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Conclusions and Further Scope for Research Work
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Artificial Neural Network (ANN) is an important tool for solving many complex problems. In the recent past this tool has been widely used in the field of telecommunication, geophysics, instrumentation and financial forecasting. The ANN is an adaptive technique which suits extremely well for the Digital Signal Processing (DSP) problems. In the present thesis we have provided an overview of various ANNs and the associated learning algorithms. The inherent non-linearity and the distributed processing structure associated with the neural networks help in solving complex DSP problems.

In this thesis we have developed ANN model to compute log and antilog of decimal numbers. This simple problem has been undertaken to show the modeling capability of ANN structure. A generalized transform model has been proposed which can compute the DFT, DHT and DWT of a set of input values. An inverse transform model has also been proposed to compute the inverse DFT, DHT and DWT values. It has been shown that the true and the predicted forward transform and inverse transform values obtained form this model match quite well. The computation of the convolution and deconvolution finds extensive applications in many areas. There are two types of convolvers such as linear and circular convolvers used in practice. Adaptive model has been developed to compute both convolution and deconvolution of linear and circular types. The performance of this model has been assessed by comparing the predicted outputs with the ideal convolution and deconvolution outputs. It is in general observed that the proposed model can accurately act a convolver and deconvolver. Because of the inherent non-linearity of the neural network, ANN is suitable for non-linear system identification. We have developed a generalized ANN model which is capable of identifying different static non-linear systems.
To test the efficiency of this model different non-linear systems have been used and it is observed that the response of the proposed model in close agreement with ideal response obtained from each of the non-linear systems. Channel equalization is another important DSP problem which is used in communication. The channel equalization is viewed as an inverse model of the channel filter. An ANN structure has been proposed to act as an equalizer of the digital channel. The channel considered here is basically non-linear in nature. The performance of the equalizer has been studied for different non-linear channels and under different noise conditions. The convergence characteristics and the bit error rates (BER) have been obtained for each channel. The performance reveals that the ANN based equalizer is well suited for non-linear channels.

**Scope for further work**

There are many other DSP problems which can be investigated using ANN technique. For example, in mobile telephone, multipath possesses severe problems. For compensating the multipath effect, efficient ANN based equalizers can be designed. This study can also be extended to equalization of non-stationary and complex channels. The ANN technique can also be applied to data compression which can be used for ISDN applications. For image restoration, enhancement and coding, ANN can be conveniently applied.

Thus it can be concluded that ANN is an important tool for DSP applications and has a potential future.