

基于模糊推理的图像椒盐噪声自适应滤波算法

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摘要: 为了解决图像椒盐噪声的滤除和图像细节保护这一矛盾问题, 利用模糊推理系统提出了一种新的细节保护滤波算法---自适应模糊方向中值滤波算法. 主要技术包括对图像像素的模糊划分, 噪声图的构建以及自适应滤波的噪声滤除方式. 在滤波过程中通过计算方向指数和平均偏差来建立用于创建噪声图的模糊隶属函数, 对划分为标签 1 和标签 2 的噪声点, 根据其方向指数值与自适应阈值的相对大小关系, 算法自动选择执行中值滤波或特定方向上的中值滤波. 仿真实验表明, 该算法在滤波效果和细节保护能力上都可以得到满意的结果.
关键词: 细节保护; 方向指数; 椒盐噪声; 模糊隶属函数; 噪声图; 中值滤波

Image Salt and Pepper Noise Adaptive Filtering Algorithm Based on Fuzzy Reasoning

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Abstract: In order to tackle conflicting issues of image salt and pepper noise smoothing and image detail preservation, a new detail protection filter algorithm --- Adaptive Fuzzy Directional Median (AFDM) filter algorithm is proposed based on fuzzy reasoning system. The main techniques include fuzzy partitioning of image pixels, construction of noise map, and noise filtering of adaptive filtering. In the process of filtering, the fuzzy membership function for creating the noise map is established by calculating the direction index and the mean deviation. For the noise pixels divided into labels 1 and 2, according to the relative relationship between the direction index and the adaptive threshold, the algorithm automatically selects to perform median filtering or median filtering in a particular direction. The simulation results show that the algorithm can get satisfactory results in filtering effect and detail preservation ability.
Key words: detail preservation; direction index; salt and pepper noise; fuzzy membership function; noise map; median filter

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