NDSU | COMPUTER SCIENCE

Capstone 2024

Ground Image Calculation and Display

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galois

Project Overview

What: Web-based application for the processing & display of vegetation imagery

Why:

- NDVI provides information about vegetation health
- Proof of concept of Model Based Systems Engineering for US Air Force

Model Based Systems Engineering

System component inputs & outputs are defined for integration with other components, rather than defining implementation requirements

What is Normalized Difference Vegetation Index (NDVI) ?

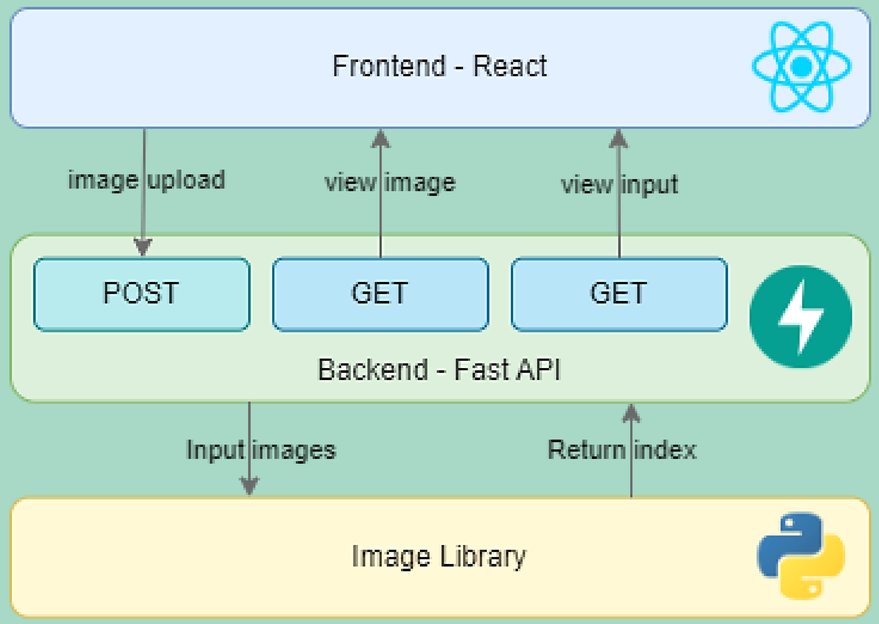
Ratio between red & near-infrared wavelengths

$$\text{NDVI} = \frac{\text{NIR} - \text{Red}}{\text{NIR} + \text{Red}}$$

Healthy vegetation absorbs most red light & reflects most near-infrared (NIR) light. This contrast can be used to gauge general vegetation health.

RGB NIR NDVI

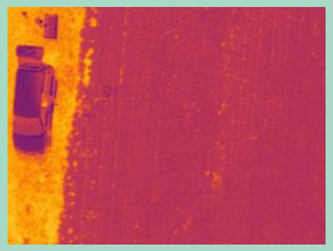
Architecture



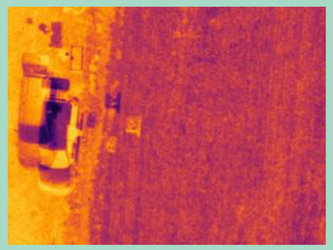
Alignment Challenge

- Physical separation of sensors on camera creates image alignment issues
- Used OpenCV to align images

MicaSense RedEdge-P



Aligned



Unaligned

Features

1. **Bulk Or Single Upload**
2. **Custom Colormaps**
   - User-definable colors & threshold values
   - Reusable
3. **Image Display**
   - Drag & zoom capabilities
   - Switch between viewing calculated index, RGB, B, G, R, NIR
4. **Image Alignment**
5. **Calculation Of NDVI**
   - Also supports other vegetation indices: SAVI, BAI, VARI

Server-based