1. **An iterative reconstruction algorithm for unsupervised PET image**

Wang S, Liu B, Xie F, Chai L. An iterative reconstruction algorithm for unsupervised PET image. Phys Med Biol. 2024;69(5):10.1088/1361-6560/ad2882. Published 2024 Feb 27. doi:10.1088/1361-6560/ad2882They develop am iterative reconstruction

* Algorithm which integrates the deep image prior (DIP) framework, which only needs the prior information (e.g. MRI) and sinogram data of patients.

1. **MRI brain tumor detection using optimal possibilistic fuzzy C‐means clustering algorithm and adaptive k‐nearest neighbor classifier**

Kumar, D.M., Satyanarayana, D. & Prasad, M.N.G. MRI brain tumor detection using optimal possibilistic fuzzy C-means clustering algorithm and adaptive k-nearest neighbor classifier. J Ambient Intell Human Comput 12, 2867–2880 (2021). <https://doi.org/10.1007/s12652-020-02444-7>

* Automatic MRI brain tumor classification system.
* Texture features are extracted from the pre-processed image. After the feature extraction process, the features are given to the adaptive k-nearest neighbor classifier to classify an image as normal or abnormal. Later, the tumor regions are segmented with the help of the optimal possibilistic fuzzy C-means clustering algorithm.

1. Medical image fusion based on sparse representation and neighbor energy activity,

Xiaosong Li, Weijun Wan, Fuqiang Zhou, Xiaoqi Cheng, Yuchan Jie, Haishu Tan,

Biomedical Signal Processing and Control,

Volume 80, Part 2,

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104353,

ISSN 1746-8094,

https://doi.org/10.1016/j.bspc.2022.104353.

(<https://www.sciencedirect.com/science/article/pii/S1746809422008072>)

Interesting overview of the fusion software technique

Abstract: Medical image fusion has become popular in recent years. The fused image can provide a more objective and comprehensive description of lesions and has significant clinical medical aid potential. In this paper, we propose a novel medical image fusion method based on sparse representation and neighbor energy activity that improves the quality of fused images and preserves key information in the source images, such as details, brightness, and color. The proposed method divides the source image into base and detail layers and adopts sparse representation to fuse the base layers. Further, a neighbor energy activity operator that effectively captures the changing features in the detail layers is utilized. The fused result is obtained by combining the selective layers. The proposed method is applicable to both grayscale and color image fusion problems. In experiments, ten sets of medical images were used as test images. The images included seven different diseases and one normal cranial image and covered five different fusion types: CT/T2, Gad/T2, PET/T1, PET/T2, and SPECT/T2. Further, it was compared with 11 state-of-the-art fusion algorithms, with six highly recognized metrics used for quantitative evaluation. The experimental results indicated that the proposed method outperformed several of the state-of-the-art methods in visual and objective evaluations. Additionally, in experiments conducted to medically analyze the fused images with eight different lesion conditions in the fused images, the fusion results were found to be practicable for medical assistance in actual clinics.

Keywords: Multimodal medical image fusion; Sparse representation; Neighbor energy activity; Medical aid

Other paper from main author: <https://www.sciencedirect.com/science/article/pii/S0950705121003506?via%3Dihub>

<https://github.com/lxs6/Image_fusion_denoising?tab=readme-ov-file>

1. Multimodal medical image fusion using adaptive co-occurrence filter-based decomposition optimization model

Rui Zhu, Xiongfei Li, Sa Huang, Xiaoli Zhang, Multimodal medical image fusion using adaptive co-occurrence filter-based decomposition optimization model, *Bioinformatics*, Volume 38, Issue 3, February 2022, Pages 818–826, <https://doi.org/10.1093/bioinformatics/btab721>

<https://github.com/zhunui/acof>

Algorithm to improve quality of fused image.

1. Local extreme map guided multi-modal brain image fusion

Zhang, Yu et al. “Local extreme map guided multi-modal brain image fusion.” *Frontiers in neuroscience* vol. 16 1055451. 28 Oct. 2022, doi:10.3389/fnins.2022.1055451

<https://github.com/uzeful/LEGFF/blob/main/Main.m>

Quite simple algorithm in MATLAB to fuse PET-MRI, SPECT-MRI, 3CT-MRI, infrared and visual images, and multi-focus images

The paper was building diffusion atlas from EPI images. Is it an image format you are interest in? They post-processed