

PARTNERS IN COMMUNITY FORESTRY

2024 CONFERENCE



BRANCHING OUT: INTEGRATING AI INTO COMMUNITY FORESTRY



PRESENTED BY:

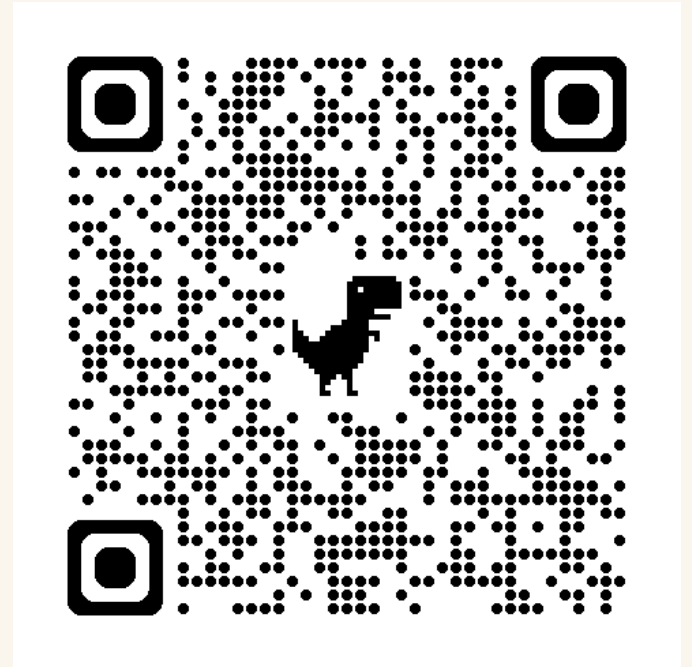
Josh Behounek

Business Development Manager

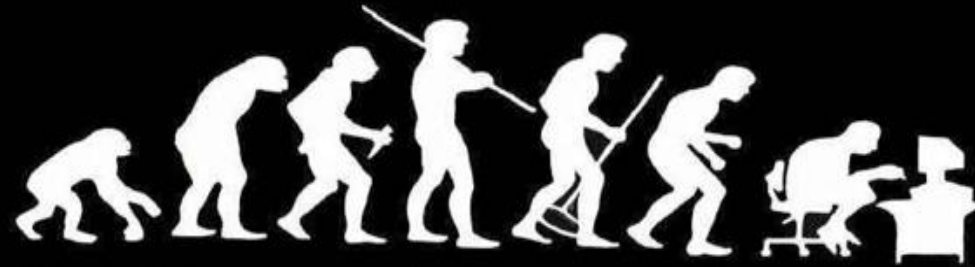
Davey Resource Group

Josh.Behounek@davey.com

573-673-7530



*Technology won't replace arborists but
arborists who use technology will replace
arborist who do not.*

