Quadrature Mirror Filter Bank Design Using Population Based Stochastic Optimization

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Abstract : The paper deals with the optimal design of two-channel linear-phase (LP) quadrature mirror filter (QMF) banks using a metaheuristic based optimization technique. Based on the theory of two-channel QMF banks using two recursive digital all-pass filters (DAFs), the design problem is appropriately formulated to result in an objective function which is a weighted sum of the group delay error of the designed QMF bank and the magnitude response error of the designed low-pass analysis filter. Through a frequency sampling and a weighted least squares approach, the optimization problem of the objective function can be solved by utilizing a particle swarm optimization algorithm. The resulting two-channel QMF banks can possess approximately LP response without magnitude distortion. Simulation results are presented for illustration and comparison.