

Single Crop Phenotyping using Unmanned Aerial System (UAS) Data

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Abstract: Advanced Unmanned Aircraft System (UAS) and sensor technologies are providing a great opportunity to collect super-high-spatial and high-temporal resolution data, to identify individual crop, and to extract plant-level attributes for High Throughput Phenotyping (HTP) for precision agriculture at lower cost. Although various researches have conducted to extract the phenotypic data form UAS, recently, plot-level, which consists of same genotype or treatment, attributes are mainly considered. In this study, we proposed a novel method to extract phenotypic data from UAS data for plant-level phenotyping. UAS data with RGB and multi-spectral sensor collected with high overlap at low altitude over whole growing season. Early season data when crop seeds germinated was used to identify single crop and to draw single crop polygon. The time-series attributes including canopy cover, canopy height, canopy volume, and vegetation indices were extracted for each single plant. The result will show that the proposed UAV-based single crop phenotyping is feasible for advanced crop management and precision agriculture.

Keywords: UAS, Phenotyping, Precision Agriculture