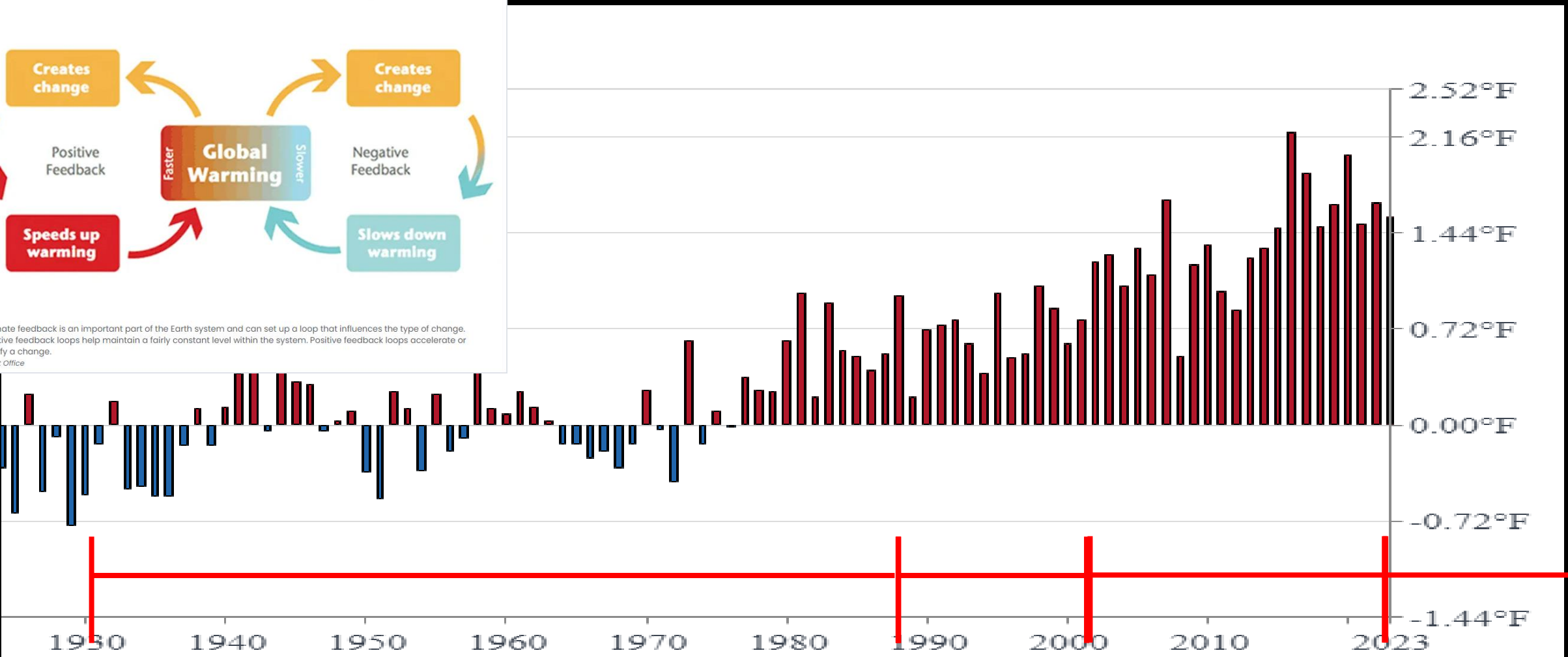


Something, somewhere went terribly wrong:

Climate Feedback Loops can be Positive or Negative



A climate feedback is an important part of the Earth system and can set up a loop that influences the type of change. Negative feedback loops help maintain a fairly constant level within the system. Positive feedback loops accelerate or amplify a change.
UK Met Office



Summary of Tree Survey of the City of Oswego, New York.
Conducted from July 6 to July 21, 1974, inclusive.

It was found impracticable to scale the distances so no attempt has been made to trace the trees on the tally sheets according to the distance between them and the distance is indicated numerically between each tree. Therefore trees 10 feet apart appear as far apart on the tally sheets as trees 40, 70, 70 feet or more apart. All distances were determined by pacing.

All maples and box elders should be replaced by Norway Maples, Sugar Maples or another like spaced at least thirty feet apart.

All of those trees marked (D) should be removed; the removal of some of the Sugar Maples marked (D) depends upon the choice of the rido-man. Care must be taken when removing trees not to injure adjacent trees.

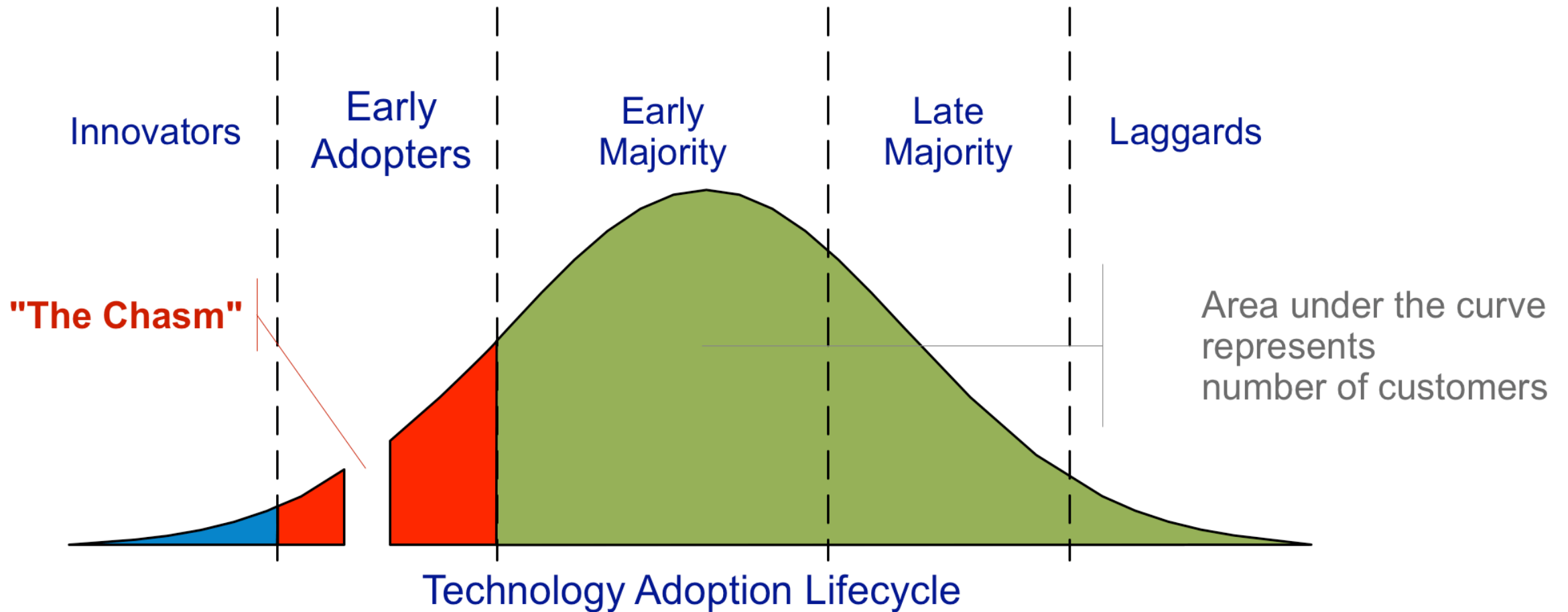
All of the transcribed (C) are dangerous and must be removed immediately.

