

# Prediction of harvest outcome using data from harvesters and airborne laser scanning in Deep Learning - a few examples.

Table 1: Evaluated neural network designs.

Network	Predicted vars.	LiDAR vars.	layers
A	4	4	3
B	4	4	5
C	4	4	8
D	11	11	6

Table 2: Model fit of the networks ( $R^2$ ).

Iterations	A	B	C	D
100	0.69	0.70	No convergence	0.53
1000	0.71	0.71	No convergence	0.68
10000	0.71	0.71	No convergence	0.54

Table 3: Prediction accuracy of network A evaluated on 1000 independent harvester segments, in percent of sampled means.

Variable	RMSE	Bias
Mean height	8.3	-6.6
Mean diameter	9.9	-3.9
Basal area	19.1	-5.4
Volume	19.5	-3.3

Table 4: Prediction accuracy of network B evaluated on 1000 independent harvester segments, in percent of sampled means.

Variable	RMSE	Bias
Mean height	4.7	-0.1
Mean diameter	8.8	0.0
Basal area	18.8	-5.1
Volume	19.5	-4.2

Table 5: Prediction accuracy of network D evaluated on 1000 independent harvester segments, in percent of sampled means.

	Variable	RMSE	Bias
1	Mean height	17.5	-16.0
2	Mean diameter	14.8	8.6
3	Basal area	32.7	-25.4
4	Volume	24.5	-12.5
6	Stems	30.6	-7.8
7	Stem defects	84.8	-31.2
8	Regular timber	33.8	-11.0
10	Pulp wood	47.5	-19.3

