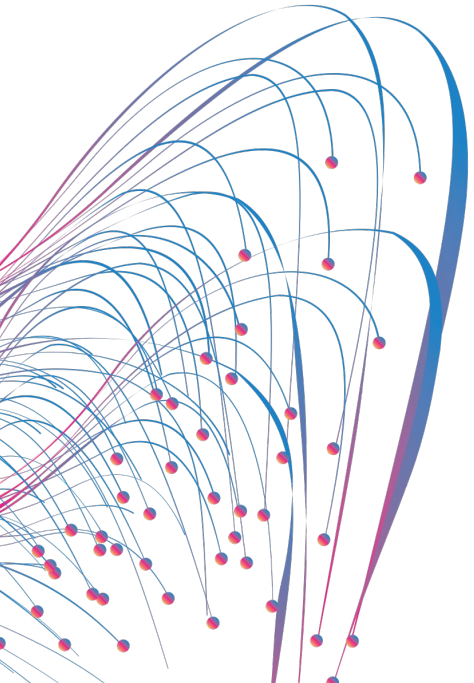
An introduction to AIBIO-UK

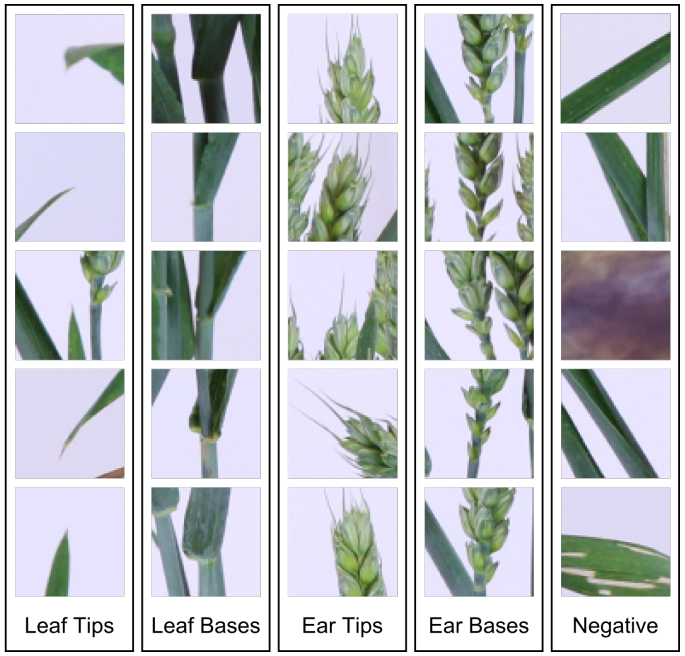
And thoughts about AI applied to bioscience image data