All of the maples are more or less subject to girdling roots and they must be taken into account in any operations.

Many of the trees marked (C) must be pruned as soon as possible for many large trees however limbs are present.

They have weak apical and weak crotches are dangerous and must be taken to prevent splitting. Calling applies only to those trees where a (C) is present; usually





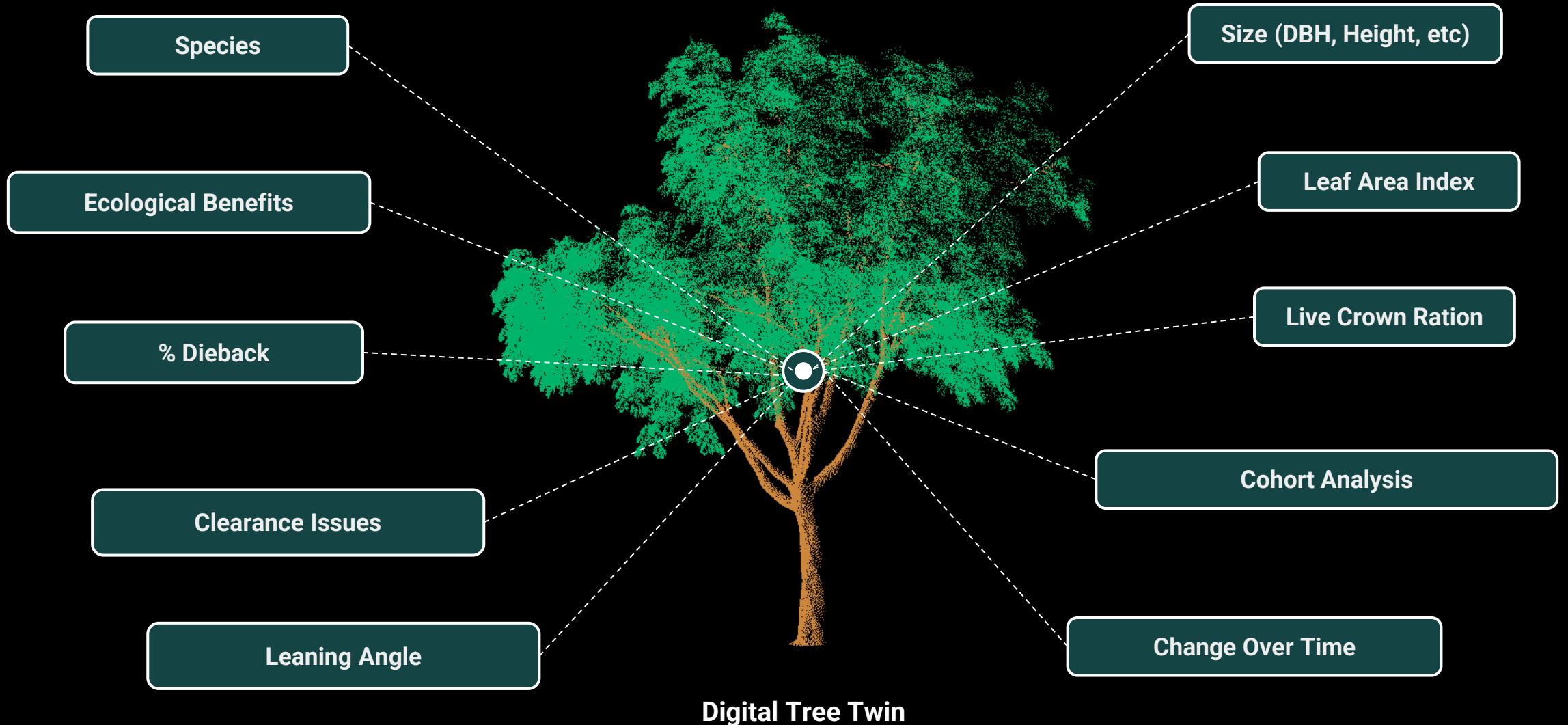
