Data-driven Interpretability of Urban Tree Species Classification from Deep Learning Models and Satellite Image Time Series

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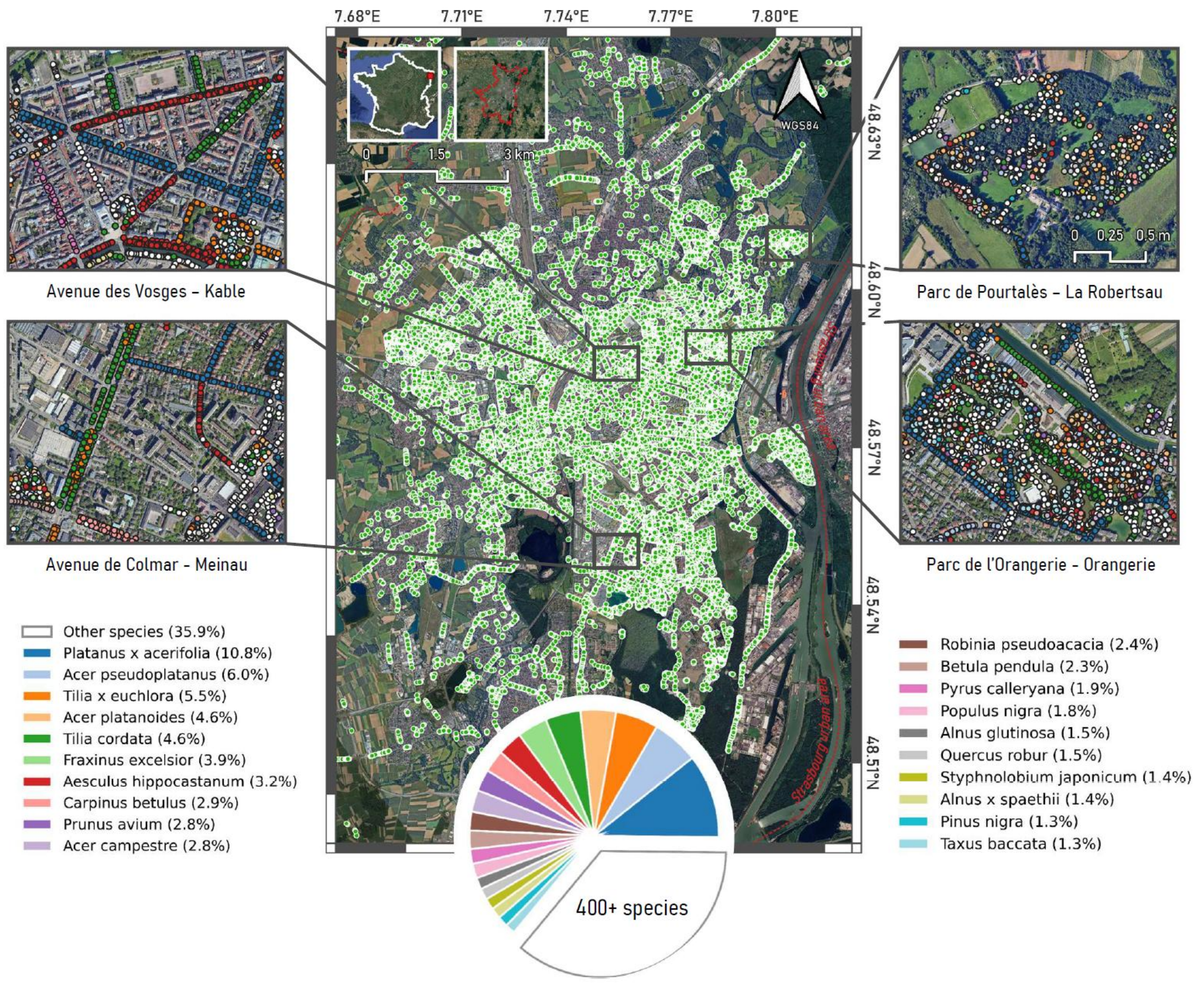
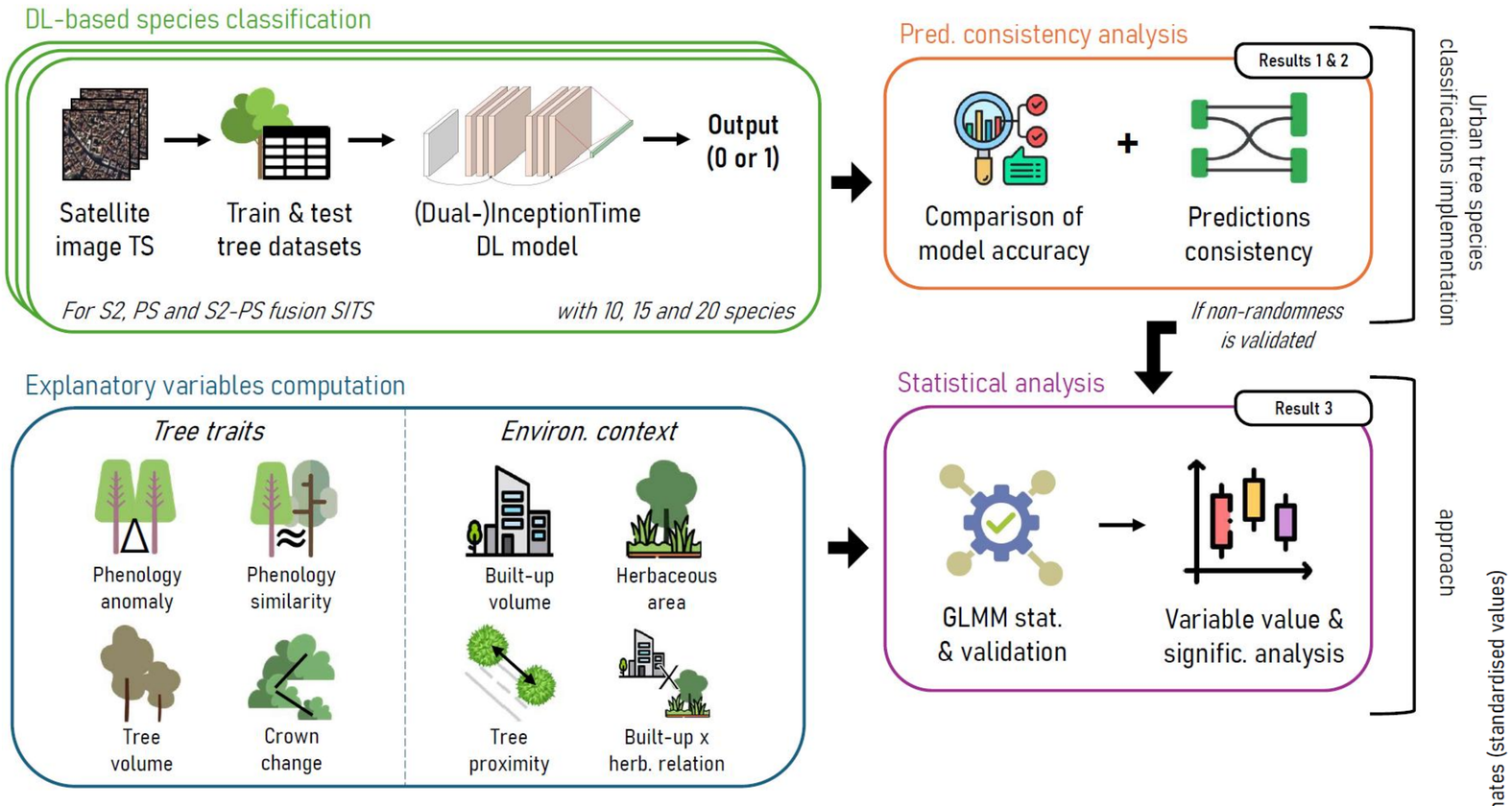


