



High Throughput Phenotyping of Carinata via Imagery

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Carinata Phenotyping Traits

- Canopy Height
 - Obtained from overlapping images
- Early Vigor
 - Obtained from plant height and plant width
- Flowering Time
 - Obtained from quantifying yellow color pixels over time
- Lodging
 - Obtained from canopy structure comparisons over time
- Cold Tolerance
 - Obtained from canopy structure comparisons over time with frost events
- Leaf Area Index
 - Correlates with NDVI obtained from multispectral sensors

The Need for High Throughput Phenotyping



High Throughput Phenotyping Methods Overview

- Remote Sensing
 - Unmanned Aerial Vehicles (UAVs)
 - Visual and multispectral cameras
- Proximal Sensing
 - Tractor based imaging
 - Visual and multispectral cameras
- Geographic Information Systems (GIS)
 - Photogrammetry
 - RTK-GPS
- Ground Truthing
 - Tablet computers
 - Barcode scanners

Unmanned Aerial Vehicle Imaging Materials



DJI Matrice 100
1.3kg Max Payload
19-40mins Flight Time



DJI Zenmuse Z3
12MP
4K Video @ 30FPS



SlantRange 3p
4 Spectra
410-950nm

Tractor Mounted Imaging Materials



LeeAgra Avenger
Underframe Clearance 59-84"
Greenstar RTK-GPS Guidance



Sony a6000
24.3MP APS-C Sensor
Can be modified to detect NIR



Video Cameras
5MP
1920P @ 15 FPS

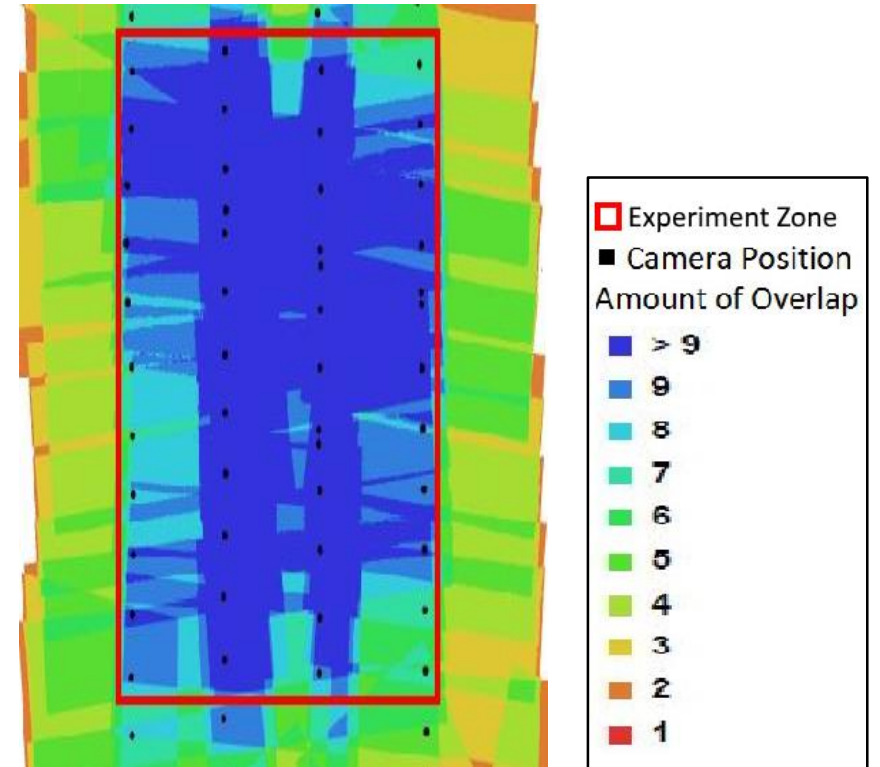
Collecting Imagery for 3D Modeling: Using High Overlap Flight Plan



