CY TECH

VISUAL DETECTION OF DISEASED TREES

Larch case

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Summary

01

Subject

PRESENTATION OF THE SUBJECT

A butterfly species is responsible for major damage to a type of tree in Sweden : larch.

Problem : object detection with tree classification into 4 categories.

- Healthy (H)
- Light Damage (LD)
- High Damage (HD)
- Other (O)

Data : 101,878 annotated trees on 1543 images

Expectations :

- Distinguish larches from other trees
- Categorize larches according to their health

02

Data Analysis

Tree Differences

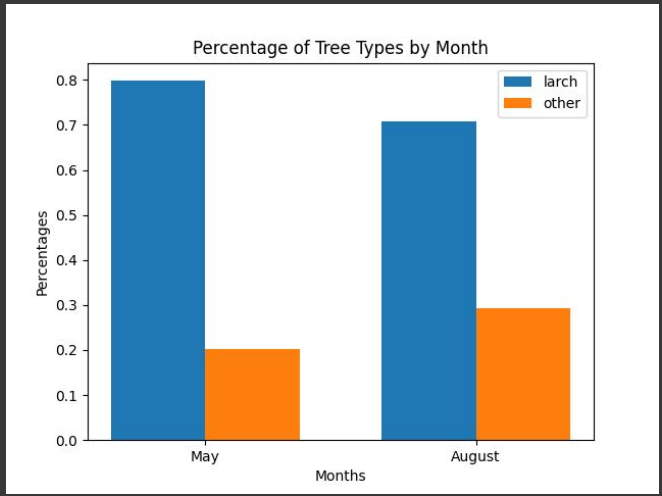
Healthy larches

Other trees

High damaged trees

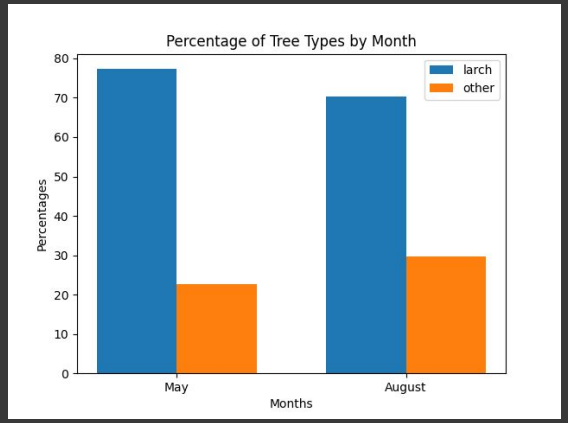
Percentage per month

Tree	May Count	August Count	May Percent	August Percent
Larch	45023	32125	79,8	70,7
Other	11400	13298	20,2	29,3