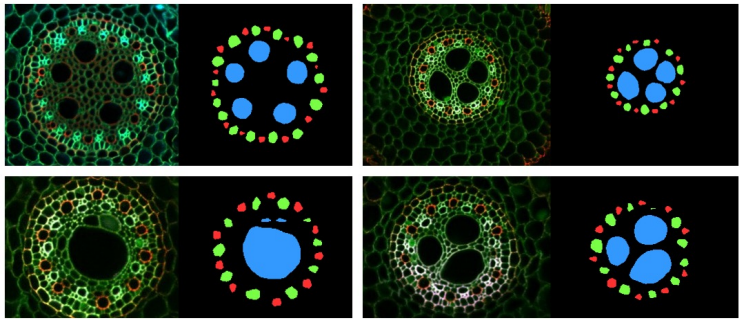


Biotechnology and Biological Sciences Research Council

University of Nottingham
UK | CHINA | MALAYSIA

Deep learning for plant phenotyping

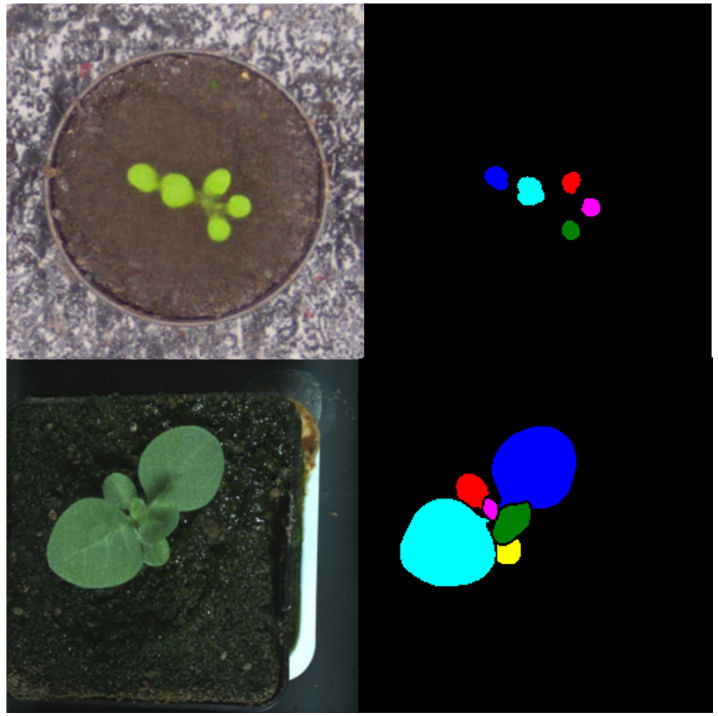




Michael Pound, Eze Benson

Computer Vision Lab, Nottingham

Develop computer vision approaches to plant and agriculture imaging challenges

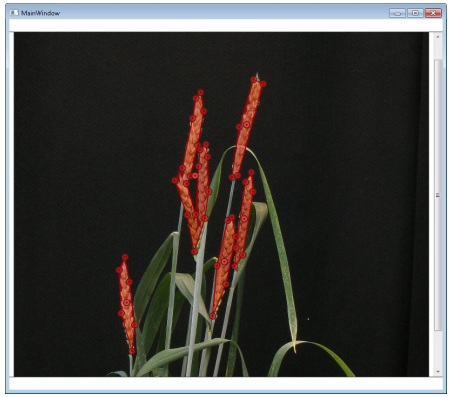


Zane Hartley

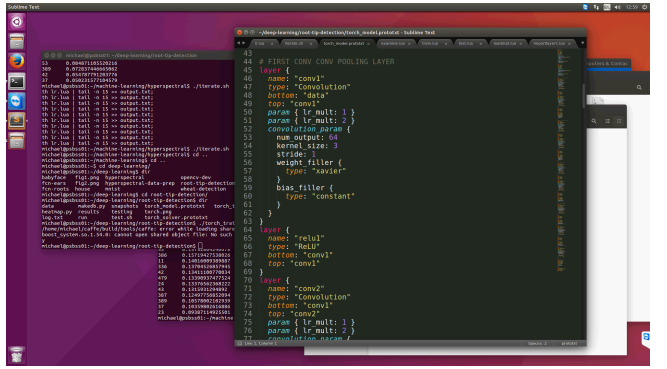
University of Nottingham
UK | CHINA | MALAYSIA

