Chen, Li-Woei; **Jou, Yue-Dar**; **Huang, Jian-Kai**; **Hao, Shu-Sheng**
Design of IIR all-pass filters using a neural-based learning algorithm. (English) Zbl 1358.94022
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Summary: Least-squares design of infinite impulse response all-pass filter can be formulated as an eigenvector solving problem based on the Rayleigh principle. The eigenfilter is designed by solving a single eigenvector corresponding to the smallest eigenvalue of a real, symmetric, and positive-definite matrix. This paper proposes a minor component analysis-based neural learning algorithm for designing eigenfilter. By appropriately mapping the associated all-pass filter specifications to the simple neural model enables the filter coefficients to be derived from the neural weights. The neural weights eventually approach the optimal filter coefficients of the eigenfilter when the neural model achieves convergence. The proposed neural learning algorithm is demonstrated from simulation results to converge rapidly and achieve accurate performance of eigenfilter design.

MSC:

94A12 Signal theory (characterization, reconstruction, filtering, etc.)
68T05 Learning and adaptive systems in artificial intelligence

Keywords:

all-pass; eigenfilter; infinite impulse response; minor component analysis

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