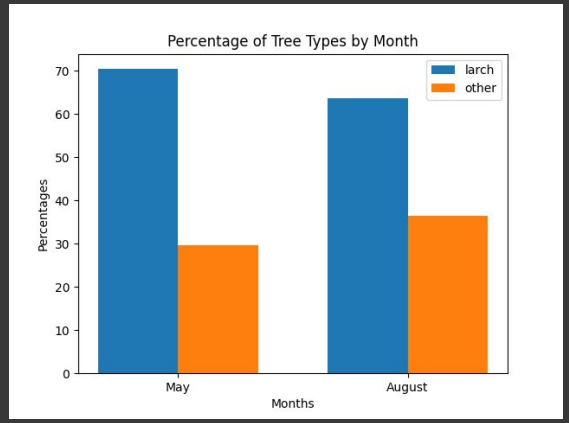


Percentage per location

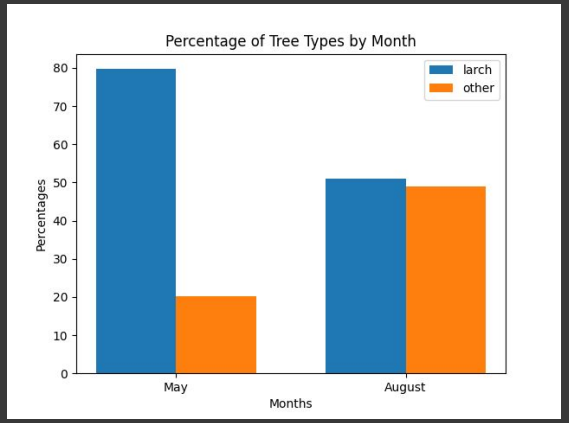
Location	Tree	May Percent	August Percent
Bebehojd	Larch	77,3	70,4
	Other	22,7	29,6
Ekbacka	Larch	70,4	63,6
	Other	29,6	36,4
Jallasvag	Larch	79,7	51,1
	Other	20,3	48,9
Kampe	Larch	86,4	84,1
	Other	13,6	15,9
Nordkap	Larch	79,3	71,5
	Other	20,7	28,5



