Teaching Machines Instream Wood

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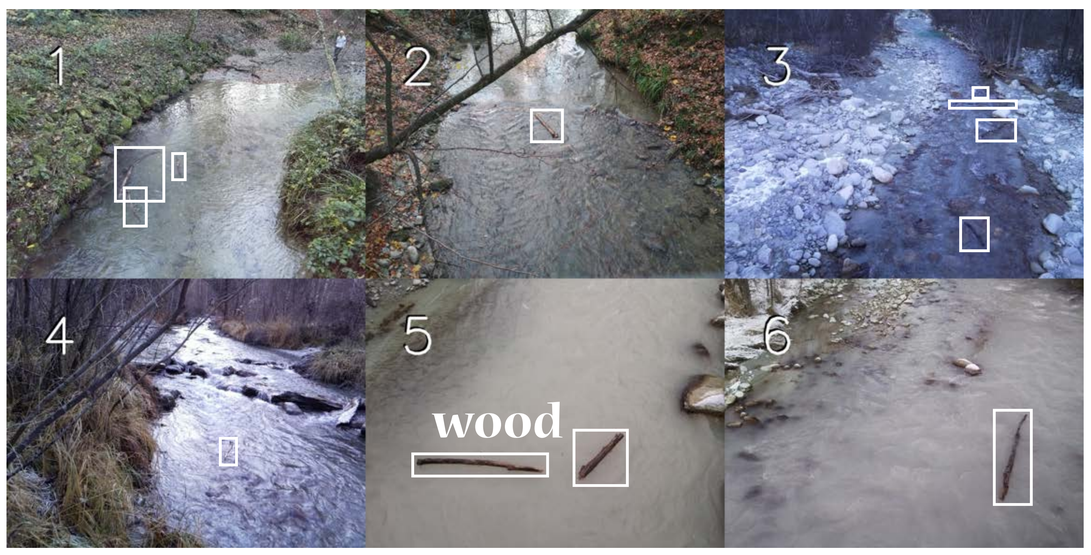
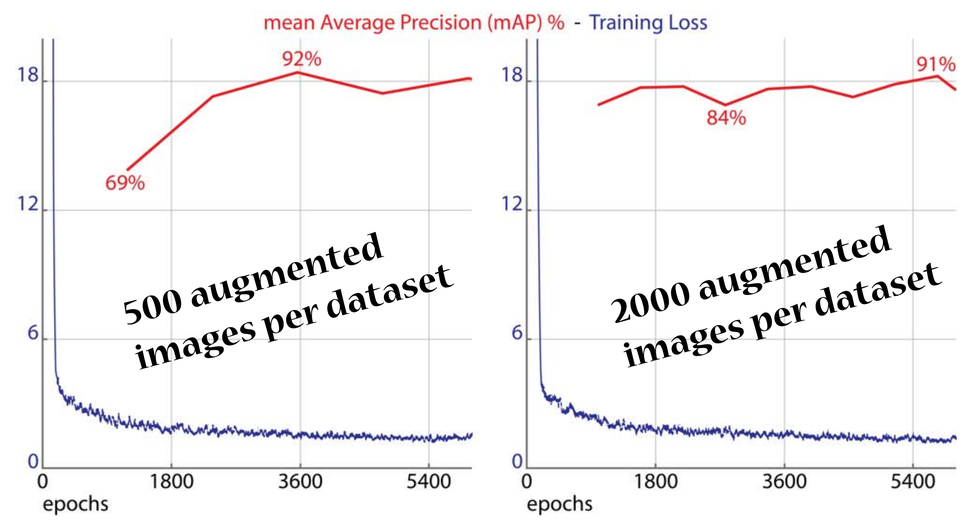
Training Data Collection in Different Valleys

We have gathered 20 different datasets (6 of which are shown here) of instream wood at several locations. We labeled all the wood floating past resulting in 1.933 labeled images in total. We analyzed the data and pre-processed it to be a diverse dataset.



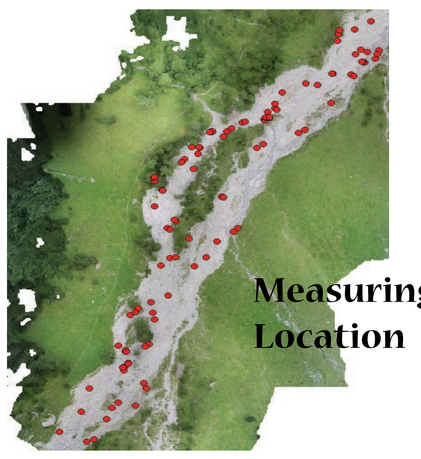
Training a Convolutional Neural Network (CNN) to Detect Wood

We trained 20 CNN's and did a sensitivity analysis. We tested training the networks with 2000 augmented images per dataset (19 * 2.000 = 38.000 in total) and with 500 augmented images per dataset (19 * 500 = 9.500 in total), see image. We saw that in both cases the model was able to tune itself to the training data. Afterwards did a k-fold validation. At every instance 1 of the datasets was kept out of the training data on which the model was tested. For some datasets the algorithm has a mean Average Precision of 92%. The performace was differing throughout the datasets, mainly because of data quality.



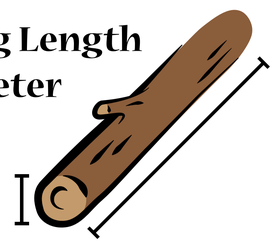
Tagging and Measuring All Wood in Vallon de Nant

We tagged, measured and stored the location of 1000 pieces of instream large wood in the Nant Valley.



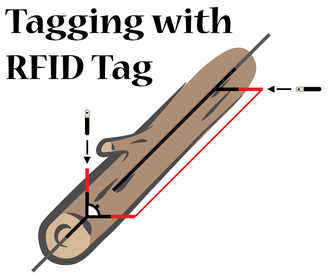
Measuring Location

Measuring Length and Diameter



4mm

Tagging with RFID Tag



Wood Detection with Video Cameras

We are currently observing the Vallon de Nant for wood transport and comparing the RFID tags floating by the RFID antenna to the camera observations by the CNN.