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Hyperspectral Data Processing Procedure at Ag Alumni Seed Phenotyping Facility (AAPF), Purdue University

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NAPPN Annual Conference Abstract: Hyperspectral Data Processing Procedure at Ag Alumni Seed Phenotyping Facility (AAPF), Purdue University

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Hyperspectral imaging is a non-destructive imaging technique used in plant phenotyping to collect and analyze an array of electromagnetic information in visible (380-700 nm) and near-infrared wavelengths region (700-2,500 nm). Hyperspectral imaging can provide information of plant responses under various biotic and abiotic stress, e.g., drought, temperature rising, disease, and nutrition deficiency. We present a hyperspectral data processing pipeline designed for the data collected at Ag Alumni Seed Phenotyping Facility (AAPF) in Purdue University, USA. The procedure consists of initializing a processing session, radiometric calibration with white and dark references, geometric calibration (registration) of visible and near infrared (VNIR) and short-wave infrared (SWIR) images, vegetation and non-vegetation classification, vegetation indices calculation of a plant area, exporting data products, and quality control. In concern of large data size of hyperspectral data, we highlight the need to save memory usage during computation and save disk space for data products. We also address the need of human interpretable images in the hyperspectral data products for plant scientists without experiences in hyperspectral imaging. We expect the developed procedure could improve robustness of large hyperspectral data processing and promote the usage of hyperspectral data by increasing interpretability.