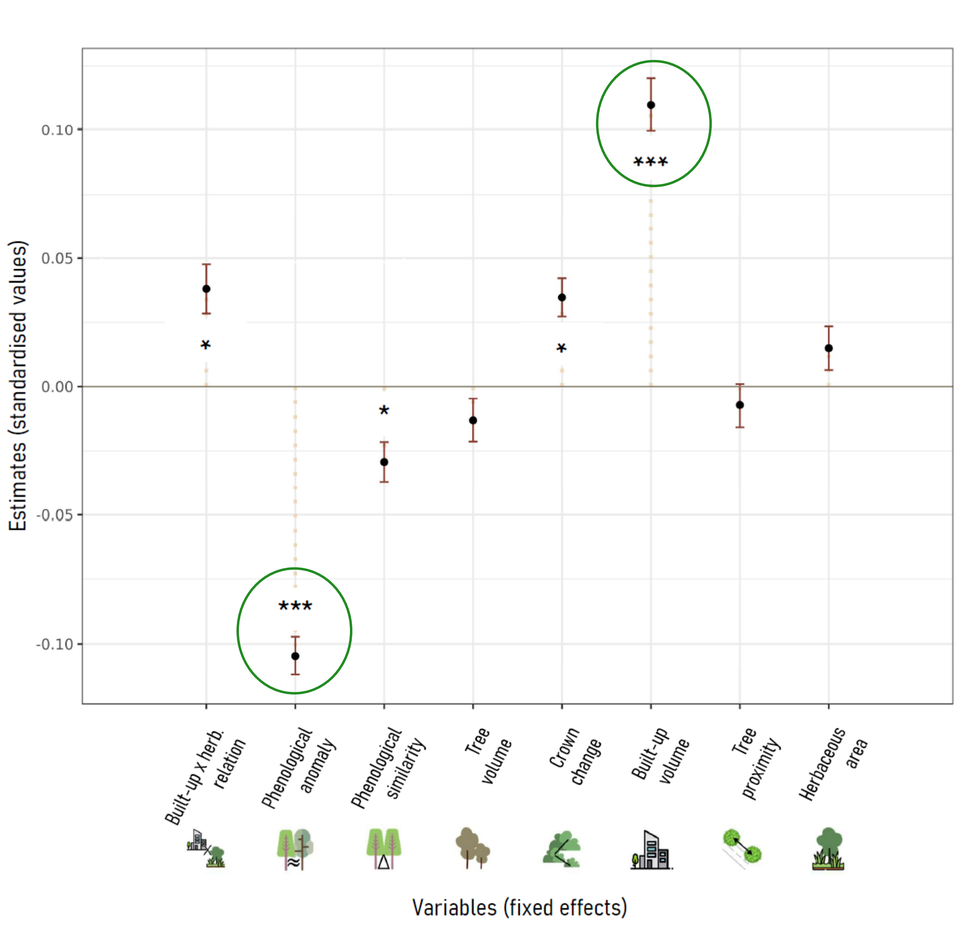
Urban tree species mapping supports biodiversity monitoring, urban forest management and climate resilience. We combine *Sentinel-2* and *PlanetScope* time series with deep learning to classify tree species in Strasbourg and analyse model interpretability.

