***HyperGix***

Building a User-Friendly, Open Source Hyperspectral Imagery Analysis Application From Scratch

Master's Project

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## Abstract

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## 1. Introduction

Spectral imaging is the art and science of capturing electromagnetic (EM) information across the EM spectrum. This spectrum includes visible light, but also infrared, ultraviolet, microwaves, x-rays, gamma rays and radio waves. Wave type is determined simply by its frequency and wavelength. Radio waves are the largest and have the lowest frequency while gamma rays are at the other end of the spectrum with wavelengths as small as atoms. [] All physical objects reflect these waves in different amounts. Plants appear green not because they absorb green light, but because they reject it and reflect it away back towards our eyes. However, human eyes can only see within the visible light spectrum and cannot measure the light reflected in other frequencies without special tools. Spectral imaging was developed to capture and display that type of information, using specialized film or digital sensors sensitive to specific frequencies of interest.

Hyperspectral imaging is a more recent advancement within this field. Rather than capturing light in a few choice frequency ranges, hyperspectral sensors aim to capture reflectance values across a wide and continuous expanse of the EM spectrum – usually beginning with ultraviolet and visible light and expanding to the near infrared and shortwave infrared frequency ranges.