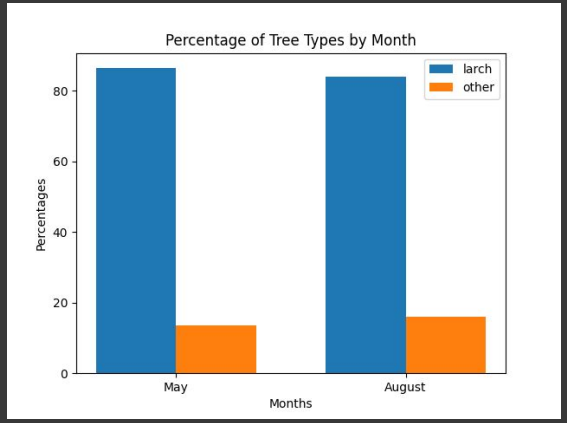
Bebhojd



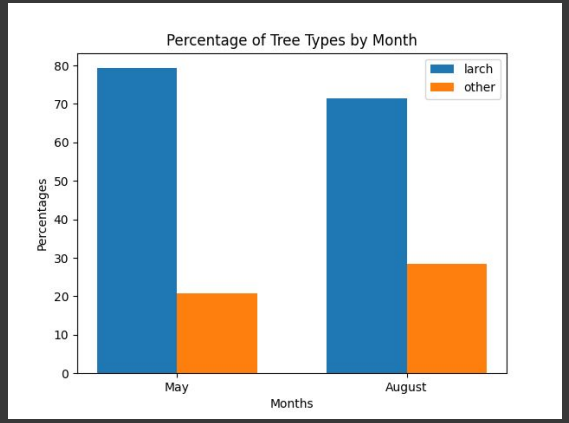
Ekbacka



Jallasvag



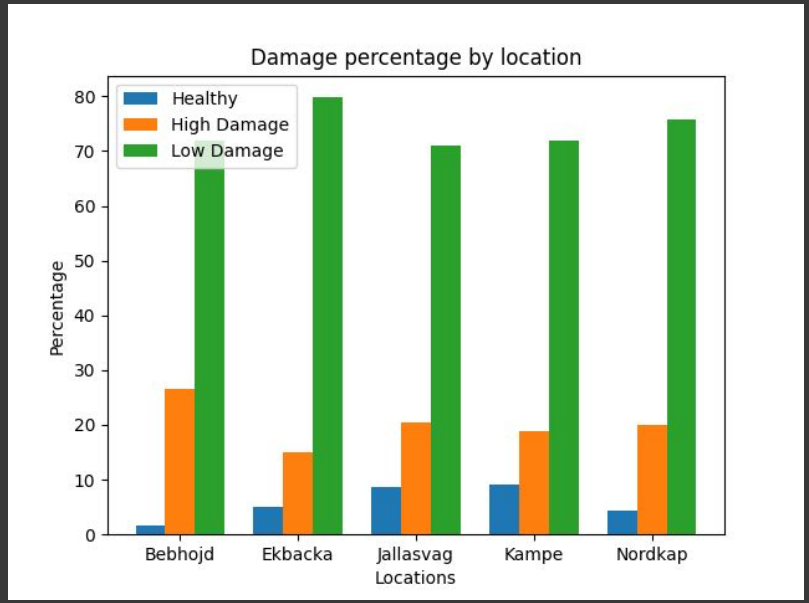
Kampe



Nordkap

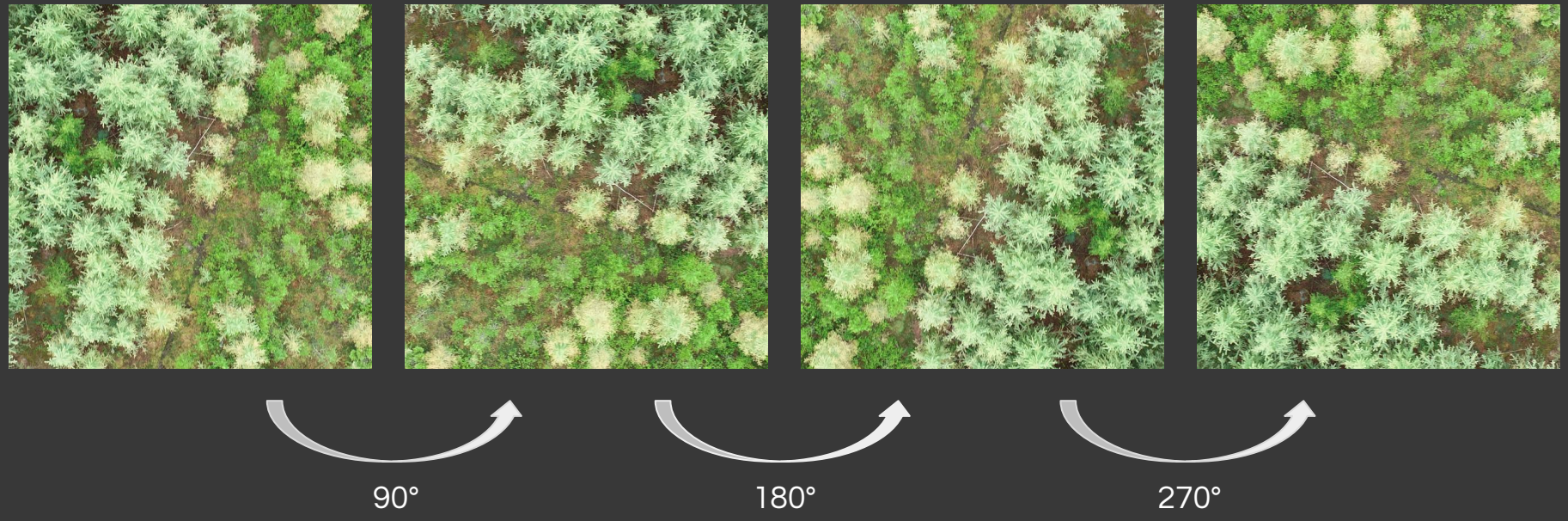
Damage per location

	Bebhojd	Ekbacka	Jallasvag	Kampe	Nordkap
Healthy	1,6 %	5,1 %	8,6 %	9,2 %	4,3 %
High Damage	26,6 %	15,1 %	20,4 %	18,8 %	20,0 %
Low Damage	71,8 %	79,8 %	70,9 %	72,0 %	75,8 %



