Abstract

Digital filter is mathematical algorithm that operates on discrete time signals. Different optimization algorithms can be utilized to determine the impulse response of coefficient of such a filter. Optimization problems for the design of digital filters are often complex, highly nonlinear, and multimodal in nature. The problems usually exhibit many local minima. Ideally, the optimization method should lead to the global optimum of the objective function with minimum amount of computation. Classical optimization methods are generally fast and efficient, and have been found to work reasonably well for the design of digital filters. These methods are very good in locating local minima. Therefore, they tend to locate minima in the locale of the initialization point. In recent years, a variety of algorithms have been proposed for global optimization including stochastic or heuristic algorithms; one such technique is Differential Evolution (DE). This paper presents an efficient DE based optimization technique for designing digital IIR filter by solving constrained multivariable optimization problem, to optimize the magnitude response of digital filters employing stability constraints using DE with opposition based strategy.
Optimal IIR Filter Design using Differential Evolution Algorithm


Index Terms

Computer Science
Algorithms
Keywords

IIR Filter design  magnitude error (norm approximation error)  Differential evolution Algorithm.