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# BUNCH RACHIS RECONSTRUCTION FROM A SINGLE IMAGE

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The Australian Wine Research Institute

Plant & Food RESEARCH RANGAHAU AHUMĀRA KAI

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MAKINEX CONSTRUCTION PRODUCTS

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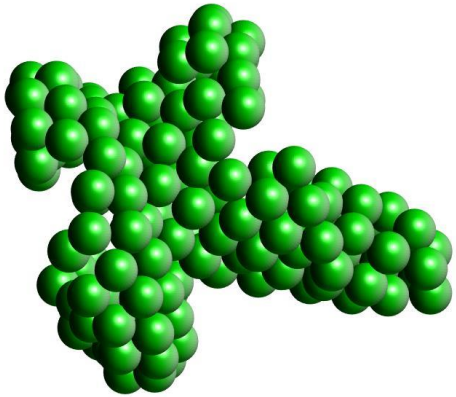
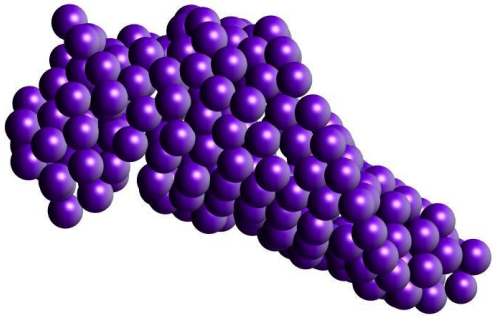
# Berry Counting and Bunch Reconstruction (Dr Scarlett Liu)