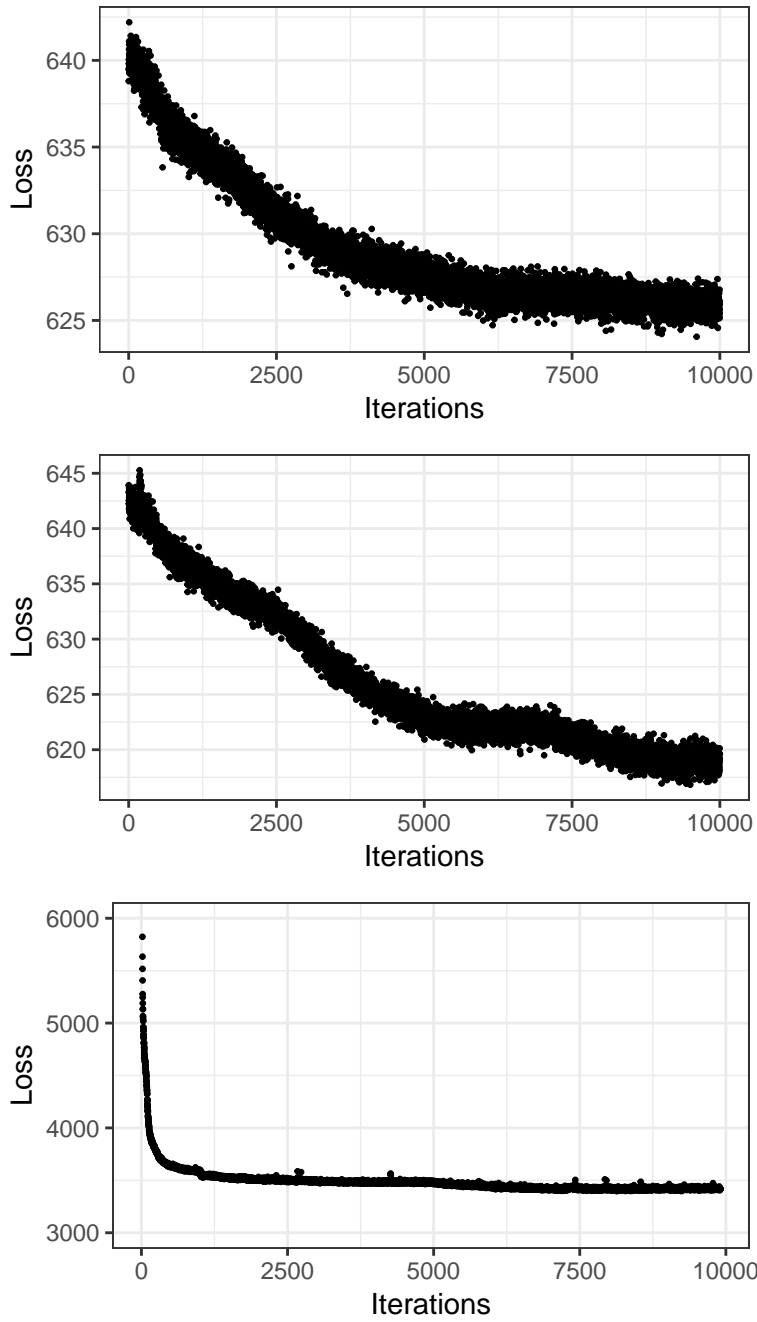


Figure 1: Learning rates for networks A (top), B (middle), and C (bottom). Training was interrupted at 10000 iterations regardless of convergence.

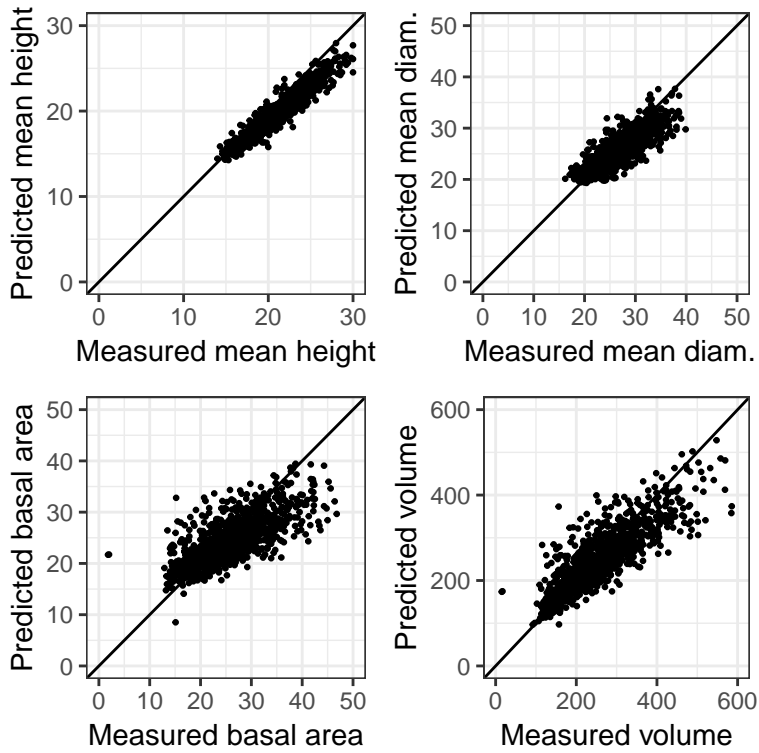


Figure 2: Prediction accuracy of single harvester segments, by network A.

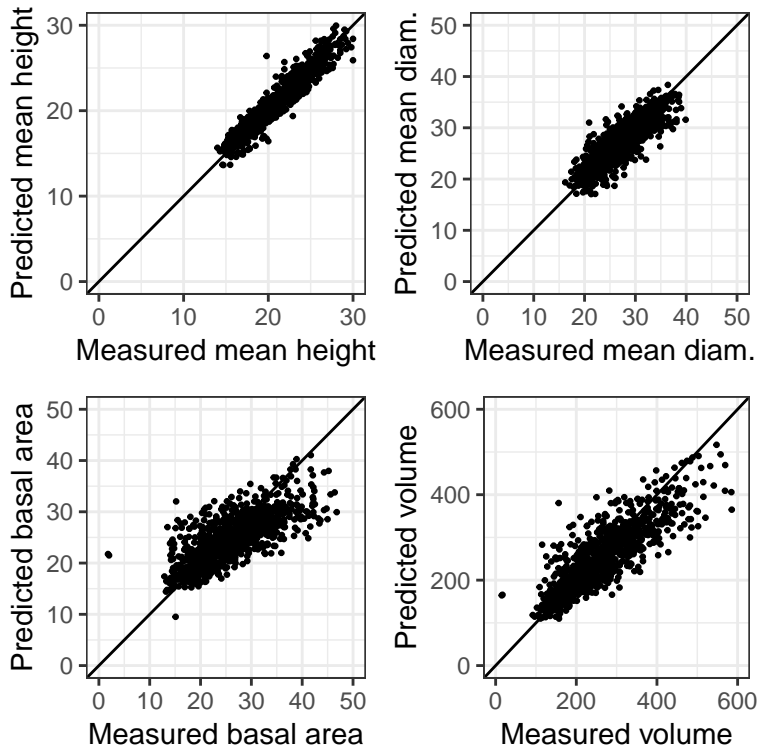


Figure 3: Prediction accuracy of single harvester segments, by network B.