03
TRAIN DATASETS

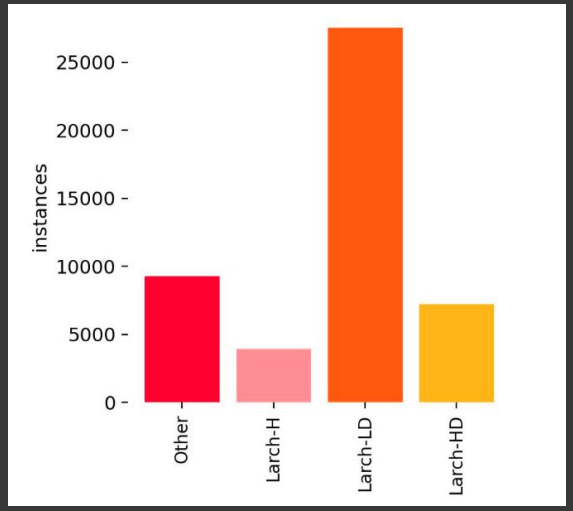
Data Augmentation : Rotation



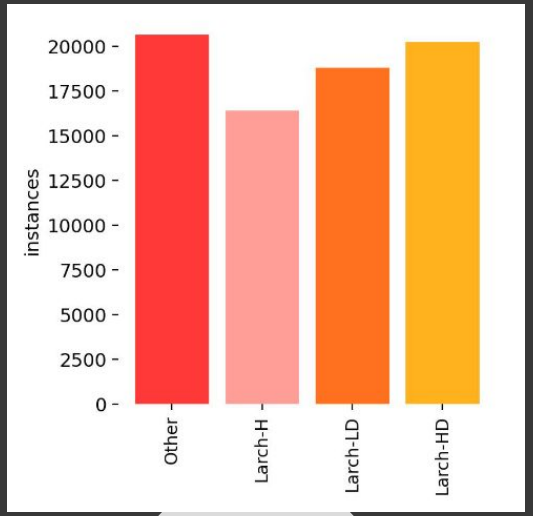
Data Augmentation : Blur

DATASETS

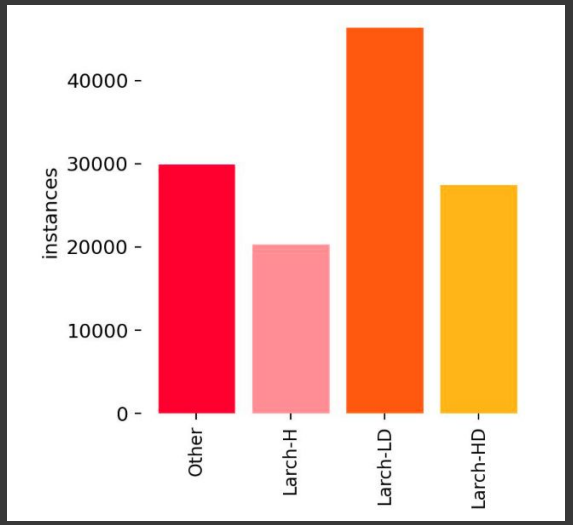
ORIGINAL



AUGMENTED



CONCATENATED



04
MODELS

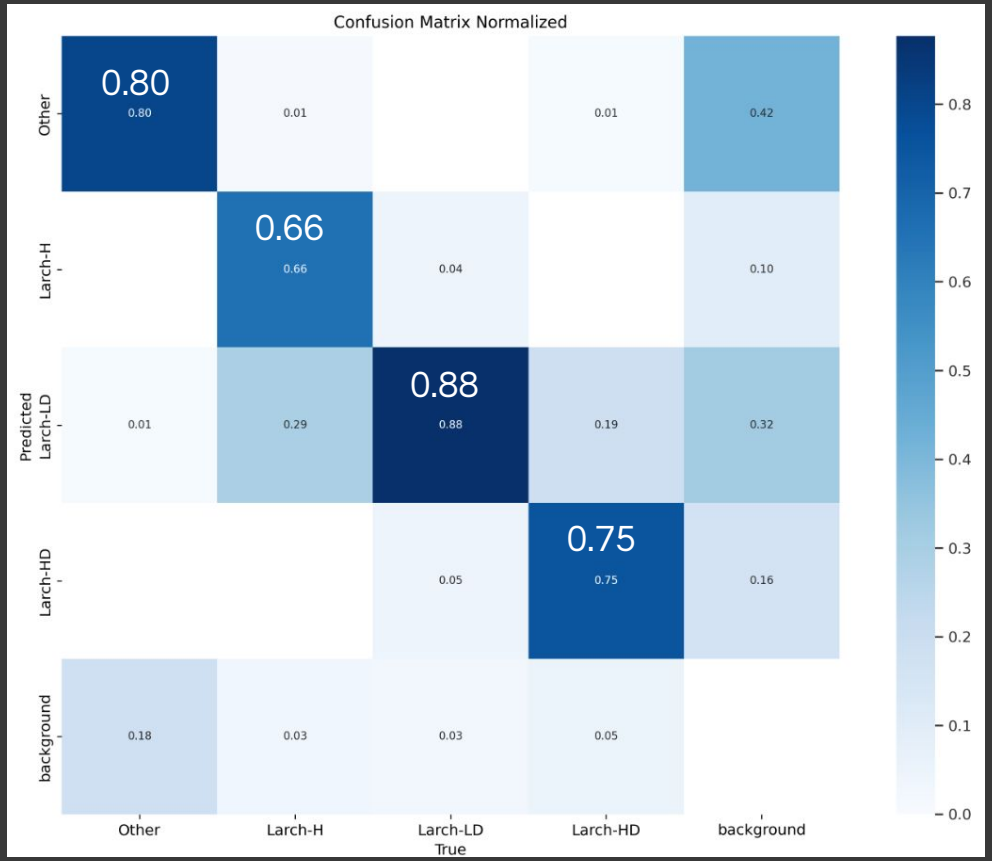
Accuracy : Yolo V8

Model	H	LD	HD	Other
original_n	66%	88%	75%	80%
augmented_n	59%	80%	72%	71%