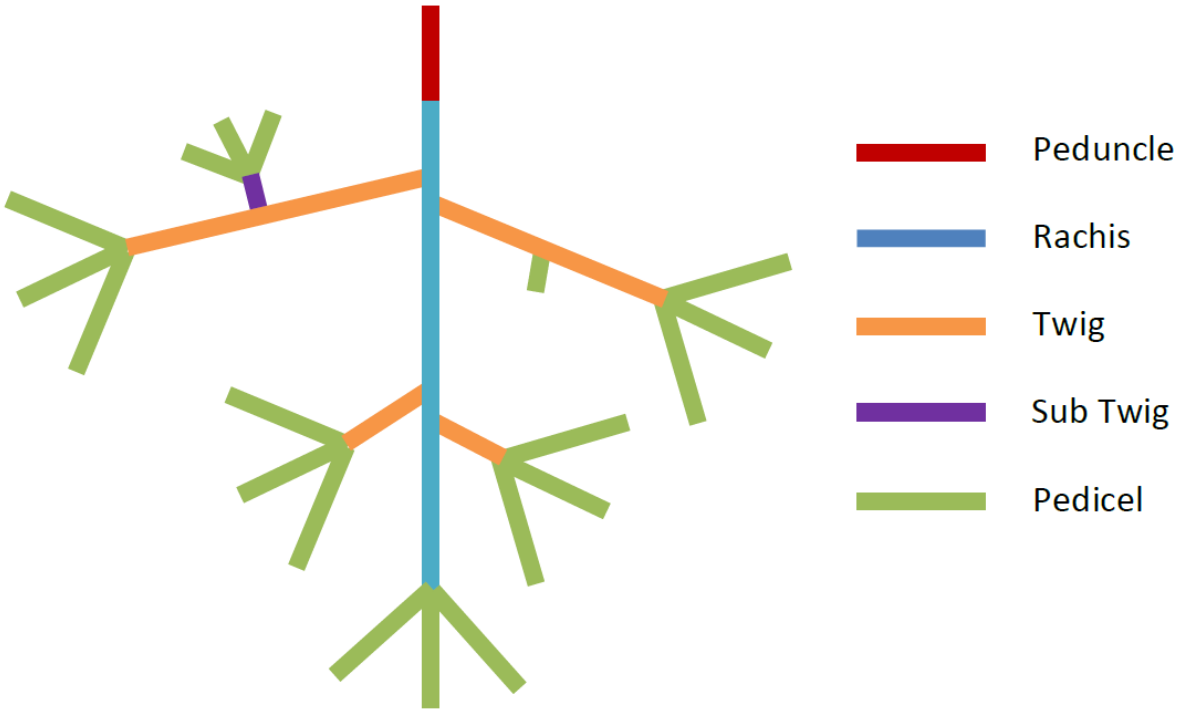




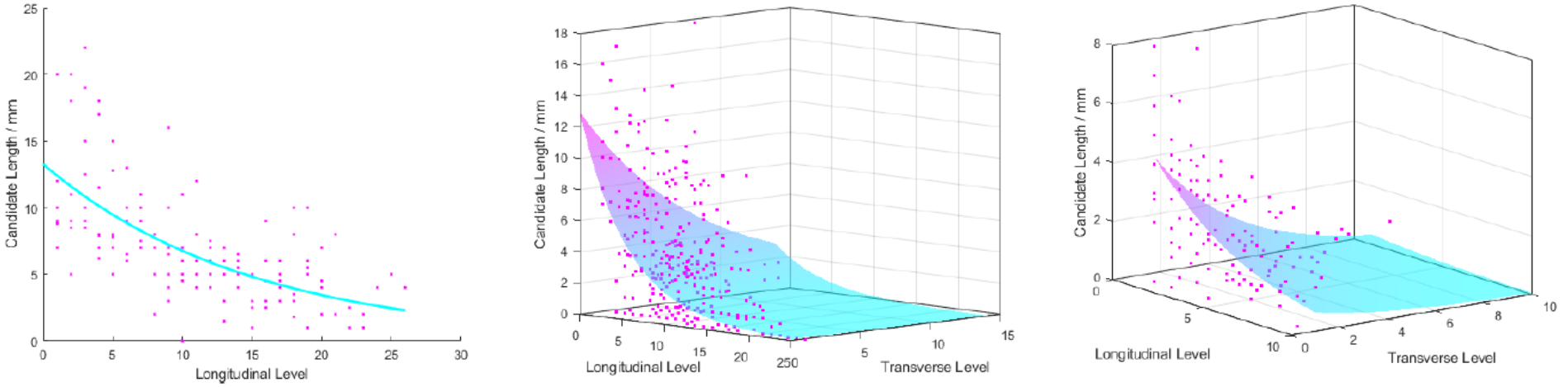
| Harvest stage | Berry Counting Accuracy [%] across 120 samples |
|---|---|
| 40A (CHA) | 98.5 |
| 47A (SHI) | 91 |
| B12 (CHA) | 98.3 |

Liu S; Whitty M; Cossell S, 2015, 'A Lightweight Method for Grape Berry Counting based on Automated 3D Bunch Reconstruction from a Single Image', in *A Lightweight Method for Grape Berry Counting based on Automated 3D Bunch Reconstruction from a Single Image*, ICRA, International Conference on Robotics and Automation (IEEE), Seattle, 30 - 30 May 2015

# Bunch Architecture (Bolai Xin)



# BUNCH ARCHITECTURE (BOLAI XIN)

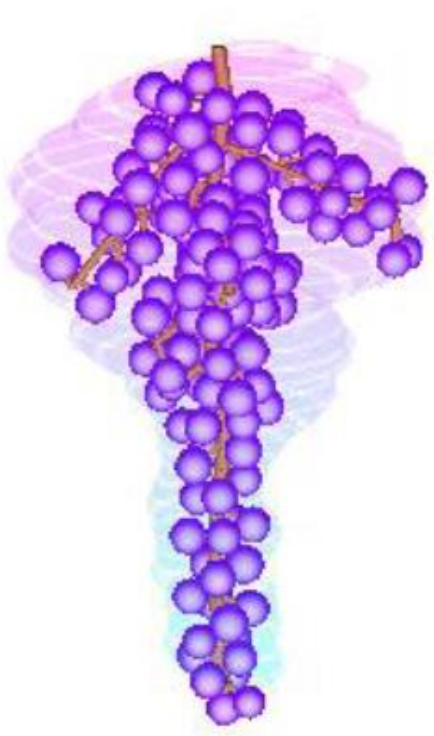


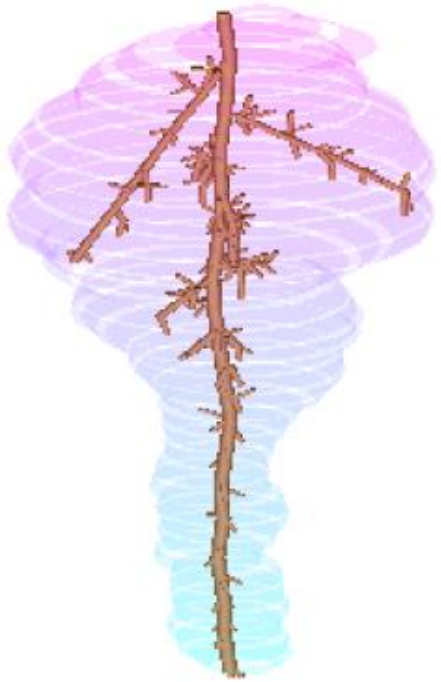

(a) (b) (c)

Attenuation curve fitting for rachis internode (a), twig internode (b), sub-twig internode (c)

Xin, B., Liu, S., Whitty, M., 2019, A Restricted Reconstruction Grammar for Grape Bunches Based on the Stochastic L-system, *Submitted to the Australian Journal of Grape and Wine Research.*

