Deep learning model accurately predicts tree species from drone imagery

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Introduction

❖ There is a pressing need for data on forest ecosystems, but current methods are limited.

❖ One way to acquire data more rapidly and for larger areas is by combining deep learning and aerial imagery.
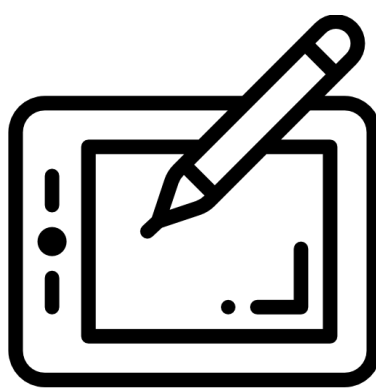
Objective:
Develop a model to map tree species using deep learning and imagery throughout the growing season, specifically the effect of fall colours.
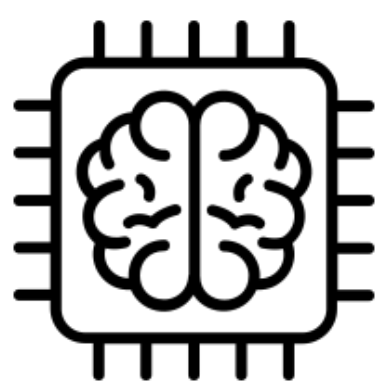
Methods

Imagery acquisition with a UAV from May to October 2021 at the Station de Biologie des Laurentides

