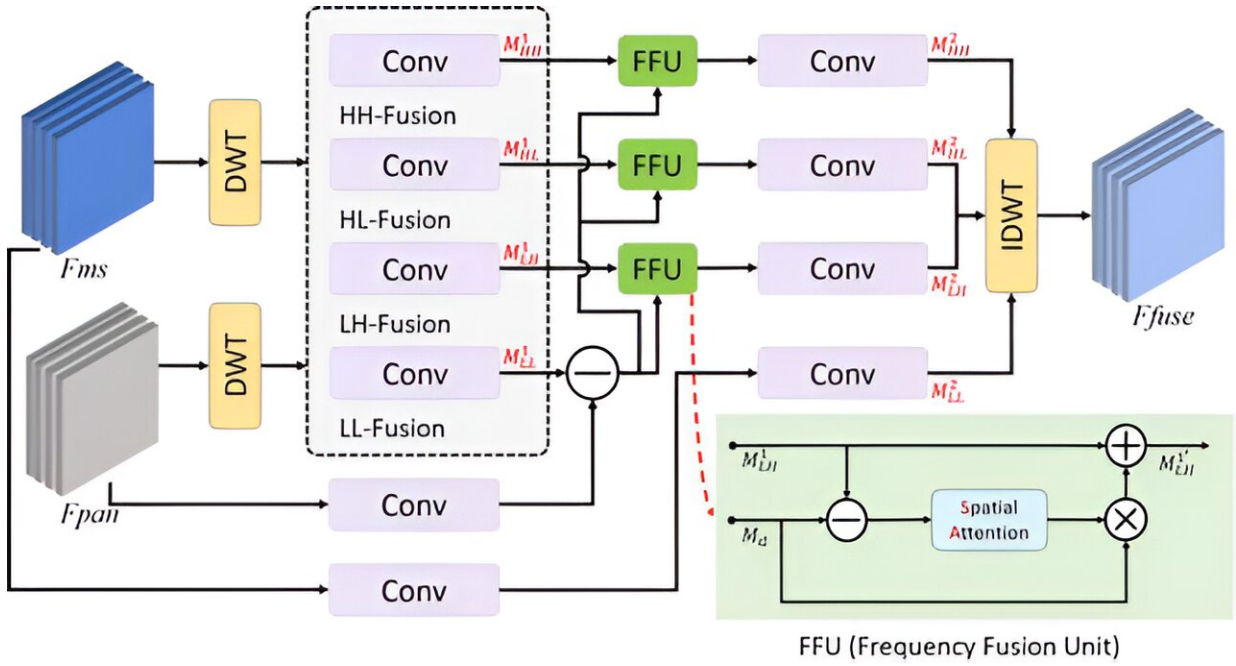
Pan-sharpening methodology enhances remote sensing images

March 18 2024, by Zhang Nannan



High-frequency enhancement block structure. Credit: Zhang Jie

Researchers led by Prof. Xie Chengjun and Assoc. Prof. Zhang Jie from the Hefei Institutes of Physical Science of the Chinese Academy of Sciences have introduced an innovative pan-sharpening method to improve remote sensing images.

Their results were published in *IEEE Transactions on Geoscience and*

Remote Sensing.

Pan-sharpening is an important technique in multi-source remote sensing image fusion that addresses the limitations between spatial and spectral resolution in optical remote sensing satellites. However, current spatial-domain-based pan-sharpening techniques face challenges in accurately recovering complex image textures, while frequency-domain approaches struggle to establish effective interactions with the spatial domains, thus affecting the overall quality of the generated images.

In this study, the researchers introduced a novel pan-sharpening method based on the enhancement of high-frequency wavelet information.

They took advantage of the complicated interaction of spatial frequencies as well as the frequency division capabilities inherent in wavelet transform and achieved efficient image fusion by integrating two key modules: a wavelet-inspired fusion block and a high-frequency enhancement block.

This method demonstrates outstanding performance through extensive experimentation on several publicly available datasets, including World View-II and World View-III. It performed particularly well in terms of peak signal-to-noise ratio and structural similarity.

This study provides new insights into the field of remote sensing image processing, demonstrating the effectiveness of integrating wavelet transforms into neural networks.

More information: Jie Zhang et al, Pan-Sharpening With Wavelet-Enhanced High-Frequency Information, *IEEE Transactions on Geoscience and Remote Sensing* (2024). DOI:

10.1109/TGRS.2024.3367165

Provided by Chinese Academy of Sciences

Citation: Pan-sharpening methodology enhances remote sensing images (2024, March 18) retrieved 8 May 2024 from https://techxplore.com/news/2024-03-pan-sharpening-methodology-remote-images.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.