# BUNCH ARCHITECTURE (BOLAI XIN)





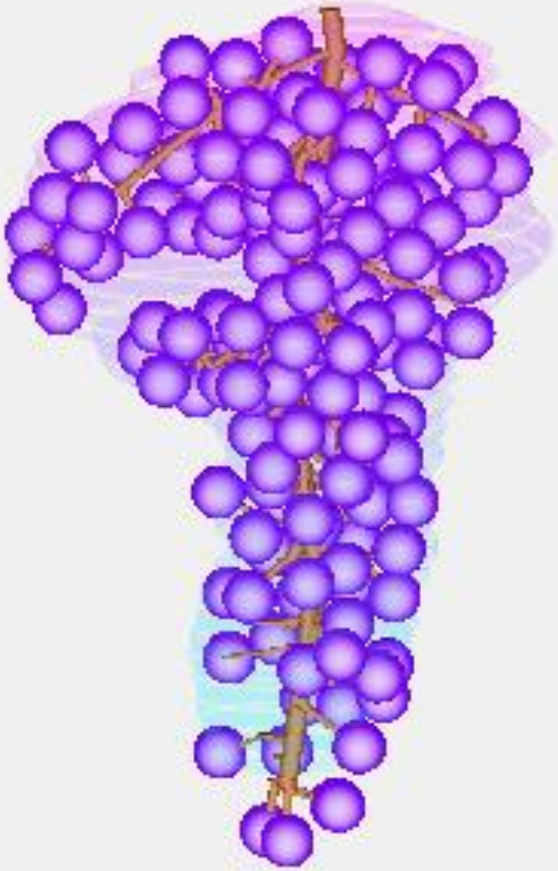
Xin, B., Liu, S., Whitty, M., 2019, A Restricted Reconstruction Grammar for Grape Bunches Based on the Stochastic L-system, *Submitted to the Australian Journal of Grape and Wine Research.*

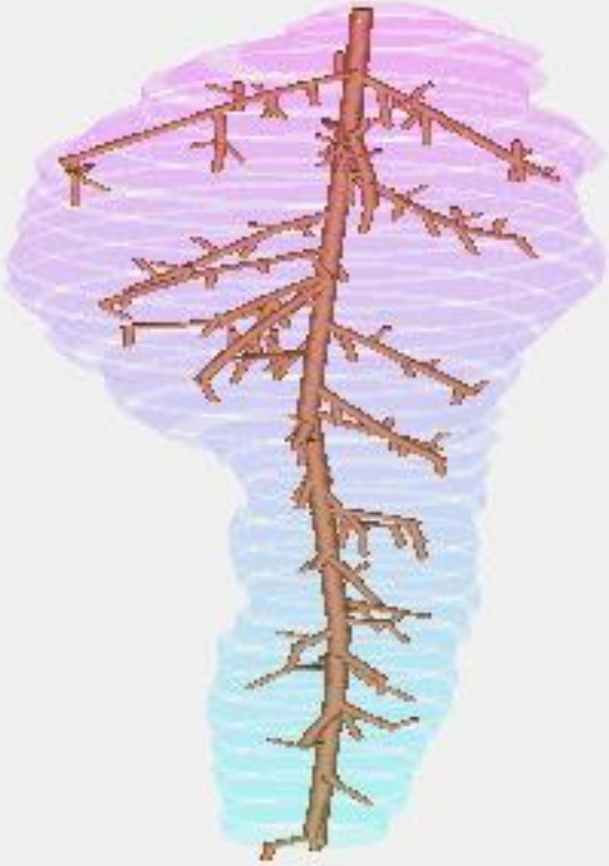
# Bunch Architecture (Bolai Xin)

| Overall length error | Rachis internodes [% error] | Secondary internodes [% error] | Tertiary internodes [% error] | Pedicels [% error] |
|---|---|---|---|---|
| Schöler (2015) | - | 29.6 | -11.1 | 21.3 |
| Proposed approach | 3.5 | 14.6 | -1.5 | 0.1 |

Xin, B., Liu, S., Whitty, M., 2019, A Restricted Reconstruction Grammar for Grape Bunches Based on the Stochastic L-system, *Submitted to the Australian Journal of Grape and Wine Research.*

# Bunch Architecture (Bolai Xin)



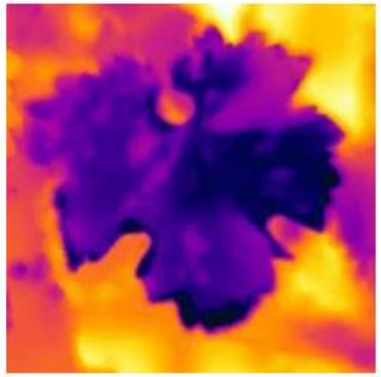


# RACHIS RECONSTRUCTION (Yiwei Han)

# FLOWER COUNTING

Liu S;Li X;Wu H;Xin B;Tang J;Petrie P;Whitty M, 2018, 'A robust automated flower estimation system for grape vines', *Biosystems Engineering*, vol. 172, pp. 110 - 123, http://dx.doi.org/10.1016/j.biosystemseng.2018.05.009

