PAN FUSION

FUSING MULTISPECTRAL IMAGE AND PAN IMAGE USING RGB-HSI METHOD

GNR607 PROJECT PRESENTATION

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INTRODUCTION

Remote sensing technology is widely used for Earth observation, providing valuable data for various applications like agriculture, urban planning, and environmental monitoring.

Image Fusion: Combining the high-resolution panchromatic (PAN) image with multispectral (MS) image to enhance spatial and spectral resolution.

Purpose of the Project: To explore the RGB-HSI method for fusing PAN and MS images to improve image quality.

PROBLEM STATEMENT

- **Problem:** Multispectral images often have lower spatial resolution compared to panchromatic images.
- **Objective:** To create a method that fuses PAN and MS images to improve spatial resolution without compromising spectral integrity.
- **Method Used:** Using the RGB-HSI color model for image fusion that incorporates both spectral information and spatial details.

METHODOLOGY - RGB-HSI FUSION TECHNIQUE

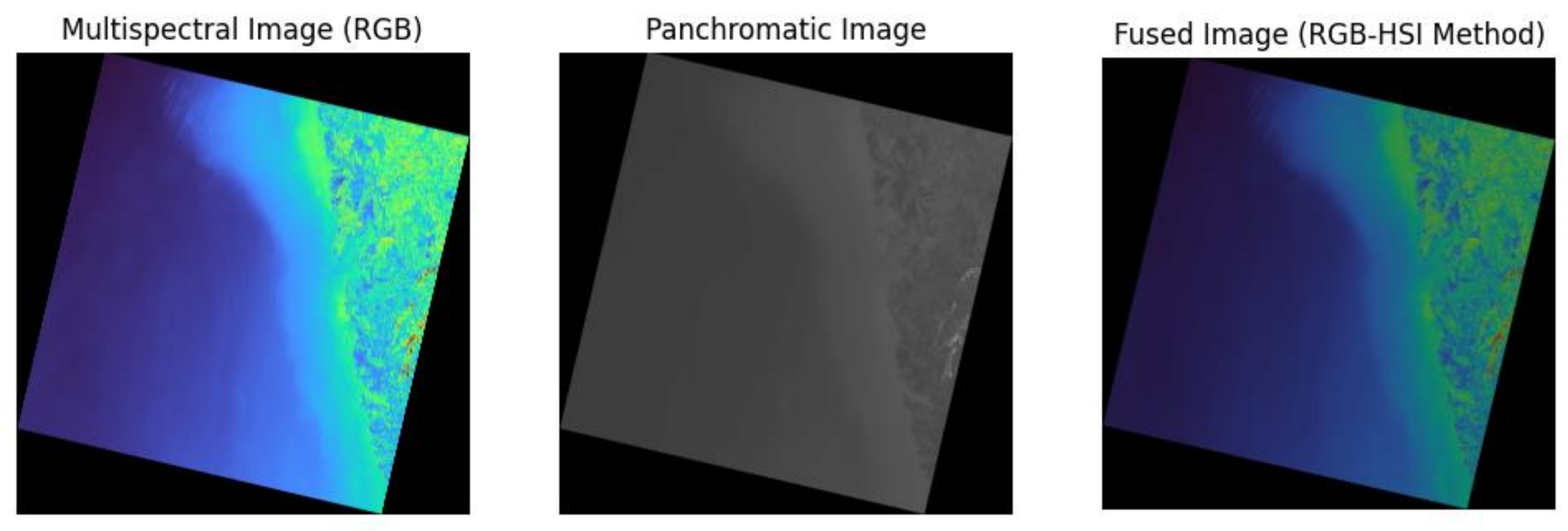
Content:

- **RGB to HSI Conversion**: Multispectral images are first converted from RGB to the HSI (Hue, Saturation, Intensity) color space.
  - **Hue (H)**: Represents the color information.
  - **Saturation (S)**: Describes the color intensity.
  - **Intensity (I)**: Represents the brightness.
- Panchromatic Image Integration: The PAN image replaces the intensity channel (I) in the HSI space.
- HSI to RGB Conversion: The fused HSI data is then converted back into RGB, creating the final fused image.

STEPS INVOLVED IN THERGB -HSI FUSION PROCESS

Content:

- Step 1: Dataset collection and processing
- Step 2: Converting the multispectral image to HSI.
- Step 3: Replace the intensity channel in HSI with the PAN image.
- Step 4: Reconstruct the image by converting the modified HSI back to RGB.



CODE IMPLEMENTATION

- Python Libraries Used:
- OpenCV for image reading and conversion .
- NumPy for matrix operations.
- Matplotlib for visualizing the images.
- Key Functions:
- rgb_to_hsi(): Converts RGB image to HSI.
- hsi_to_rgb(): Converts HSI back to RGB.
- fuse_images(): Main function to fuse MS and PAN images.
- Challenges: Memory management and large image size.

CONCLUSION

The RGB-HSI fusion method effectively enhances the spatial resolution of multispectral images while preserving their spectral content.

Benefits:

- Improved clarity and sharpness in the fused image.
- Useful for applications like land-use classification and change detection.

Limitations:

- The method can be computationally expensive for very large images, and blurring can reduce fine details in certain cases.

RESOURCES USED

QGIS

https://earthexplorer.usgs.gov/

THANK YOU