Modify Additive Lee's Filter for Filtering images Corrupted by Film Grain Noise

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Abstract

In many image– processing applications the noise corrupts the image is signal dependent, the most widely encountered types being multiplicative such as film grain noise. Their common feature is that the power of the noise is related to the brightness of the corrupted pixel. This results in brighter areas appearing to be noisier than darker areas. In this paper, we introduce modify additive noise Lee's filter for filtering images corrupted by signal dependent film-grain noise.

This by assuming that the noise variance not constant over the whole image regions, and can be estimated locally. Results of Modify Lee's filter are compared with the multiplicative versions Lee's filter standard, both in terms of subjective and objective measures. The modify Lee's filter provides better noise suppression as indicated by lower normalize mean square error in homogenous image regions and edge regions than the standard Lee's filter.

Key Word: (Digital filter, Noise Reduction, Smoothing, Film-Grain, Lee's Filter)

الخلاصة:

في الكثير من تطبيقات معالجة الصورة الرقمية ،تكون الضوضاء المشوبة للصور ضوضاء معتمدة على الأشارة، كما في ضوضاء حبيبة الفيلم ومن الصفات الشائعة لهذه الضوضاء تكون المناطق البراقة من الصورة ذات ضوضاء عالية. تم في هذه الدراسة تطوير مرشح ليي لترشيح الصور المشوبة بضوضاء حبيبة الفيلم، وذلك على أفتراض ان تغاير الضوضاء يتغير عبر مناطق الصورة، ويمكن تقديره موضعيا. تم مقارنة نتائج مرشح ليي المستحدث مع مرشح ليي الاعتيادي (الضربي) وذلك بأعتماد مقاييس نظرية وعملية، وقد أظهرت النتائج كفاءة مرشح ليي المستحدث حيث انه يعطي أقل معدل خطأ في المناطق المتجانسة والحافات في الصورة مقارنة مع مرشح ليي الضربي.

1. Introduction

For many image denoiseing applications it is commonly assumed that the dominant noise is additive and its probability density function (PDF) is Gaussian [1]. But for microwave radar imagery (Synthetic Aperture Radar SAR), associated noise are speckle noise or coherent noise that always modeled as multiplicative noise.The PDF of the noise can be either considered Gaussian or non Gaussian depending on the radar type and its characteristics[3,4]. Image scanned from photographic or some medical images are other examples where additive gaussion noise model fails [6, 7].

Smoothing filter methods can be classified into two types. Firstly; the traditional filters such as (mean, median...etc.)Filter. These traditional filters efficiently operated in homogenous regions, but that introduce sever blurring in edge image regions. Secondly; the optimal filters, represent the filters that preserve relevant features, and edge, and highly smooth the homogenous image regions. The adaptive optimal filters, take into consideration image model and local image statistics, see [6, 7]. Some of these filters are: