f$ is uniformly convex, $f$ is quasi-uniformly starlike, $f$ is starlike).

AMS subject classification (2001): 30C45
Keywords: starlike function, convex function, uniformly starlike function, uniformly convex function, quasi-uniformly starlike function.