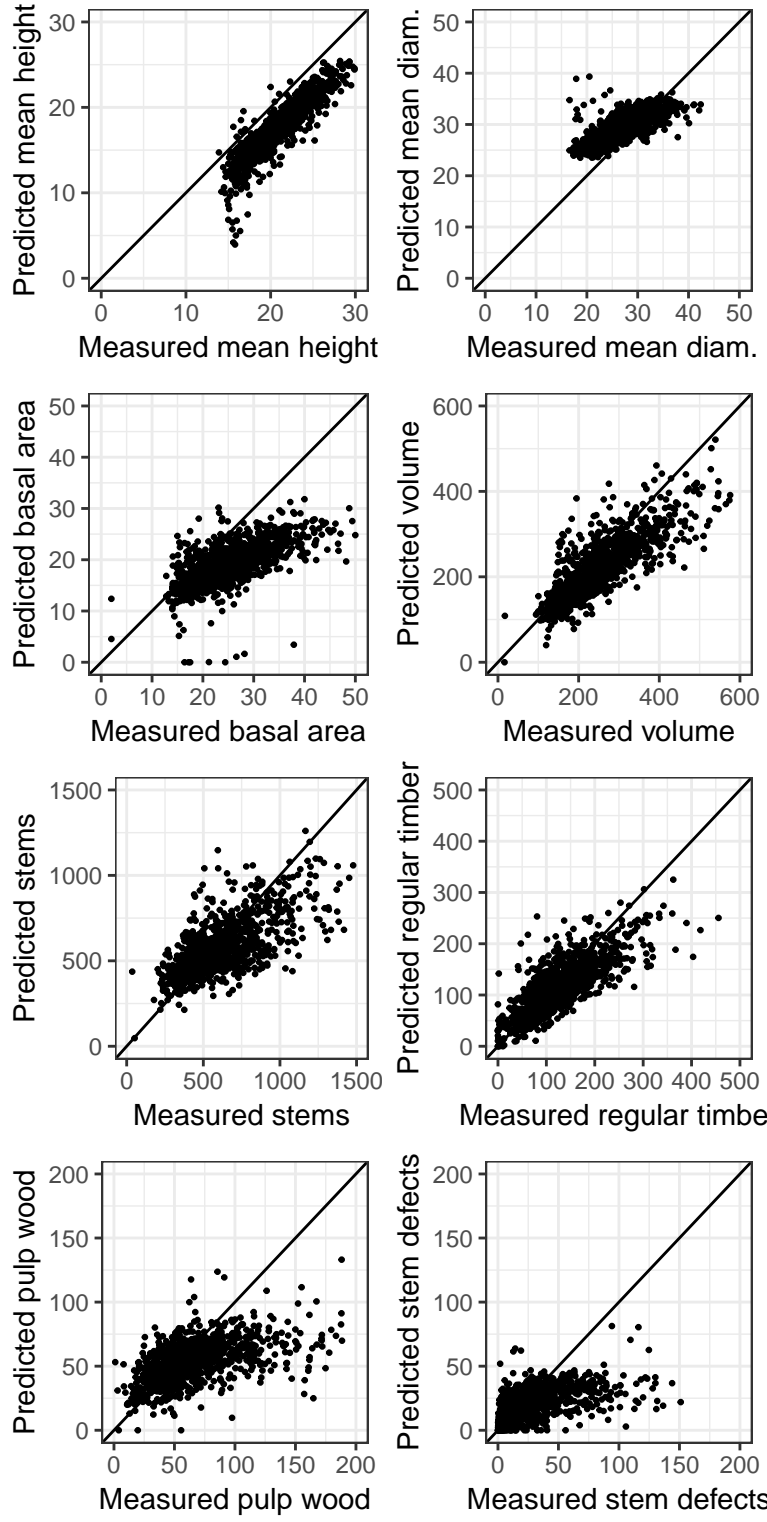


Figure 4: Prediction accuracy of single harvester segments, by network D.