Imagery Captured via
UAV and visual camera

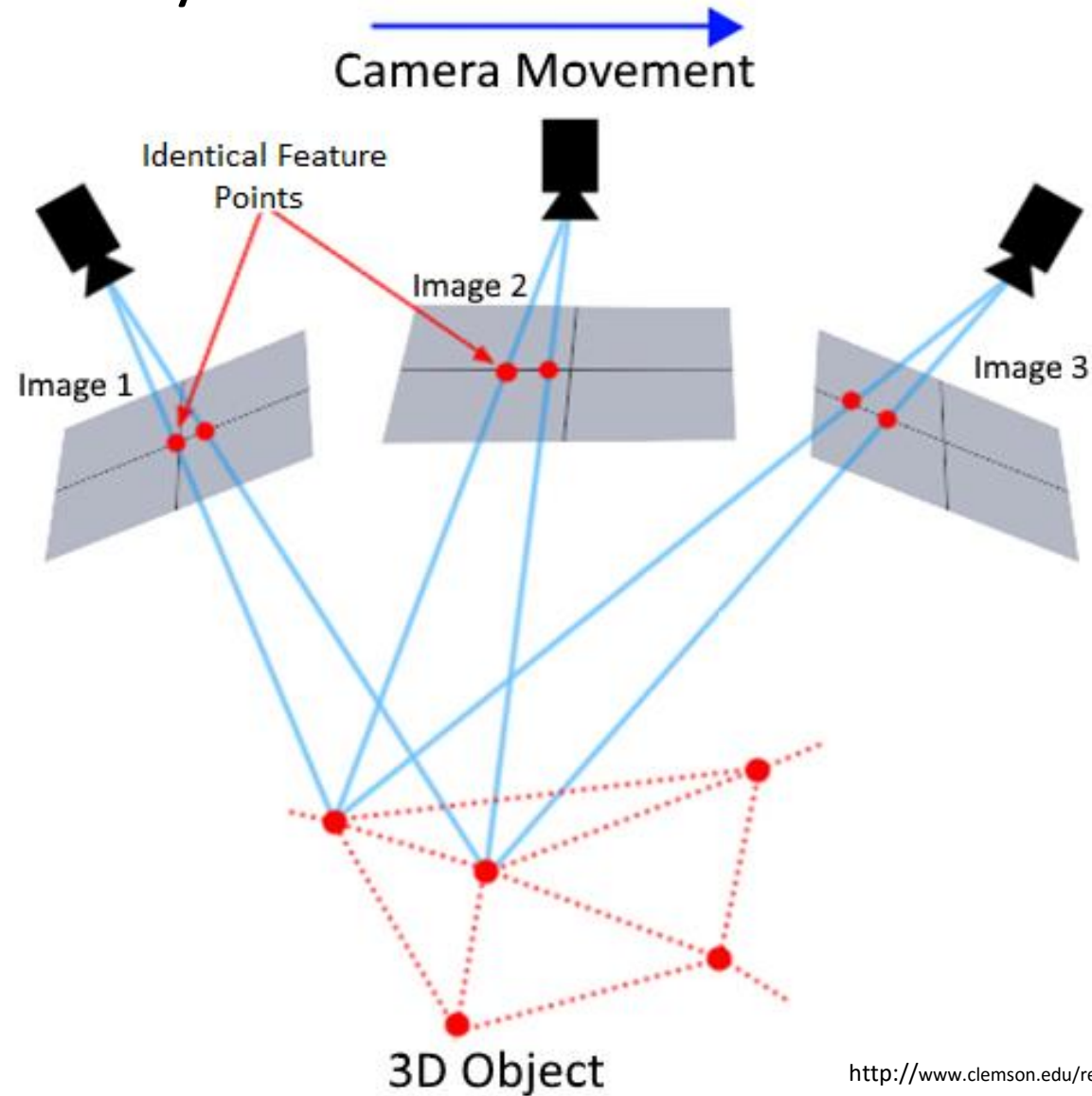


Designed GPS Guided
Flight Path



Resulting Imagery Overlaps

Stereoscopic Vision and Photogrammetry



Preliminary Results

- Using UAV imagery with GPS reference

<https://skfb.ly/6oLvu>

- Using a UAV mounted video camera

<https://skfb.ly/6oUvS>

- Using a ground based cellphone camera

<https://skfb.ly/6o8J9>

- Using ground based cellphone video

<https://skfb.ly/6oET7>

Acknowledgements