TURN INTO THE SKID



Smart Tree Inventories

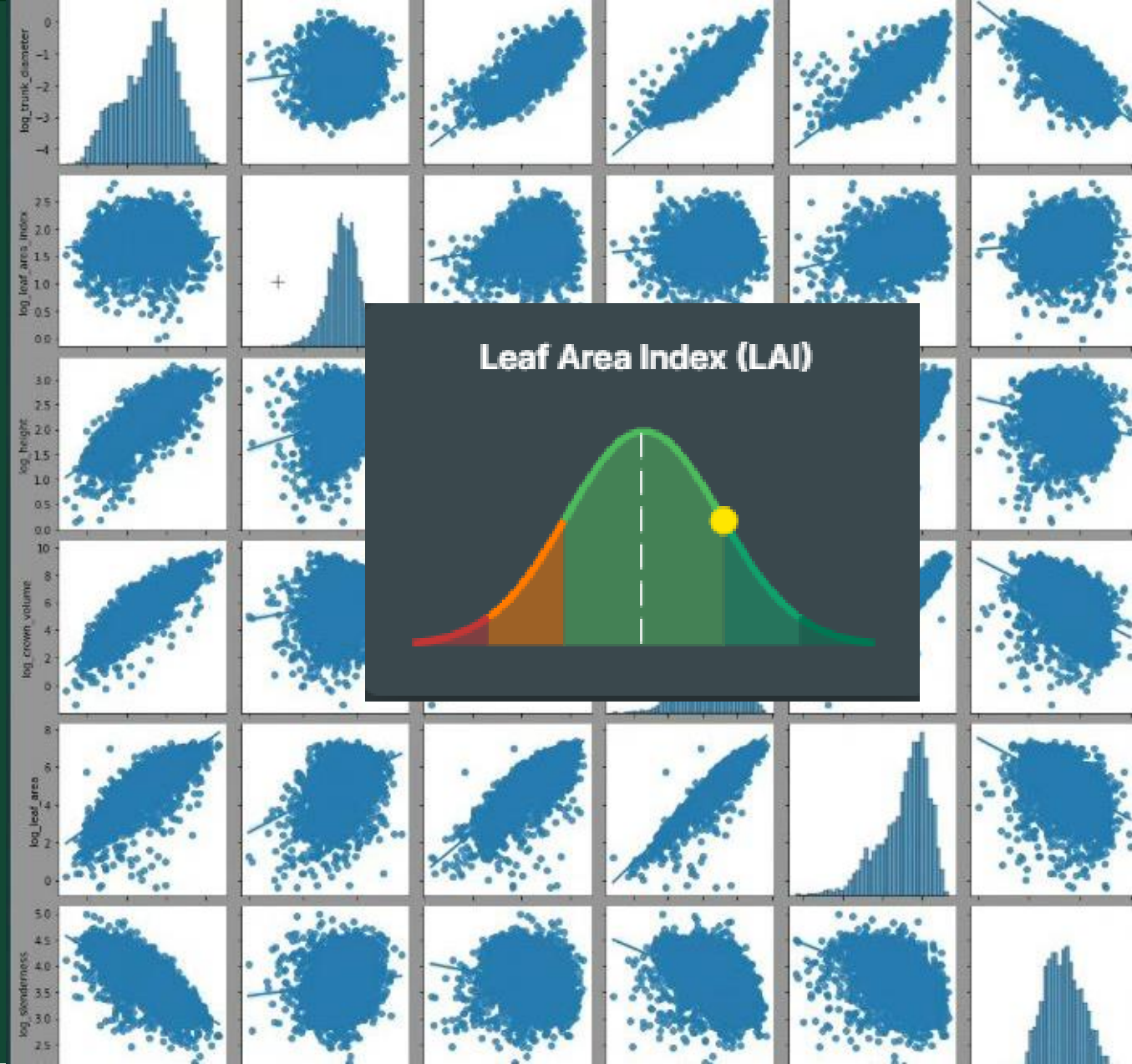


Extracting Precision Information



Big Data & Outliers

- Dead trees
- Lean angle
- Leaf Area Index
- Canopy Size
- Species
- Dieback





02. 05. 2022

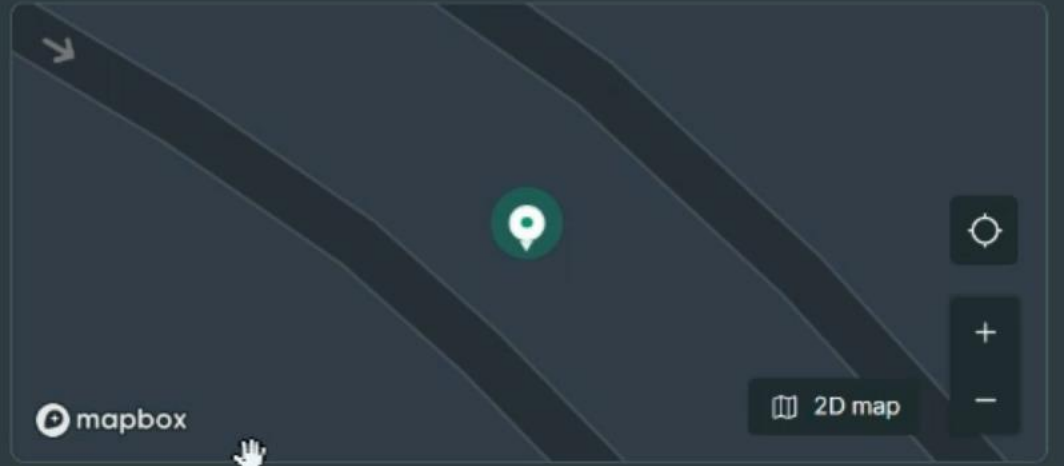
Monitor over time

TwIn view

Map navigation icons: zoom in (+), zoom out (-), reset view (circular arrow), and a share icon.