# Rapid + Non-Destructive Maturity Estimation by Multispectral Sensing (Julie Tang)



# Vine Water Stress

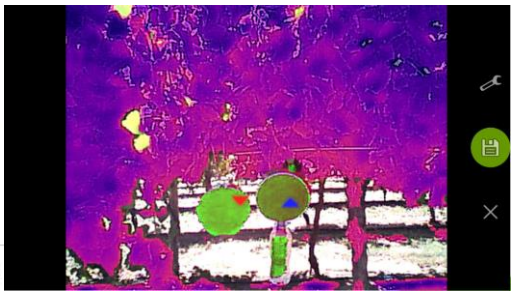
Smart Robotic Viticulture  Tools

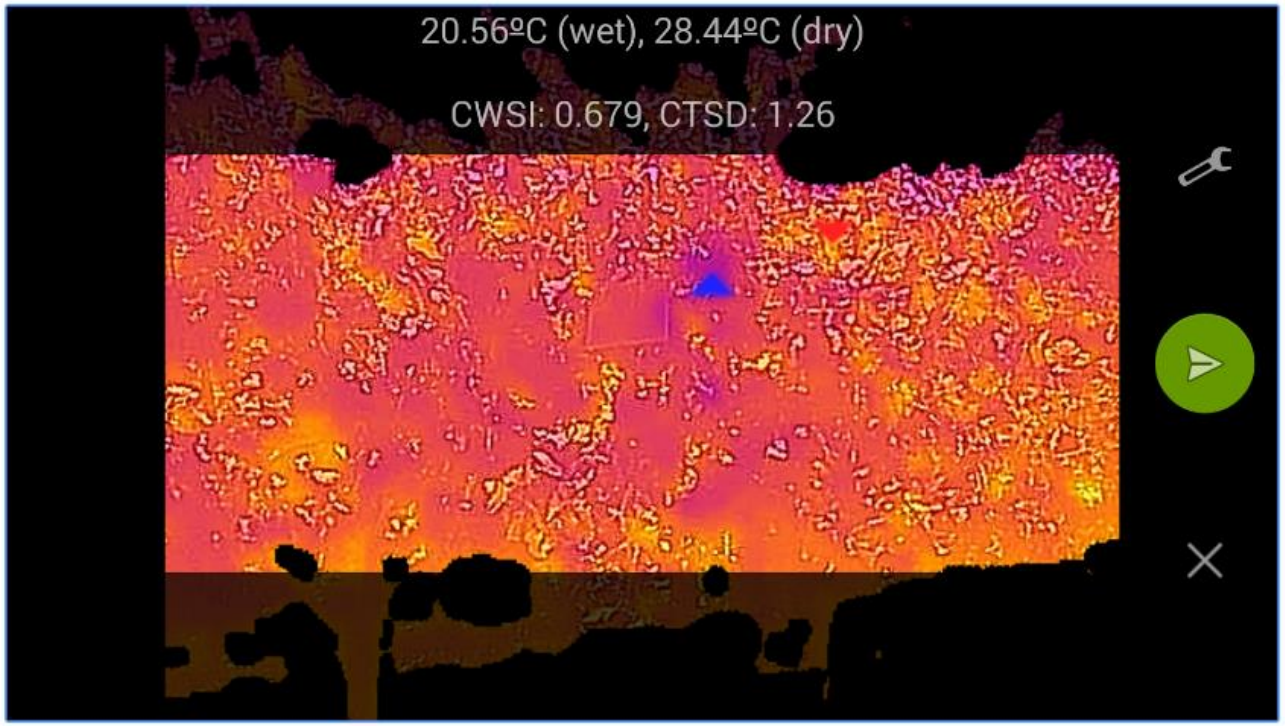
0

3+

This app is compatible with all of your devices.

