# Detection of silage bags in the Gran Chaco using deep learning and remote sensing

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## Abstract

Cattle production threatens biodiversity and the functioning of ecosystems in the Gran Chaco. Information from remote sensing on cattle production intensity could guide sustainable land-use planning. In this research, I analysed the potential in deep learning and remote sensing to detect silage bags in the Gran Chaco. I detected silage bags with u-net and random forest. For both algorithms, I compared the accuracy between three sources of image data. The image data came from Sentinel-2, PlanetScope, and a combination of Sentinel-1 and 2. For each source of image data, I also compared the accuracy between u-net and random forest. I measured the accuracy of the detection of silage bags with the intersection-over-union (IoU). U-net with PlanetScope detected silage bags with a high accuracy (IoU=0.86). Random forest with Sentinel-2 and Sentinel-1 and 2 reached a higher accuracy than with PlanetScope. On a separate dataset, u-net and random forest showed a limited suitability for the detection of silage bags. The successful implementation of u-net for the detection of silage bags was limited by missing land-cover elements in the training data and potentially by class imbalance. I could not compare the sources of image data confidently for u-net, due to an instability in the learning of silage bag features. All satellites offer benefits for the detection of silage bags. A sophisticated model training could leverage the full potential of u-net and random forest to detect silage bags accurately on images from Sentinel-2, PlanetScope, and a combination of Sentinel-1 and 2.

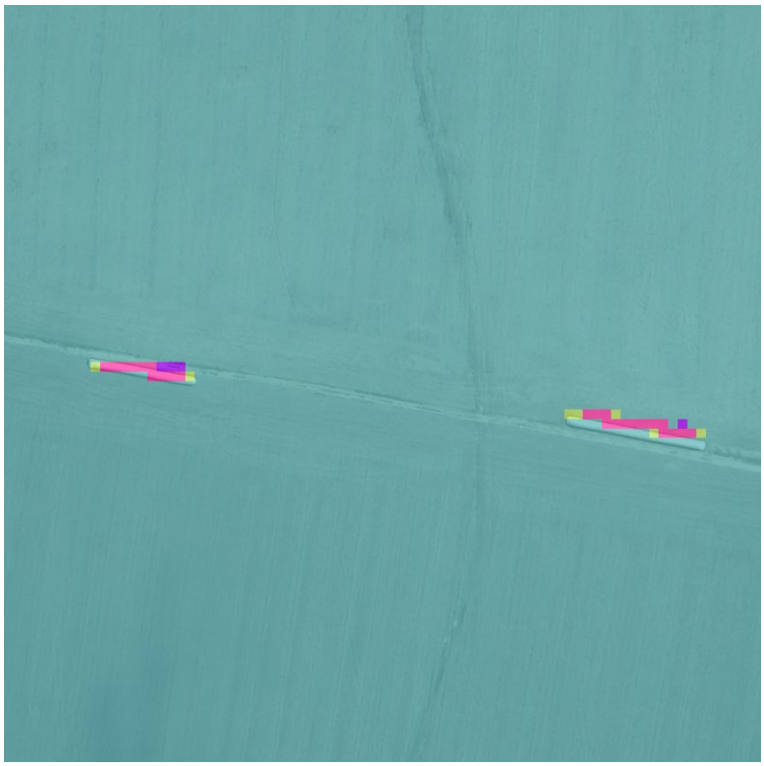

*Figure 1: Philip Liehr*

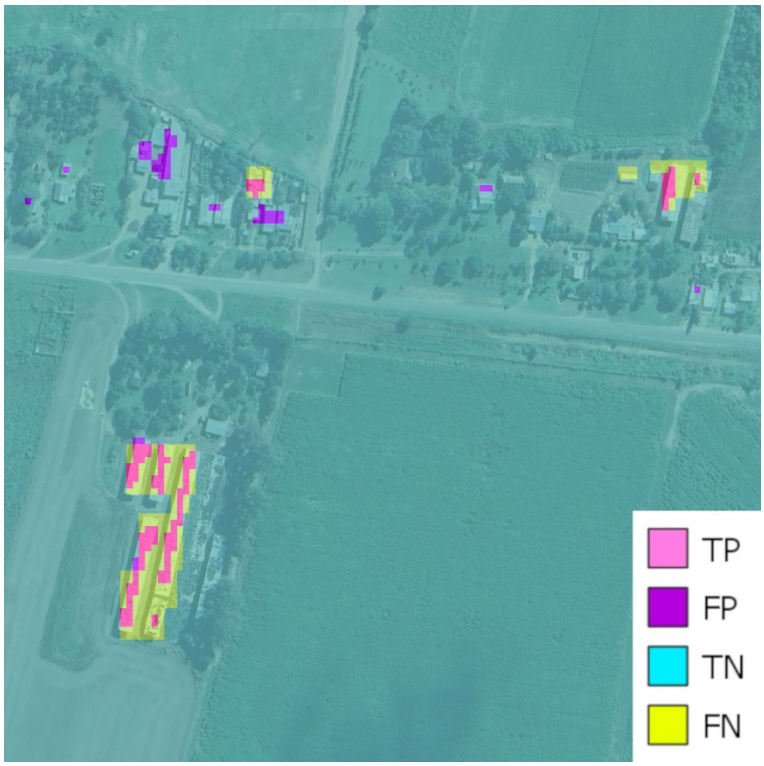


*Figure 1: Philip Liehr*