Inventory

GENUS	SPECIES	STREET NAME AND NUMBER
Prunus	No data	No data

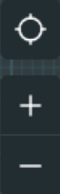
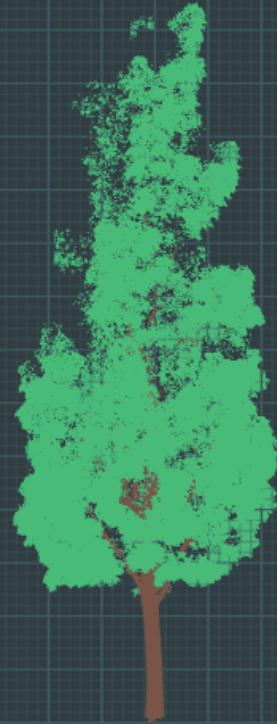


Metrics

Crown height 26.22 ft Height 22.24 ft

- > Risk
- Health & Vitality
- Environment
- Benefits

2024



5/5/2024

▼ Monitor over time

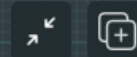
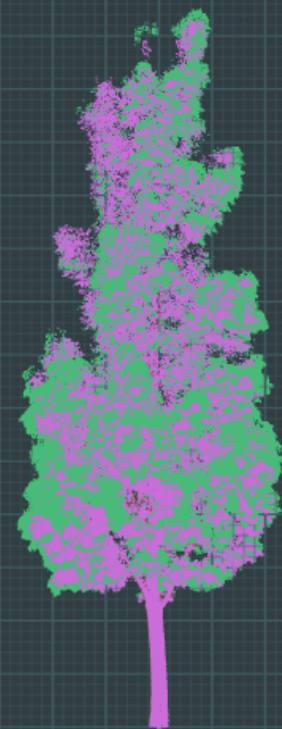


🔄 Twin view

GRAPH

	Crown Height [m]	Crown Width [m]	DBH [m]	Tree Height [m]	First Bifurcat... [m]	LAI (Leaf are...)	Trunk stabili...	Avoided run... [m³/yr]	CO ₂ [g/yr]	Gross CO ₂ S... [kg/yr]
👁 2022	10.76	4.73	0.27	13.27	2.14		4.26	0.20	2.10	18.80
2024	11.15	4.95	0.29	13.47	2.03					

2022



5/5/2024

▼ Monitor over time



🔄 Twin view

GRAPH

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Analysis & Recommendations



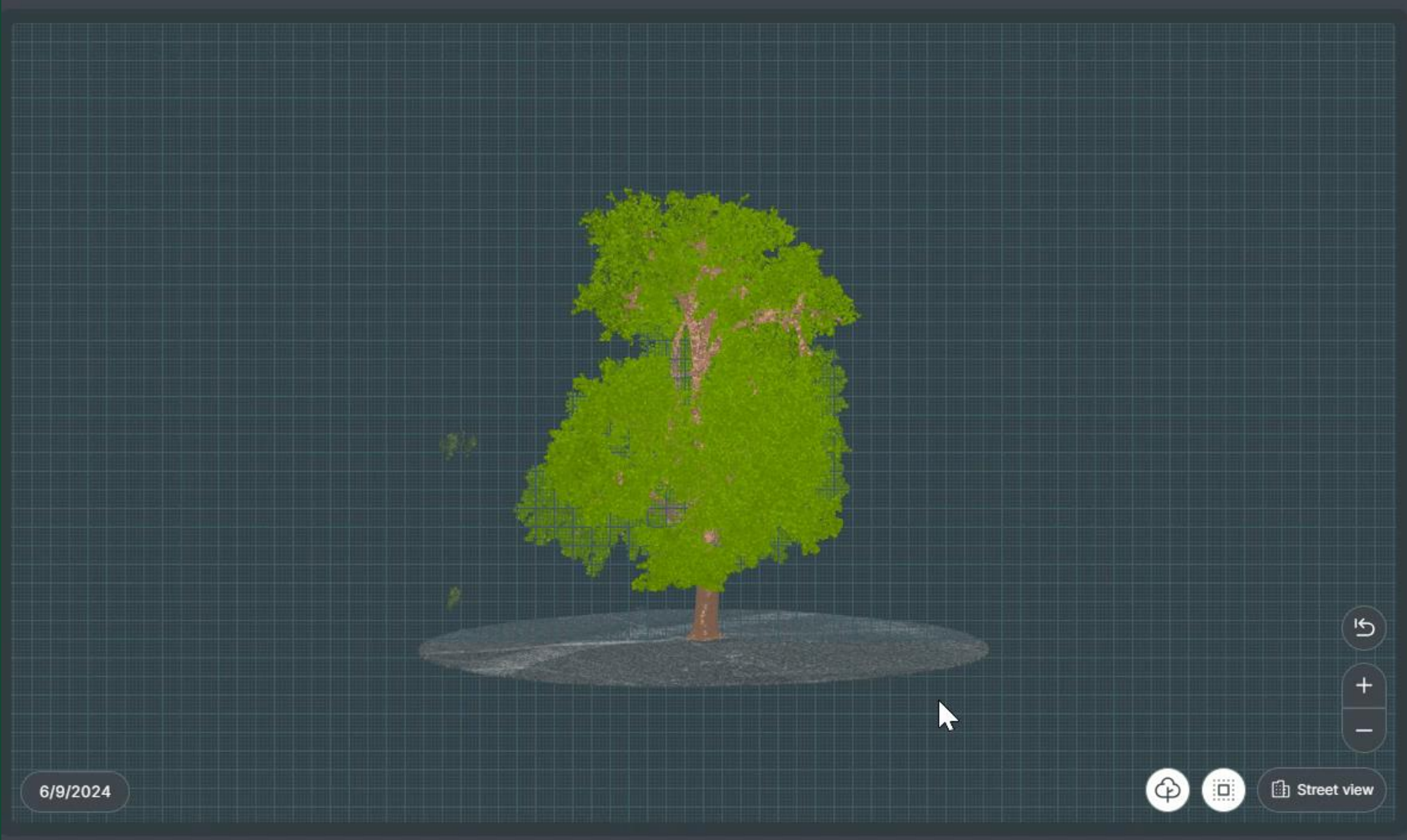
0.40 m	153 × 140 cm	0.1785 m ⁴	0.2551 m ³	7.1 MPa	280%
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Beam model - bearing profiles 2/3