Installed

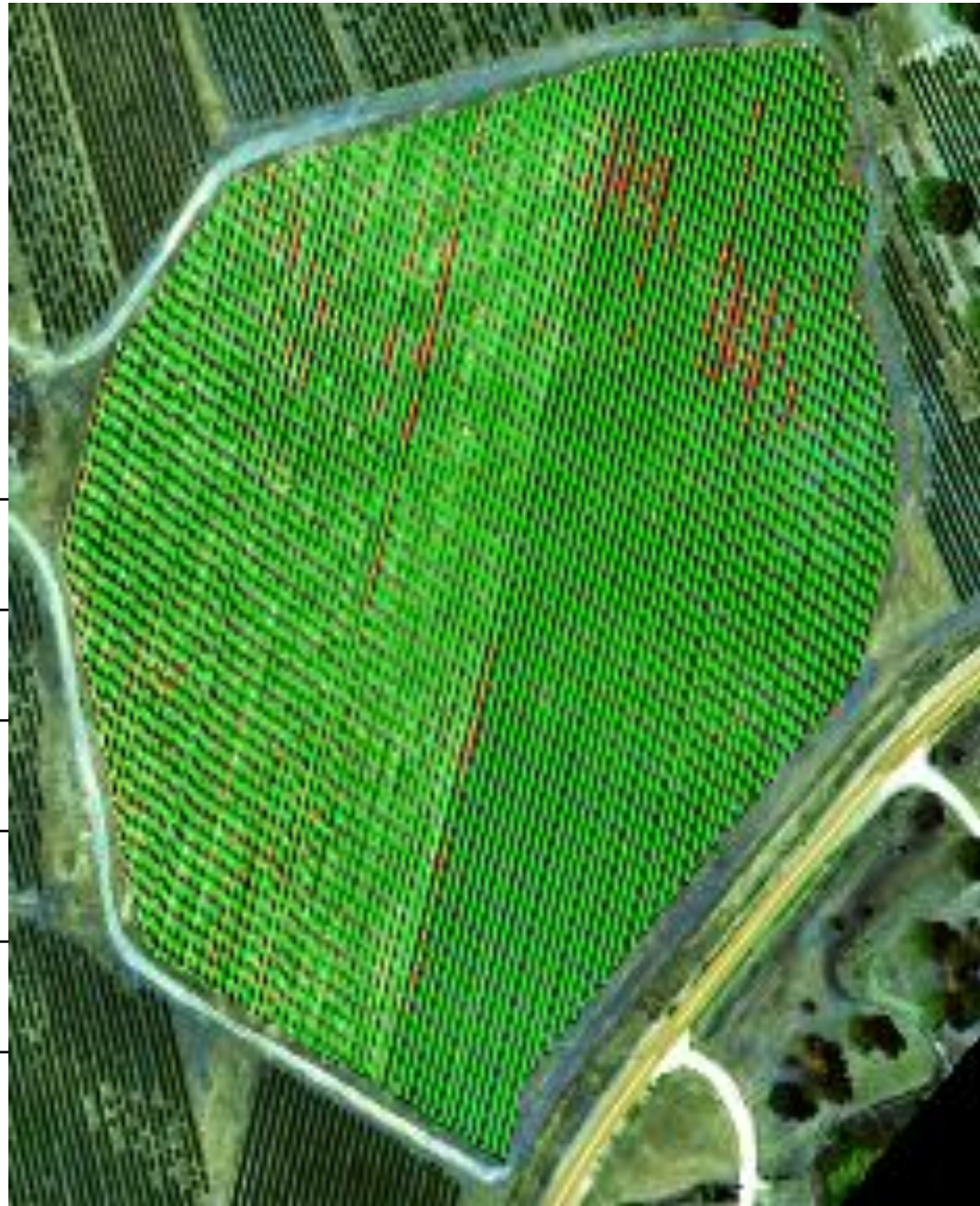



$$CWSI = \frac{T_{canopy} - T_{wet}}{T_{dry} - T_{wet}}$$


Orange
Griffith
Wollongong
Wagga Wagga
J.B.T.
Horsham
Bendigo
VICTORIA
Mount Gambier
Melbourne
Warrnambool
SAMSUNG
FLIR
South-east
Commonwealth
Marine Reserve
Network
South-east
Commonwealth