concatenated_n	57%	88%	77%	80%
original_s	54%	89%	69%	77%
augmented_s	67%	73%	85%	70%
concatenated_s	62%	86%	82%	74%

Accuracy : Yolo V8

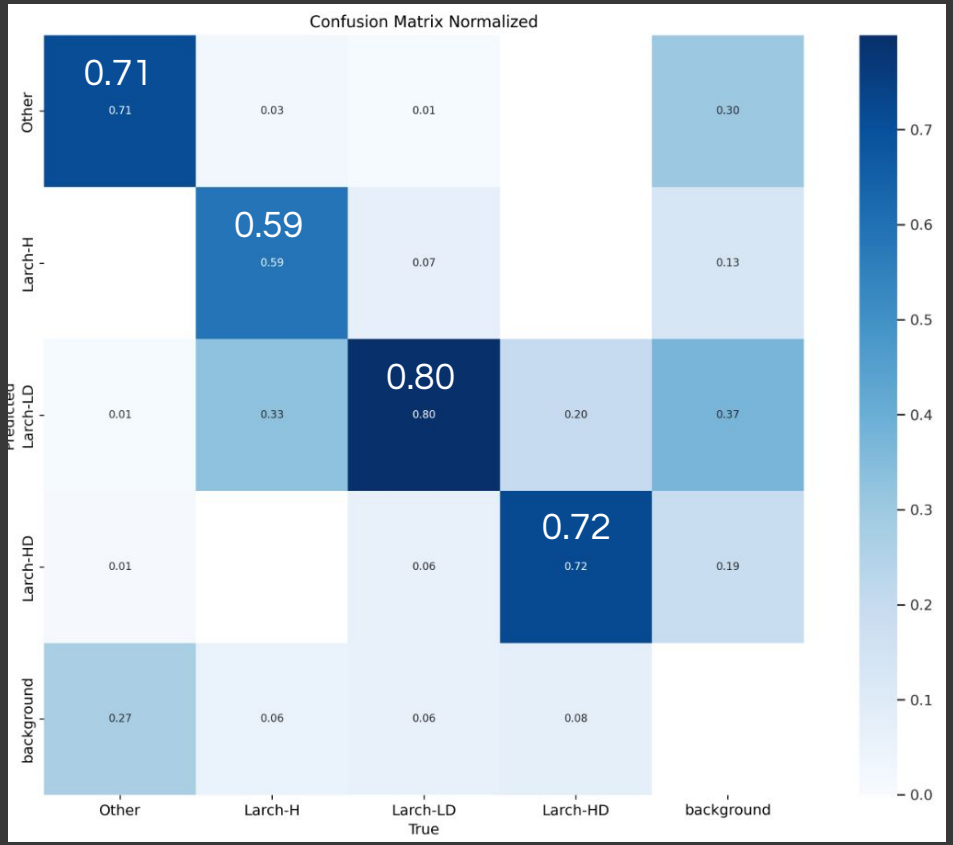
Model	H	LD	HD	Other
original_m	47%	85%	87%	72%
augmented_m	63%	74%	81%	69%
concatenated_m	52%	90%	68%	77%
original_l	51%	90%	68%	79%
augmented_l	68%	89%	73%	79%
concatenated_l	61%	87%	79%	75%