Deep learning pipeline for research

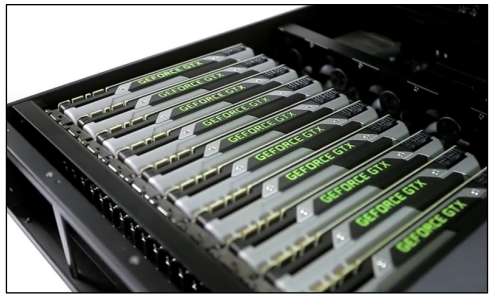
1. Capture and annotate dataset



2. Design network architecture

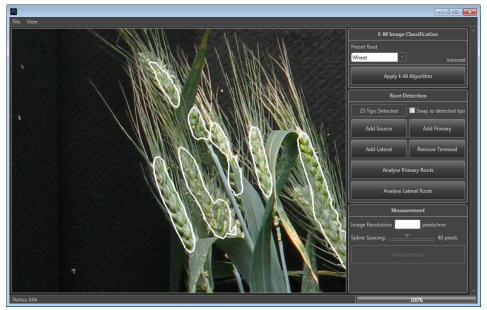


3. Train Network

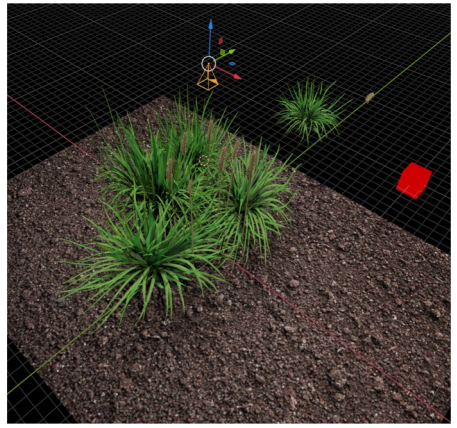


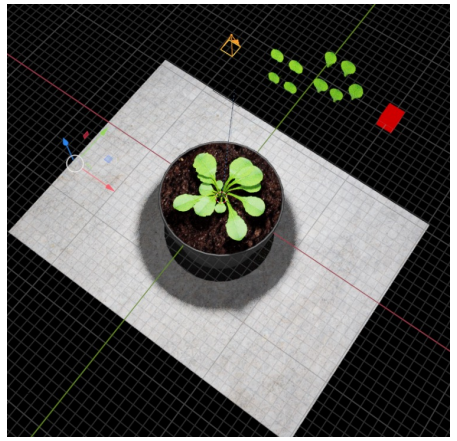
4. Test Network