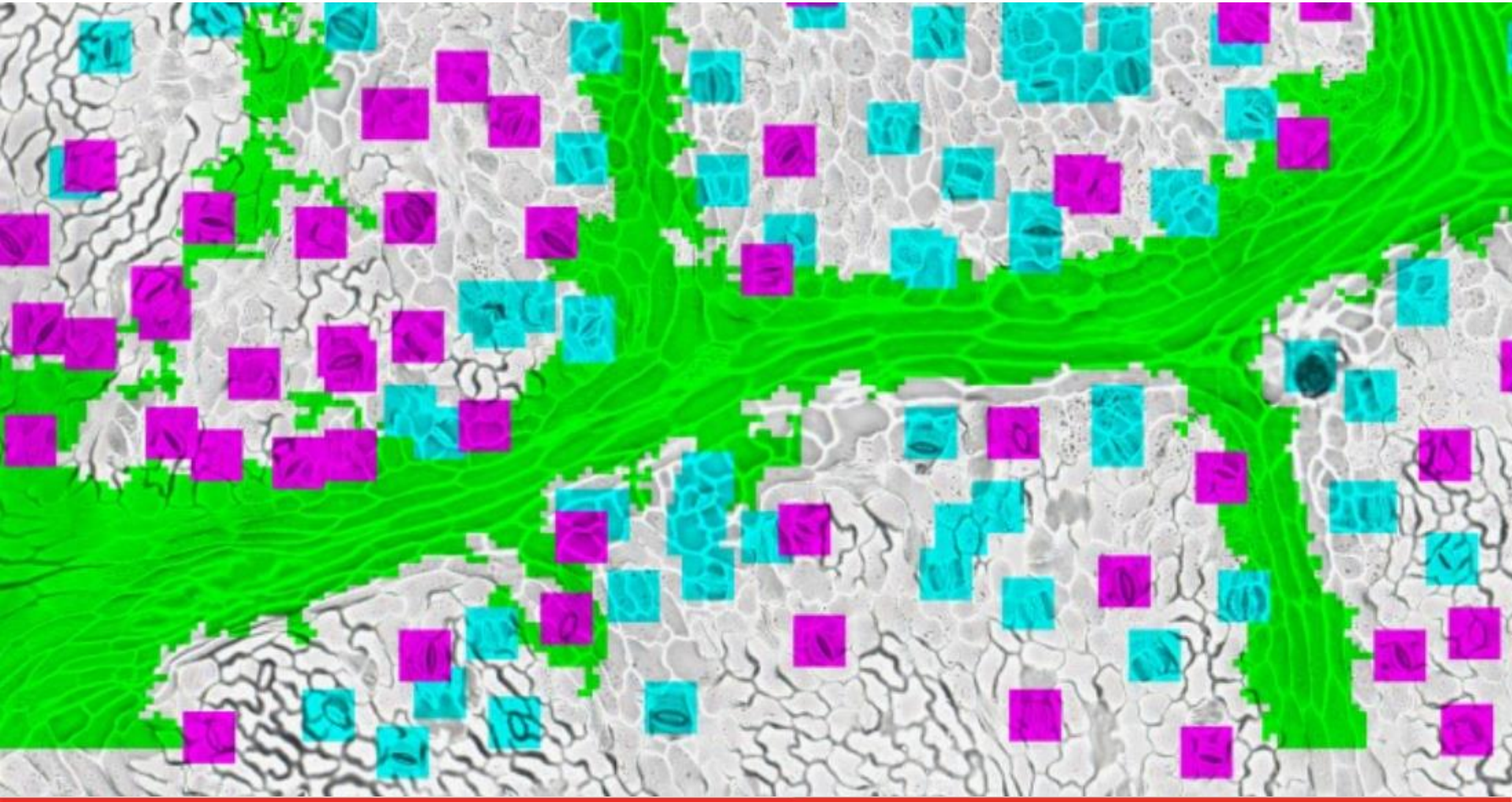
# Remote Sensing of Non-Productive Vine Canopy

| Block | Ground-truth | Estimated |
|---|---|---|
| 40A (2015) | 3.77% | 3.47% |
| 47A (2015) | 18.48% | 17.29% |
| 40A (2016) | 6.00% | 5.52% |
| 47A (2016) | 6.74% | 5.33% |



Tang J; Woods M; Cossell S; Liu S; Whitty M, 2016, 'Proximal and Remote Sensing of Non-Productive Vine Canopy', Sensing, Control and Automation Technologies for Agriculture - 5th AGRICONTROL 2016, Seattle, USA, 14 - 17 August 2016