0.50 m	151 × 133				
0.60 m	149 × 129				
0.70 m	145 × 126				
0.80 m	143 × 124				
0.90 m	142 × 123				
1.00 m	141 × 123				
1.10 m	141 × 122				
1.20 m	142 × 122				
1.30 m	142 × 121				
1.40 m	142 × 121				
1.50 m	143 × 120				
1.60 m	142 × 120	Profile:	2.00 m	Profile:	2.10 m
1.70 m	141 × 119	Safety factor:	155%	Safety factor:	154%
1.80 m	141 × 117	Stem circumference:	588 cm	Stem circumference:	602 cm
1.90 m	140 × 116	Area of cross section:	0.955 m ²	Area of cross section:	0.937 m ²
		Ideal diameter:	138 × 116 cm	Ideal diameter:	136 × 115 cm
				Profile:	2.20 m
				Safety factor:	156%
				Stem circumference:	578 cm
				Area of cross section:	0.937 m ²
				Ideal diameter:	135 × 114 cm
				Profile:	2.30 m
				Safety factor:	139%
				Stem circumference:	403 cm
				Area of cross section:	1.126 m ²
				Ideal diameter:	134 × 114 cm
				Profile:	2.40 m
				Safety factor:	140%
				Stem circumference:	405 cm
				Area of cross section:	1.120 m ²
				Ideal diameter:	132 × 113 cm

2.00 m	138 × 116 cm	0.0760 m ⁴	0.1269 m ³	12.9 MPa	155%
2.10 m	136 × 115 cm	0.0764 m ⁴	0.1256 m ³	13.0 MPa	154%
2.20 m	135 × 114 cm	0.0763 m ⁴	0.1265 m ³	12.8 MPa	156%
2.30 m	134 × 114 cm	0.0687 m ⁴	0.1117 m ³	14.4 MPa	139%
2.40 m	132 × 113 cm	0.0694 m ⁴	0.1116 m ³	14.3 MPa	140%
2.50 m	131 × 113 cm	0.0714 m ⁴	0.1139 m ³	13.9 MPa	144%
2.60 m	130 × 114 cm	0.0736 m ⁴	0.1162 m ³	13.6 MPa	147%
2.70 m	129 × 115 cm	0.0754 m ⁴	0.1187 m ³	13.2 MPa	152%
2.80 m	129 × 117 cm	0.0772 m ⁴	0.1227 m ³	12.7 MPa	158%
2.90 m	129 × 118 cm	0.0775 m ⁴	0.1236 m ³	12.5 MPa	160%
3.00 m	128 × 118 cm	0.0781 m ⁴	0.1249 m ³	12.3 MPa	163%
3.10 m	126 × 116 cm	0.0857 m ⁴	0.1393 m ³	10.9 MPa	183%
3.20 m	125 × 113 cm	0.0791 m ⁴	0.1305 m ³	11.6 MPa	173%





6/9/2024



Street view

MACHINE LEARNING ADVANTAGES

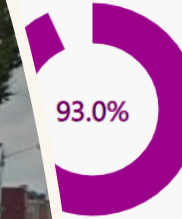
- Efficient
 - Cheaper & Faster
- Objective
- Repeatable
- Precise



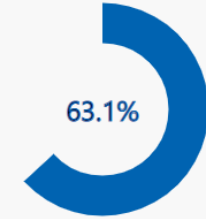
Iteration 3

Finished training on 4/4/2019, 12:51:24 PM using General domain
Finished as: TreeDetectionPOC