Annotation of trees directly on the field by delineating the tree crowns

Training of a deep learning model, specifically a CNN model

Apply the trained CNN to different imagery and map the target classes

Results

Figure 1. Comparison of the annotations done on an orthomosaic to the prediction made by a trained U-Net model. Data from September 2nd 2021. F1-score of 0.53.
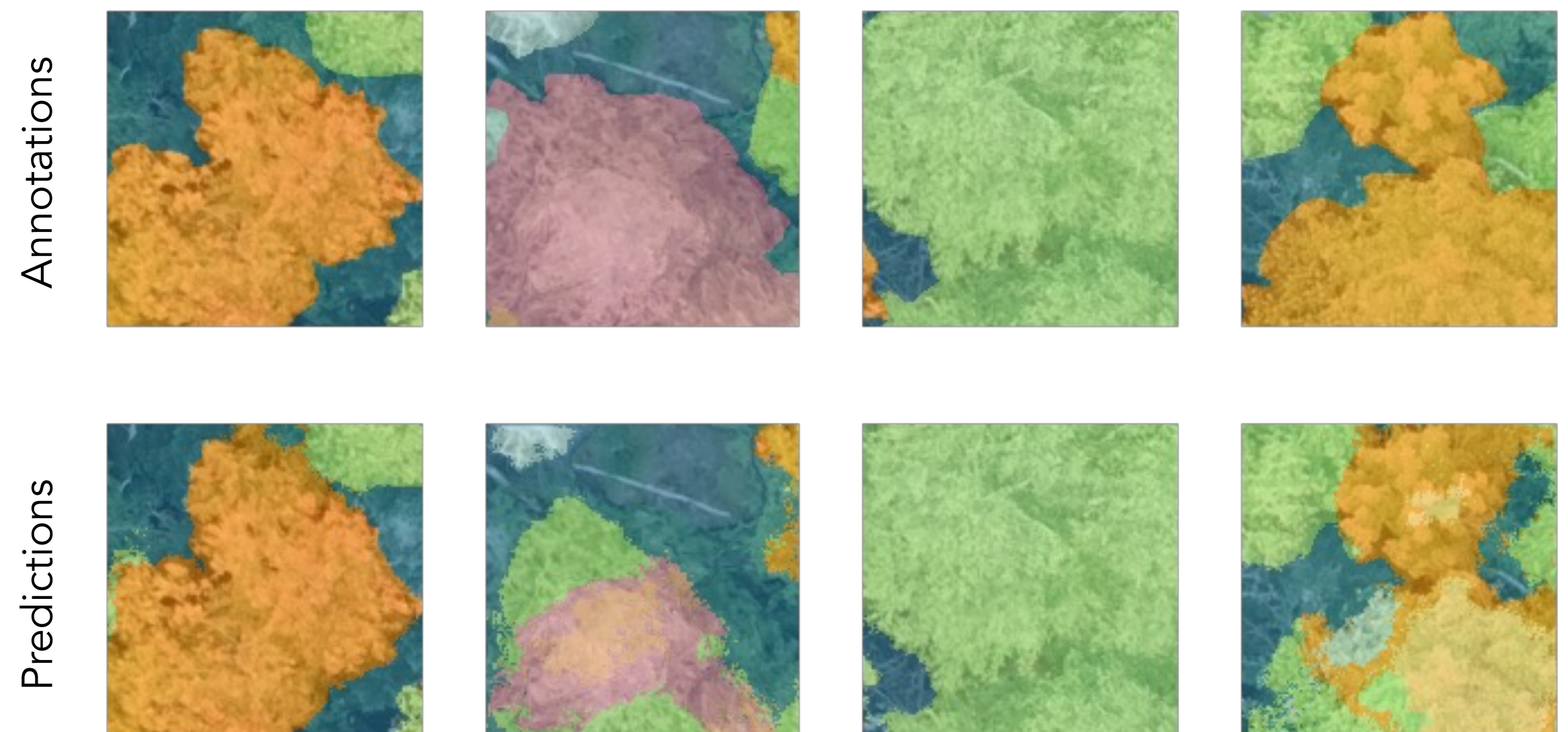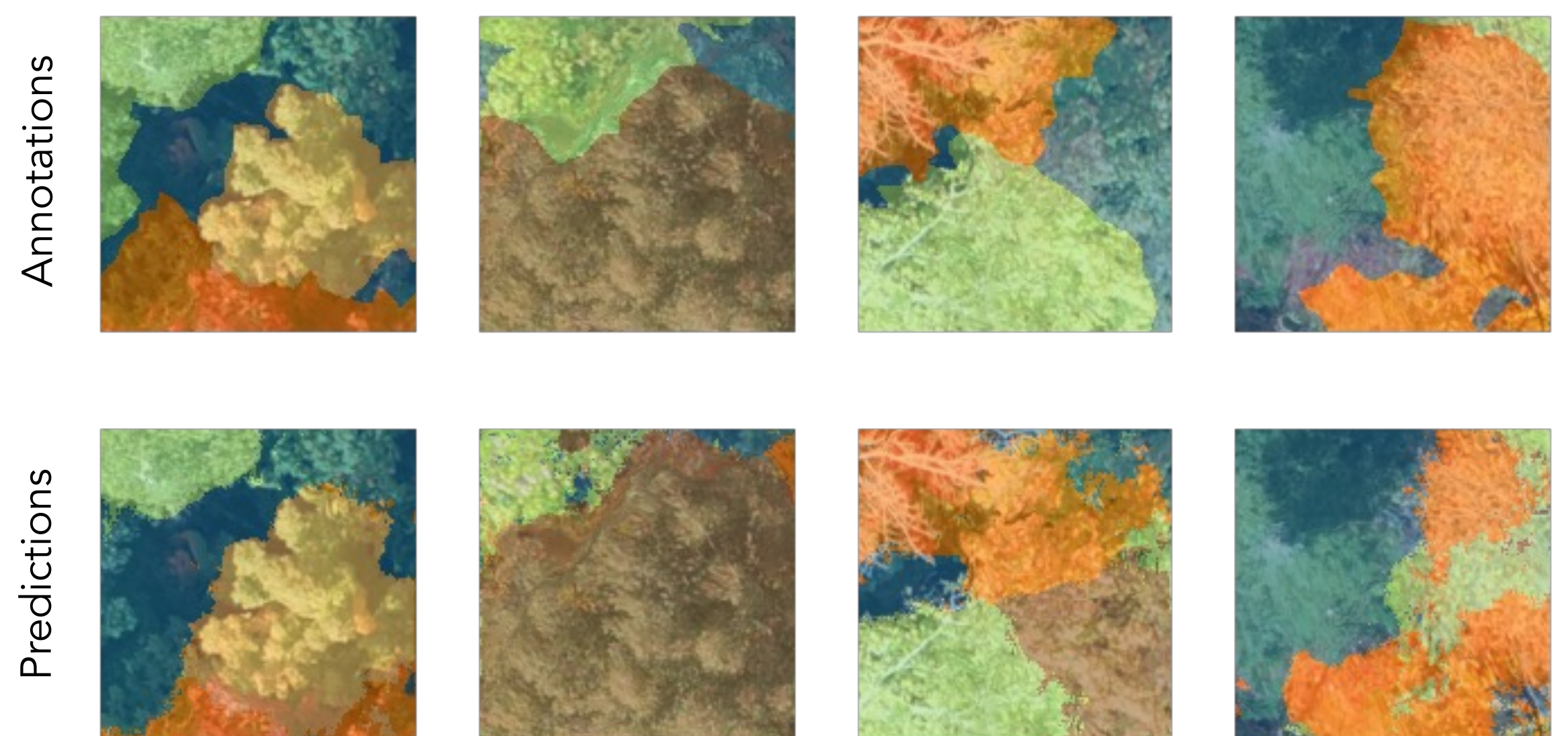

Figure 2. Comparison of the annotations done on an orthomosaic to the prediction made by a trained U-Net model. Data from September 28th 2021. F1-score of 0.47. Lower score possibly due to poorer light conditions.

Conclusions

❖ This type of method has great potential for remote sensing of vegetation and data acquisition.

❖ Imagery from different periods of the growing season contribute different information to the model.

Litterature Cited

Kattenborn, T., Leitloff, J., Schiefer, F., & Hinz, S. (2021). Review on Convolutional Neural Networks (CNN) in Vegetation Remote Sensing. *ISPRS Journal of Photogrammetry and Remote Sensing, 173*, 24–49.

Acknowledgments

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