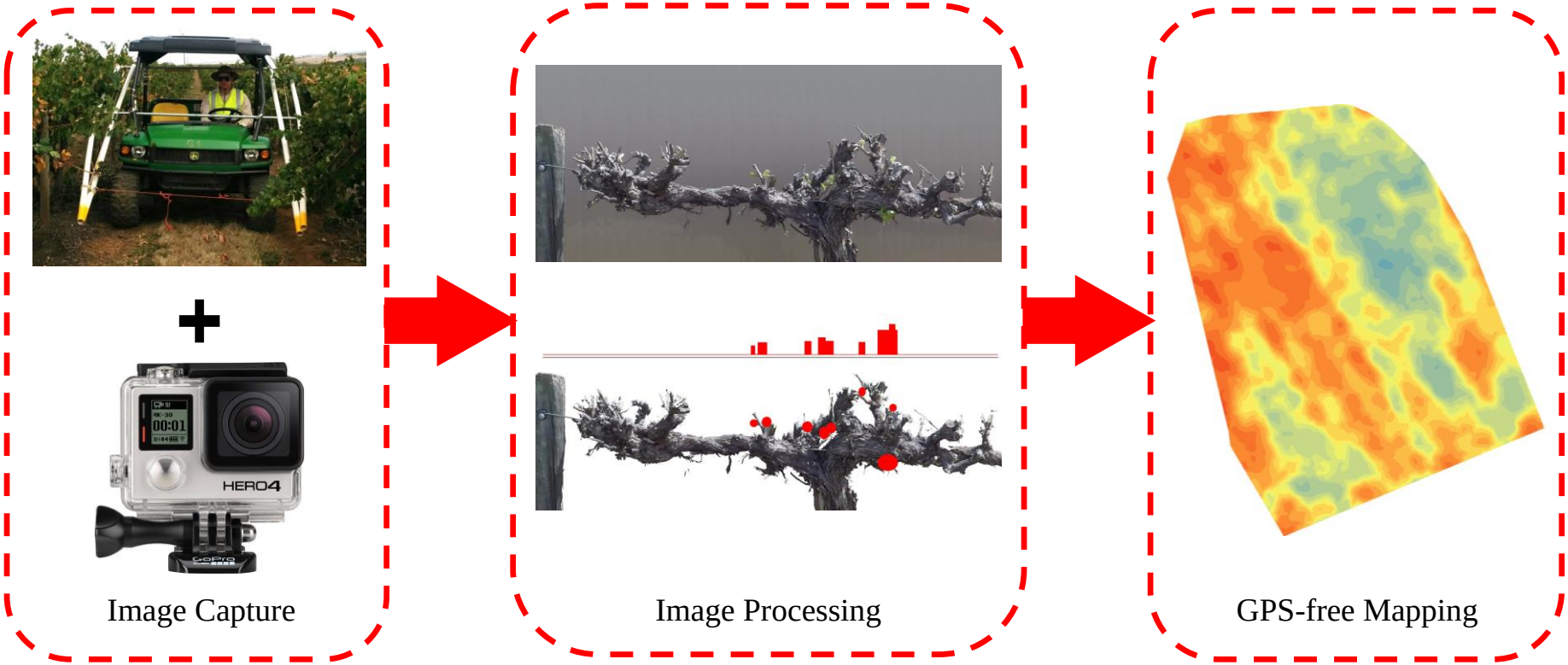
# Microscope Image Analysis (Luke Millstead)



# Bunch Detection – Dr Scarlett Liu

Liu S;Whitty M, 2015, 'Automatic grape bunch detection in vineyards with an SVM classifier',
*Journal of Applied Logic*, vol. 13, pp. 643 - 653, http://dx.doi.org/10.1016/j.jal.2015.06.001

# YIELD ESTIMATION AND MAP GENERATION




Cossell S;Whitty M;Liu S;Tang J, 2016, 'Spatial Map Generation from Low Cost Ground Vehicle Mounted Monocular Camera', in *IFAC PAPERSONLINE*, ELSEVIER SCIENCE BV, Seattle, WA, pp. 231 - 236, presented at AGRICONTROL2016, Seattle, WA, 14 - 17 August 2016, http://dx.doi.org/10.1016/j.ifacol.2016.10.043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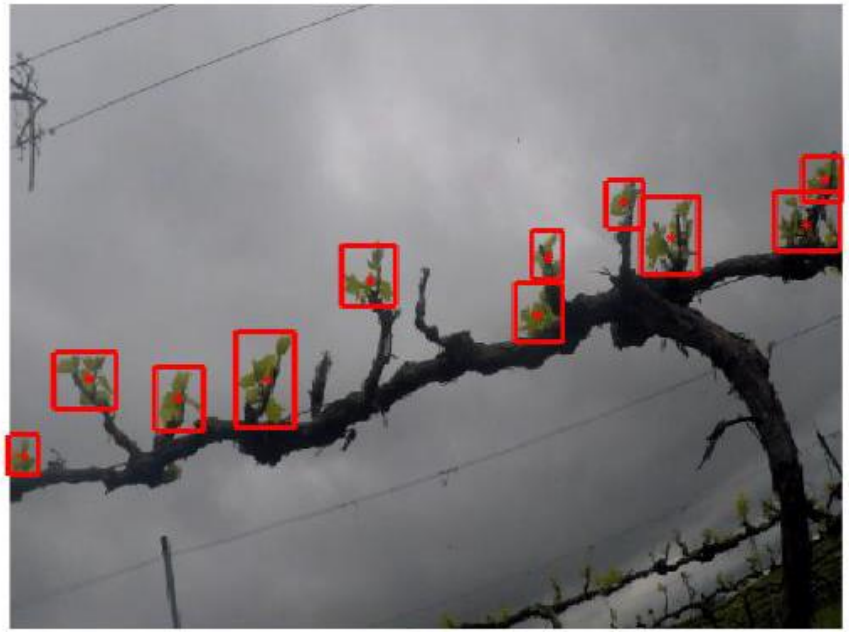
# Unsupervised Feature Selection and Classification



Liu S;Cossell S;Tang J;Dunn G;Whitty M, 2017, 'A computer vision system for early stage grape yield estimation based on shoot detection', *Computers and Electronics in Agriculture*, vol. 137, pp. 88 - 101, http://dx.doi.org/10.1016/j.compag.2017.03.013

