

This paper proposes a new recursive implementation of the Gaussian filter. Previous recursive implementations of the Gaussian filter suffer from one or several drawbacks. Some methods require employment of both causal and anti-causal filters. Implementing such filters requires both forward and backward recursions, and thus, significant amounts of memory, in the case of long sequences, to store and combine both recursion results. Moreover, most existing techniques do not ensure that the sum of impulse response weights equals unity, or that the standard deviation of the filter is exactly the desired one. The proposed technique is based on a recursive implementation of cosine-based finite impulse response filters and only requires forward recursions. The sum of filter weights and the standard deviation of the filter are constrained to the desired values during the design process. Experimental results confirm that the proposed filter provides a more suitable tradeoff between computational efficiency and filtering accuracy compared to existing recursive implementations. The performance and advantages of the proposed filter are demonstrated on signal and image processing examples.