Al solutions in forestry

Monitoring growth and dynamics throughout a full rotation



Establishment Phase Tree Detections

- Point layer
- Stocking layer (summary grid)
- Measure establishment success and assess mortality
- Best used from 8 months up to canopy closure
- Aerial imagery from fixed-wing aircraft captured in RGB + IR at 3.2 – 7 cm

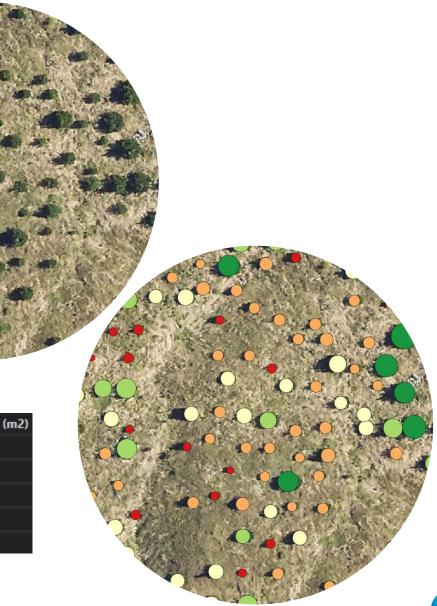




Establishment Phase Early Metrics

- Crown canopy estimate
- Starting from 12 months
- Does not require LiDAR and is more repeatable
- First indicator of NSA and productivity
- Useful tree management solution in the establishment phase identifying:
 - Anomalies/canopy disturbance
 - Variability in growth rates
 - Presence of (weed) competition
 - Drought indicator







Establishment Phase Web App (dashboard)

by forest

by stand

filter by forest filter by stand Tree Detection & Early Stand Analytics Demo average tree height (m) by introduction tree locations trees detected Indufor's Precision Forestry solution uses forest height (m) high-resolution images and artificial intelligence to detect tree locations and generate informative stand analytics. • >2.00 32,943 0 1.51 - 2.00 geraldine_e 0 1.01 - 1.50 These precision layers allow resource 0.51 - 1.00 managers to target management inventions, and track tree and stand 0.01 - 0.50 geraldine_w growth. <0.01 herbert usage Filter by forest(s) and/or stand(s) to update average tree height herbert_s charts and indicators. Zoom to the stand extent to query tree 1.5 m waimate_w height and stocking patterns across the stand. The tree locations layer can also be queried to identify tree height. 1.4 Use the map controls (top right corner of by stand by forest the map interface) to: toggle the legend average SPH by forest change layer visibility average SPH query features change the basemap geraldine_e 472 download geraldine_w 66.1 about For more information, please contact herbert_n is or see our blog to find our latest innovations and developments. trees over stand boundary herbert_s 747 627 waimate w

UNZ, Stats NZ, Esri, HERE, Garmin, USGS | SKYVUW



Operational Phase First Management

- LiDAR becomes more feasible
- Accurate height measurement assigned to individual trees
- Additional measure of productivity
- Useful to modelling:
 - Future potential (resource insights)
 - Carbon estimates
- More efficient and targeted intervention for activities such as thinning

7.613 9.557 9.132 6.732 8 932 9 02 9.022 8.702 7.29 8.198 7 464 9.001 8.949 8.398 9.238 7.296 7.296 9.498 8.334 8.03 7.166 8 041 3.557 7.592 6.123 7.613 7.152 8.761 8.838 7.636 7 958

7.144

9.573 8.295 8.631 10 058 10.55 9.872 9 872 8.369 7.613 6.629 6.732 8.779 8.932 9.132 9.028 9.557 7 29 7.464 9.252 8.8 8.398 9.238 8.334 7.296 8.644 3 557 7.59 7.613 7.152 7.628 7.958 8.159 7.144 4 903 8.362 7.982 7.045 8.907

6.675

10.015

6.572 9.079 ⁸ 6.572 8.399 7.59 6.575

Established Forest Canopy Closure

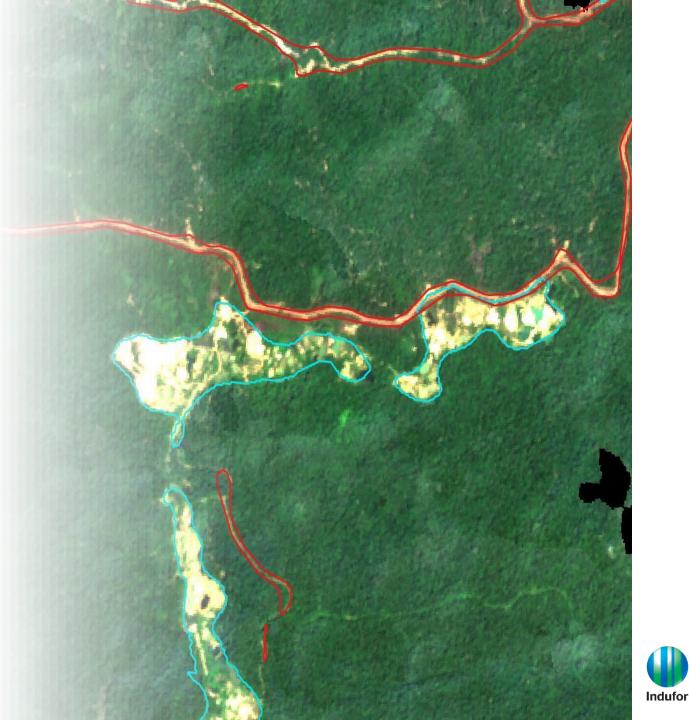
- Transitioning from object detection to area segmentation
 - More informative solution once we reach canopy closure
- Separation of primary species
 - Indigenous versus exotic
- Using aerial imagery to precisely delineate:
 - Forest/stand boundaries
 - Roading and operational (skid) sites
 - Areas of low stocking
 - Gaps
 - And finally harvesting...



Monitoring at Scale Guyana Case Study

- Indufor's long term, national-scale programme in Guyana monitoring deforestation.
- Annual deforestation mapping and reporting requirements over some 18 million square km of rainforest.
- Programme is driven by carbon markets
- Developed working AI solutions using space borne data (Sentinel-2) 10 m resolution satellite data





Summary Applications & Operational Examples

- Al-based solutions offer consistent and repeatable mapping but still require QC
- Some hesitation and pushback from industry but this is slowly changing
- Supporting valuation and due diligence projects
- ETS mapping which is an evolving space globally
- Object segmentation for census work driving modelling and yield forecasting
- National level estimates (Guyana)



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Thank you 😳