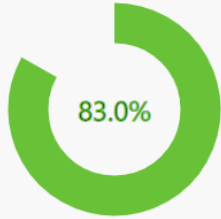
Precision ①



Recall ①

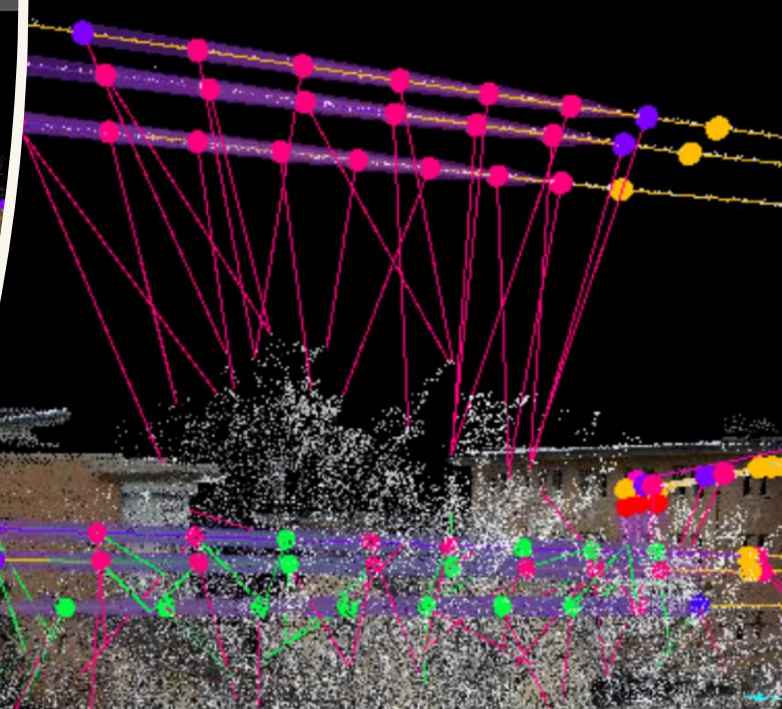
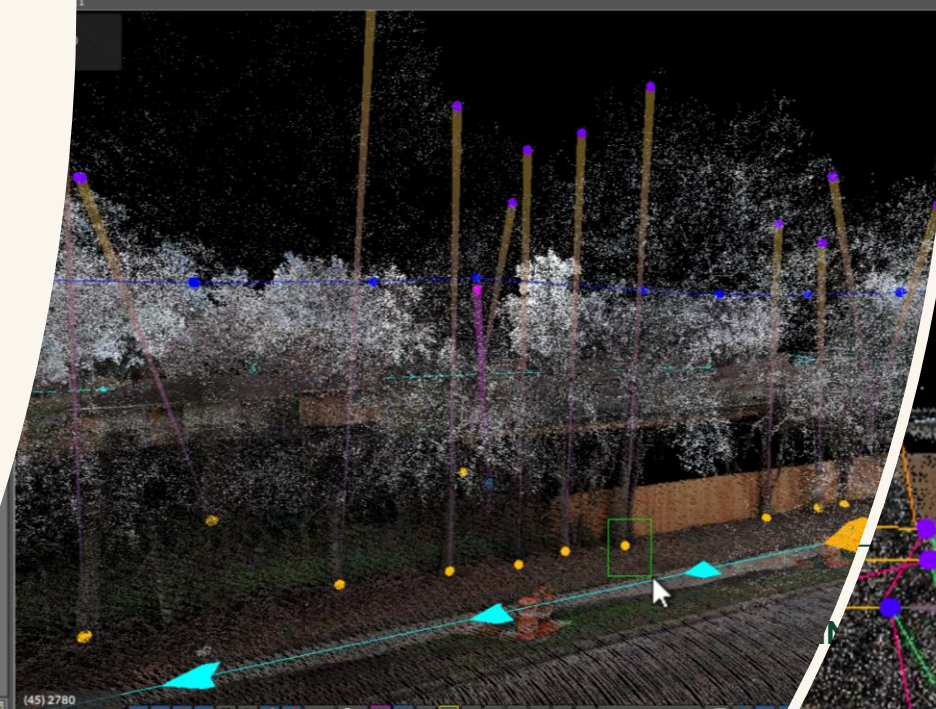


mAP ①



Score Per Tag

Precision	Recall	A.P.	Image count
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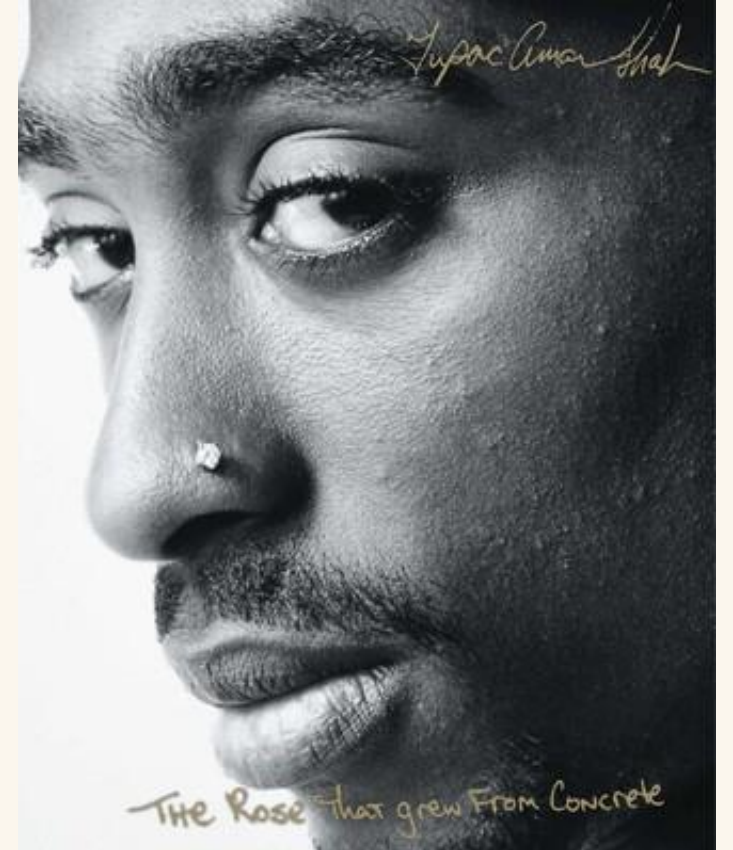