Confusion Matrix :



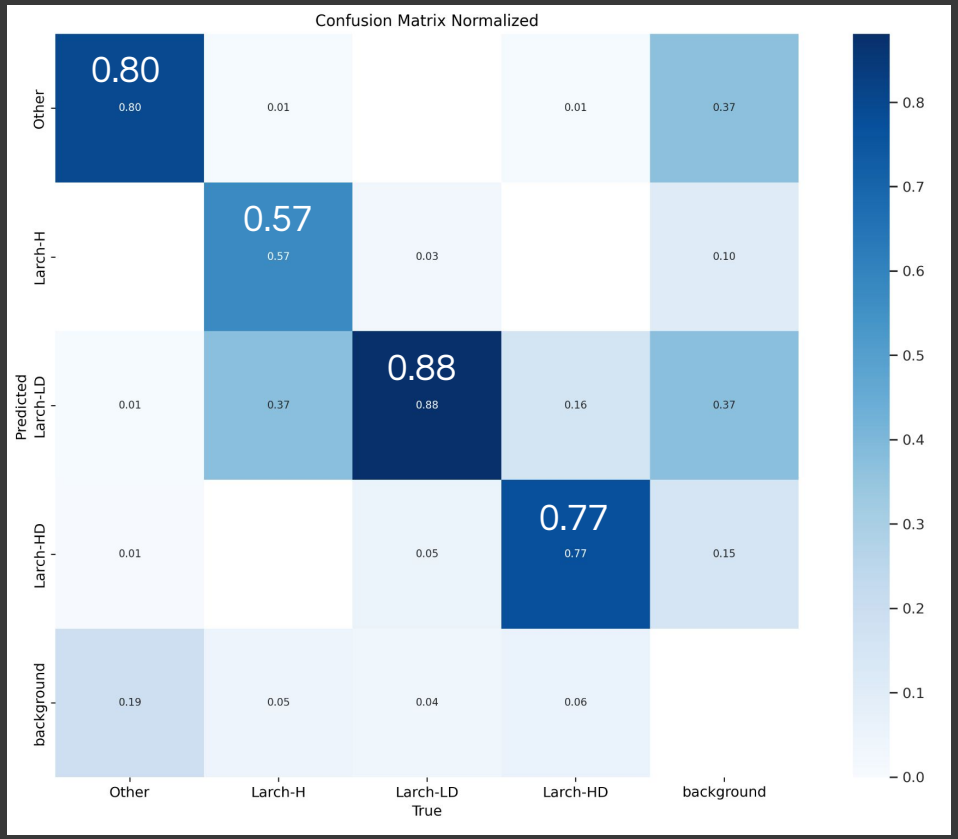
Train n

Confusion Matrix :



