

Smart Farming With Multispectral Imaging

Problem Statement:

Our main goal is to optimise the crop yield with minimising resource and environmental impact. Traditional methods of monitoring crop health are time consuming and inaccurate, not practical for large farms. To address these issues, we aim to implement smart farming techniques utilising multispectral imaging for cotton crops. Specifically, our motive is to develop an analysis system capable of assessing vegetation cover, crop growth, disease prevalence, and weed infestation. Furthermore, we seek to compare and analyse data captured at different stages of the cotton growth cycle to better understand the growth and effectiveness of the management practices.

Update of our Progress:

As of now, we have gone through a few papers and articles to understand the reflectance of different light wavelengths based on plant health conditions. For example, healthy plants reflect a smaller quantity of red light but a larger amount of near-infrared light (which humans can't detect, but multispectral imaging can), whereas the opposite is true for stressed or dead plants. Having gone through the papers, we have computed some vegetation indices like NDVI (Normalised Difference Vegetation Index) and NDRE (Normalised Difference Red Edge Index). We've also created visual representations of these indices, aiding in spatial analysis of vegetation health across farms.

Future Goals:

- ◆ Going forward we want to explore more vegetation indices, understand their significance and role in helping farmers to take necessary actions on their crops.
- ◆ Using image segmentation to effectively segment the areas where the growth is under stress to help farmers in effectively handling resources and time.
- ◆ We plan to compare the crop conditions at different instances during the plant's growth cycle using time series data to analyse the effectiveness of management practices.
- ◆ At last, we wish to deploy the work we have done on the website to facilitate farmers in making informed decisions based on the data provided.

Note: Please refer the Github repo below for the references and the code

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