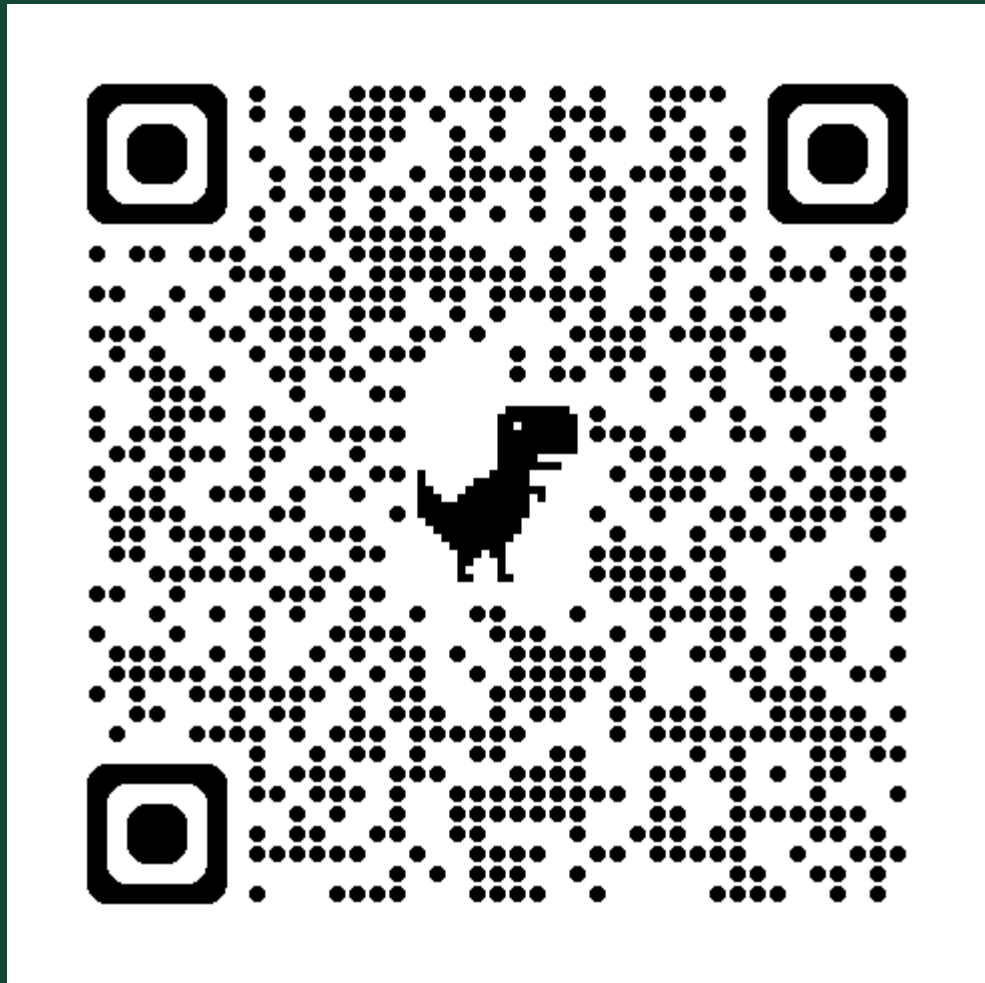
REMOVING IMPLICIT BIAS

Did you hear about the rose that grew from
a crack in the concrete?
Proving nature's law is wrong it
learned to walk with out having feet.
Funny it seems, but by keeping its dreams,
it learned to breathe fresh air.
Long live the rose that grew
from concrete when
no one else ever cared.



LivingCharm.com





Thank you.

Josh Behounek

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CEUs

For ISA CEUs, record the code to the right for each session.

Post conference, you can submit all Your CEU codes within the Conference app.

Sign-in sheets for Society of American Foresters (SAF) CFE credits are available at the registration desk post conference.

Branching Out: Integrating AI into Community Forestry

Speakers:

Josh Behounek



PP-24-917
.75 A, BCMA-M, MS