# Unsupervised Feature Selection and Classification

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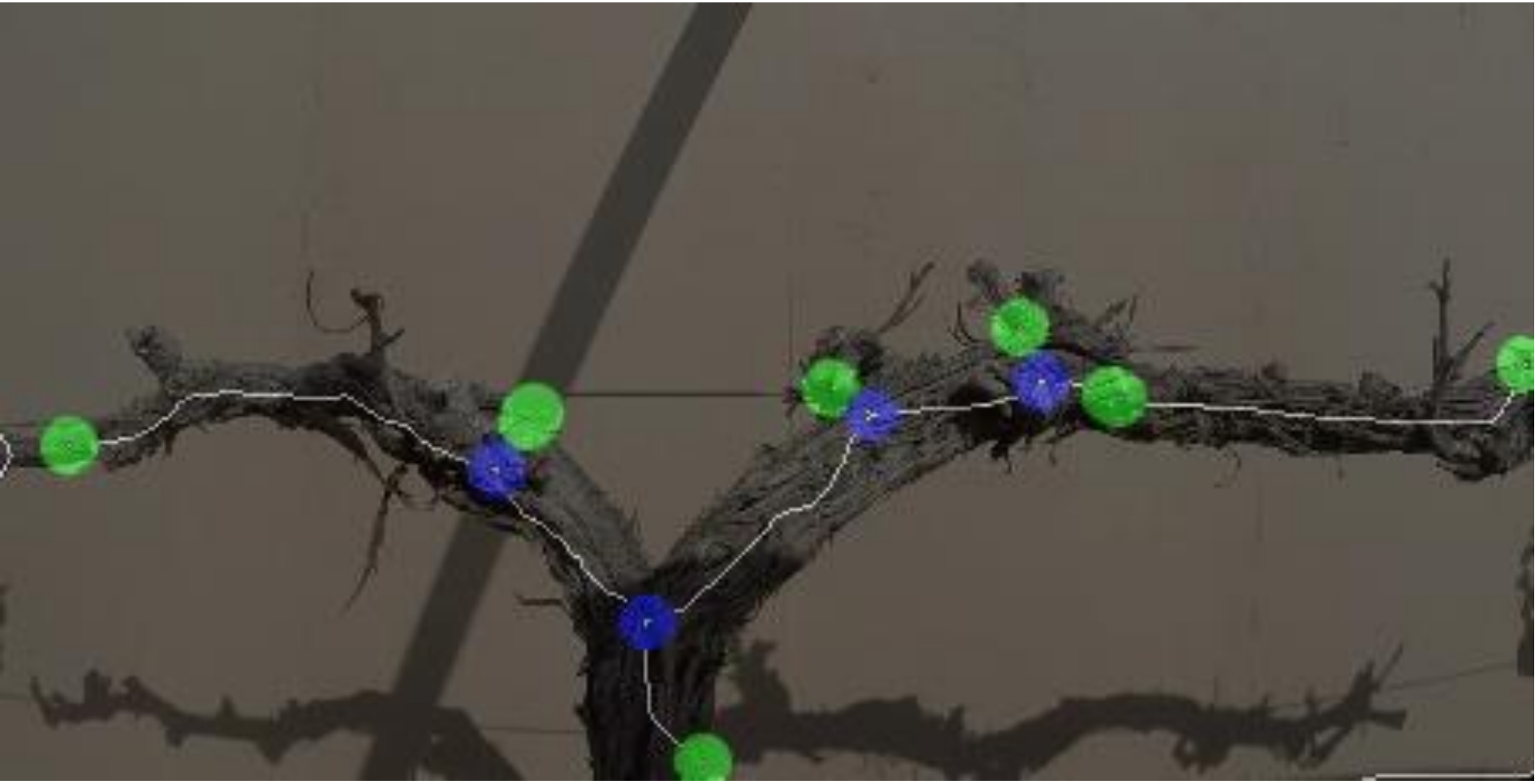
# VINE STRUCTURE FROM GOPRO VIDEO – ANNIE WANG



# VARIABLE RATE SPRAYER FOR APPLE FLOWER THINNING

School of Mechanical and Manufacturing Engineering

Mark Whitty

http://www.robotics.unsw.edu.au/srv/

UNSW AUSTRALIA


# THANK YOU!

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m.whitty@unsw.edu.au

SRV Smart Robotic Viticulture

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PETRIE PR;WANG Y;LIU S;LAM S;WHITTY MA;SKEWES MA, 2019, 'THE ACCURACY AND UTILITY OF A LOW COST THERMAL CAMERA AND SMARTPHONE-BASED SYSTEM TO ASSESS GRAPEVINE WATER STATUS', *BIOSYSTEMS ENGINEERING*, VOL. 179, PP. 126 - 139, HTTP://DX.DOI.ORG/10.1016/J.BIOSYSTEMSENG.2019.01.002

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