i. **Can multi-source time series classify urban tree species?**
ii. **What is the benefit of *Sentinel-2* and *PlanetScope* fusion?**
iii. **Are predictions driven by phenology, environmental context, or both?**
iv. **How can interpretability explain model errors?**

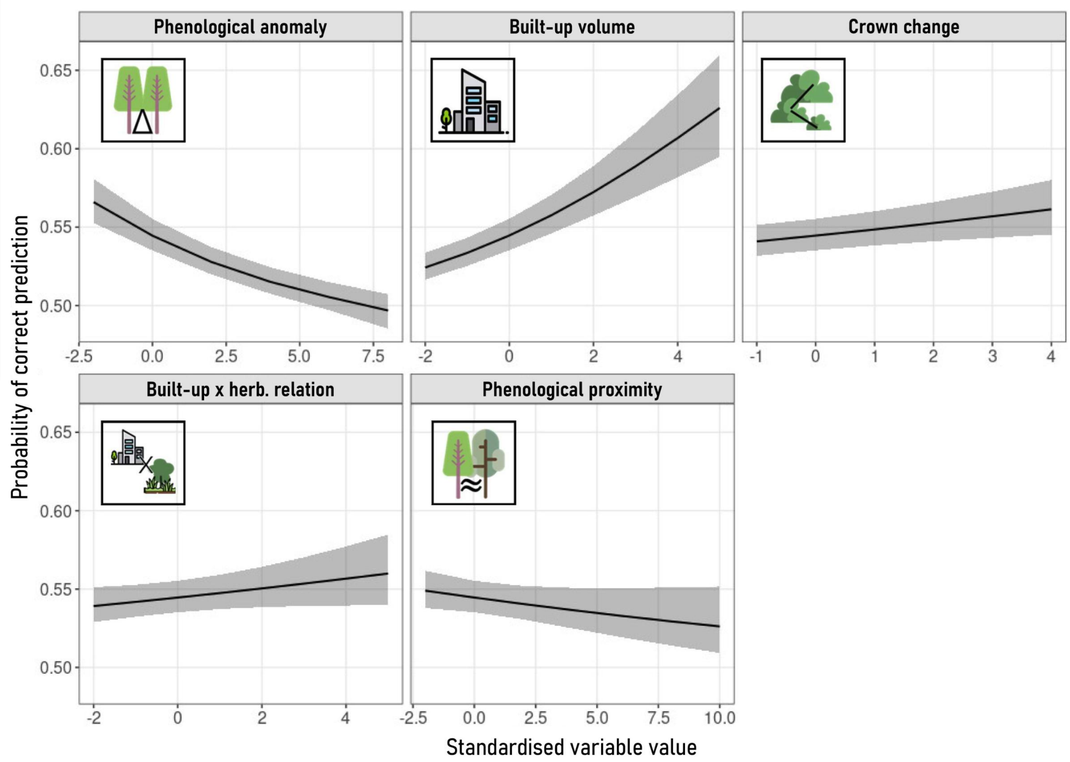


Run encoding	S2 SITS	PS SITS	Number of species	Accuracy*
Dual-InceptionTime-20-S2/PS	✓	✓	20	0.656 ± 0.005
Dual-InceptionTime-15-S2/PS	✓	✓	15	0.691 ± 0.005
Dual-InceptionTime-10-S2/PS	✓	✓	10	0.727 ± 0.004
InceptionTime-20-S2	✓		20	0.603 ± 0.003
InceptionTime-15-S2	✓		15	0.638 ± 0.009
InceptionTime-10-S2	✓		10	0.683 ± 0.003
InceptionTime-20-PS		✓	20	0.615 ± 0.004
InceptionTime-15-PS		✓	15	0.649 ± 0.014
InceptionTime-10-PS		✓	10	0.694 ± 0.006

* average value of 5-fold processes.



Interactive webmap to deepen explore the results



Scan to access the map and the paper!

Map

Paper

Theia

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