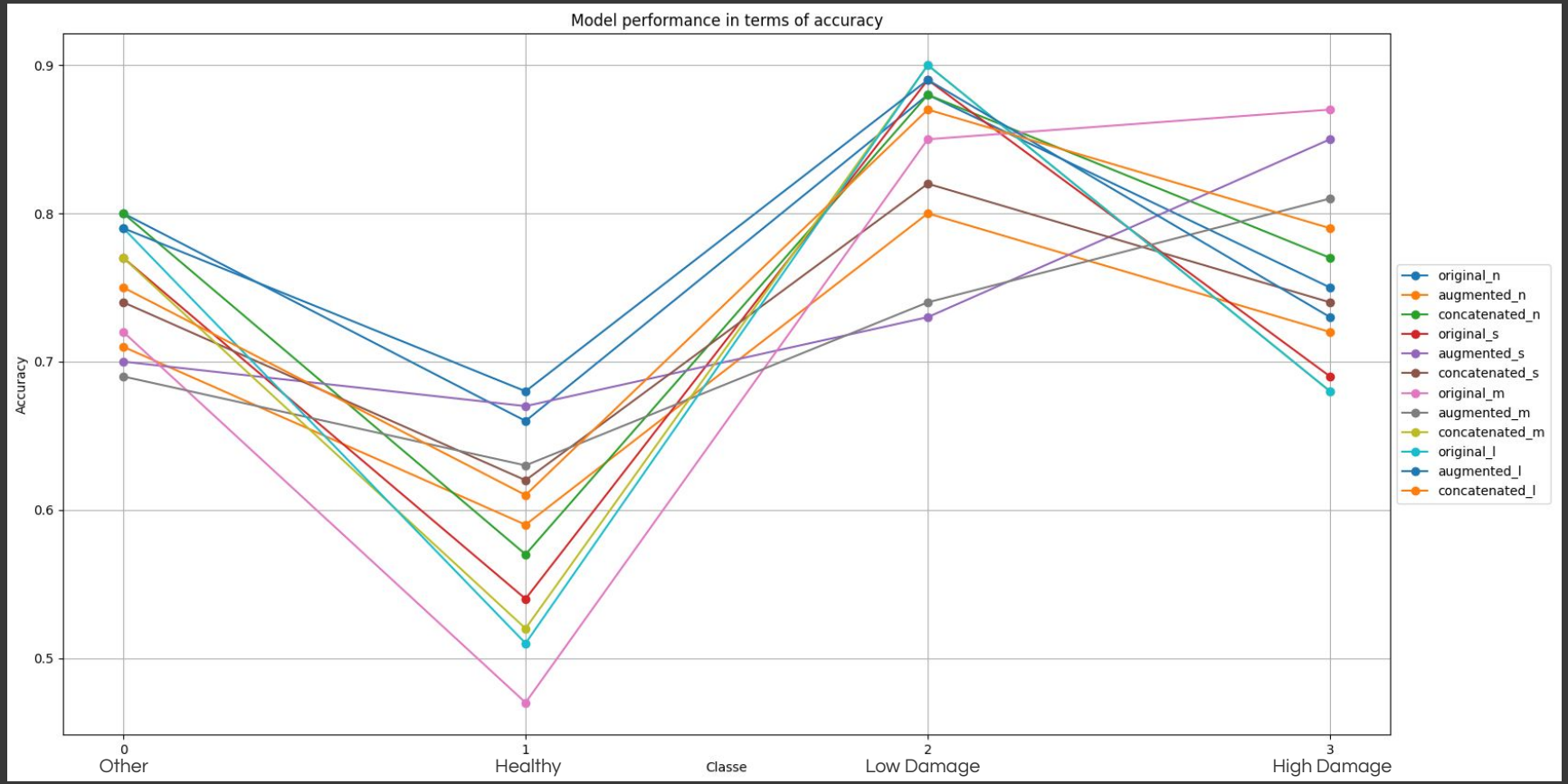
Augmented n

Confusion Matrix :



Concatenated n

Accuracy : Yolo V8



05
Demonstration

06

Environmental impact

Emission in kWh

Model	Train	Augmented	Concatenated
n	0.020	0.016	0.034
s	0.032	0.024	0.0416
m	0.043	0.030	0.068
l	0.048	0.06	0.081

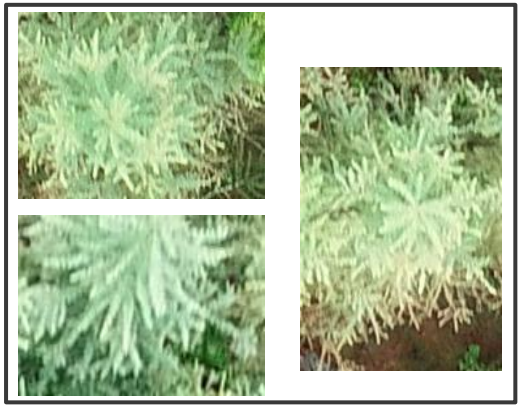
07
Limites

LIMITES OF THE SUBJECT

- Difference between H and LD is not absolute
- Number of trees in each categories is uneven
- Confusing/Incoherent results regarding datasets

Limits / Anomalies

Larch H



Larch LD

Larch HD

Thank you for your attention !

Do you have some questions ?