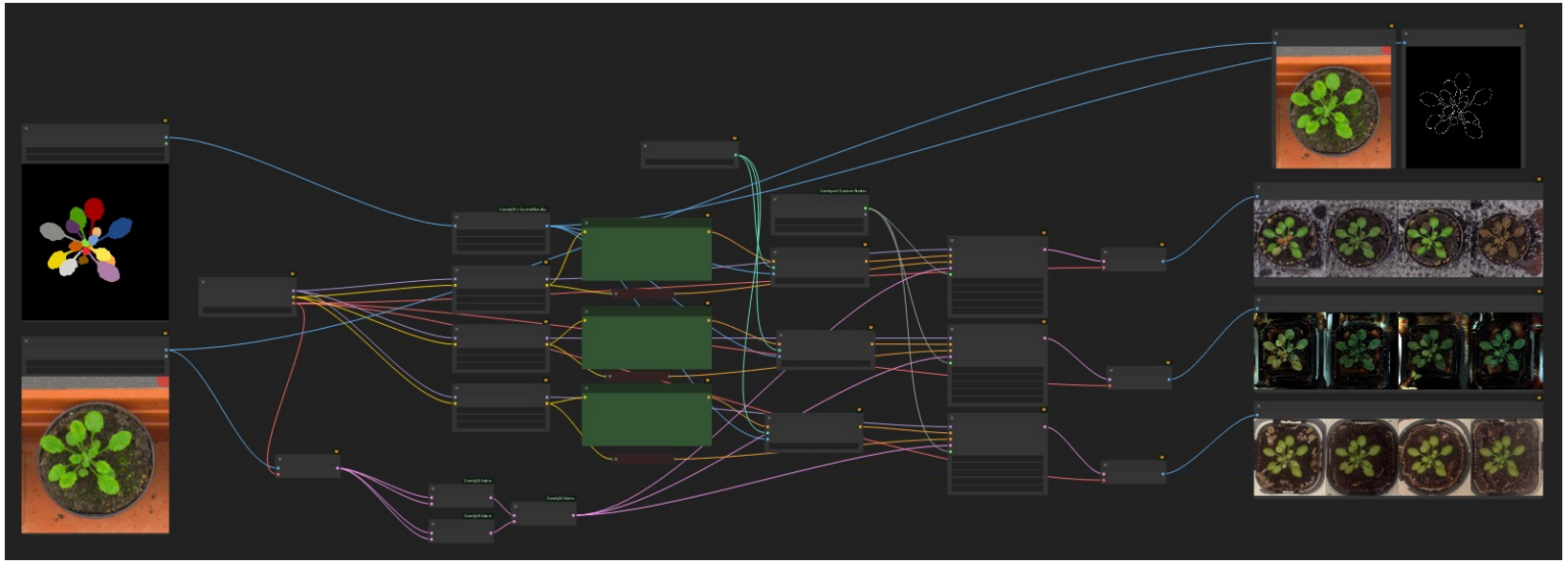
5. Deploy



Generative AI - to save annotation time





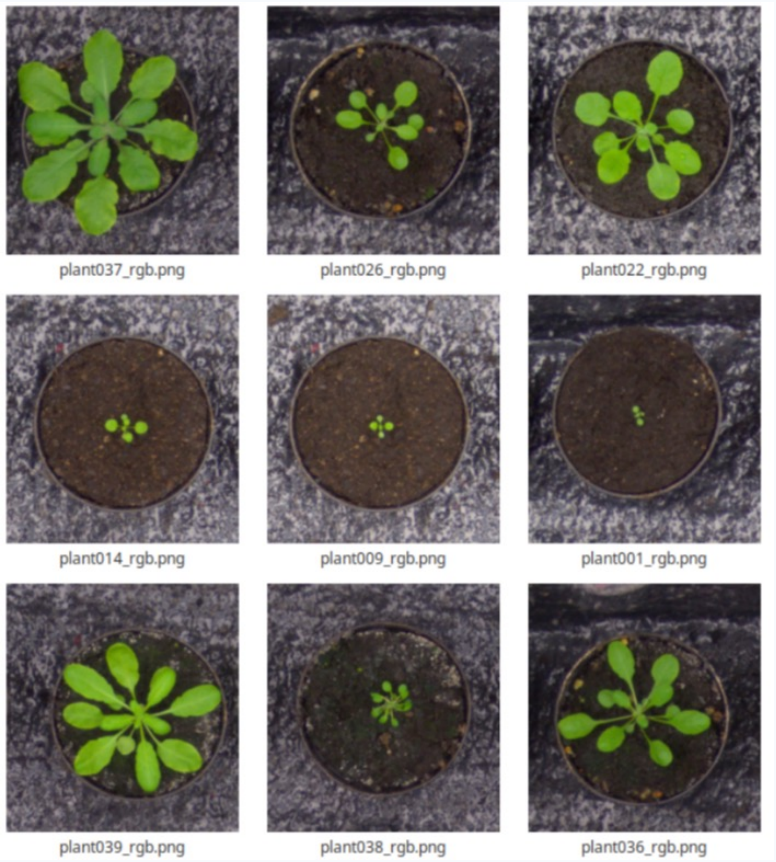


Rendered images

Style transfer: Stable Diffusion, Low Ranked Adapters (LoRAs), ControlNets via ComfyUI

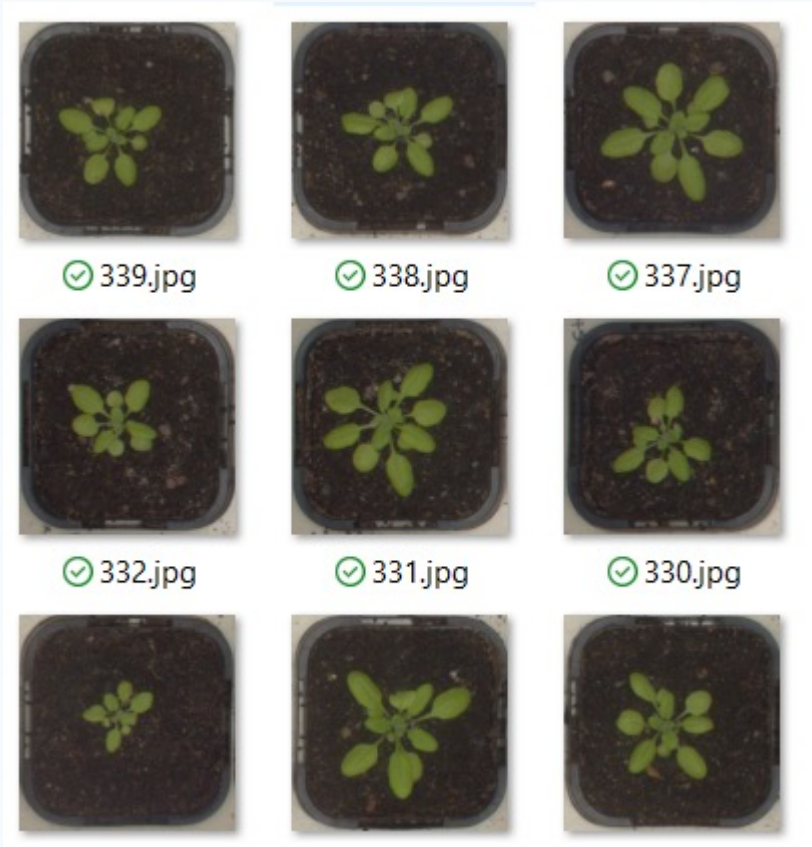
Plant image dataset – varied appearance

Type #1

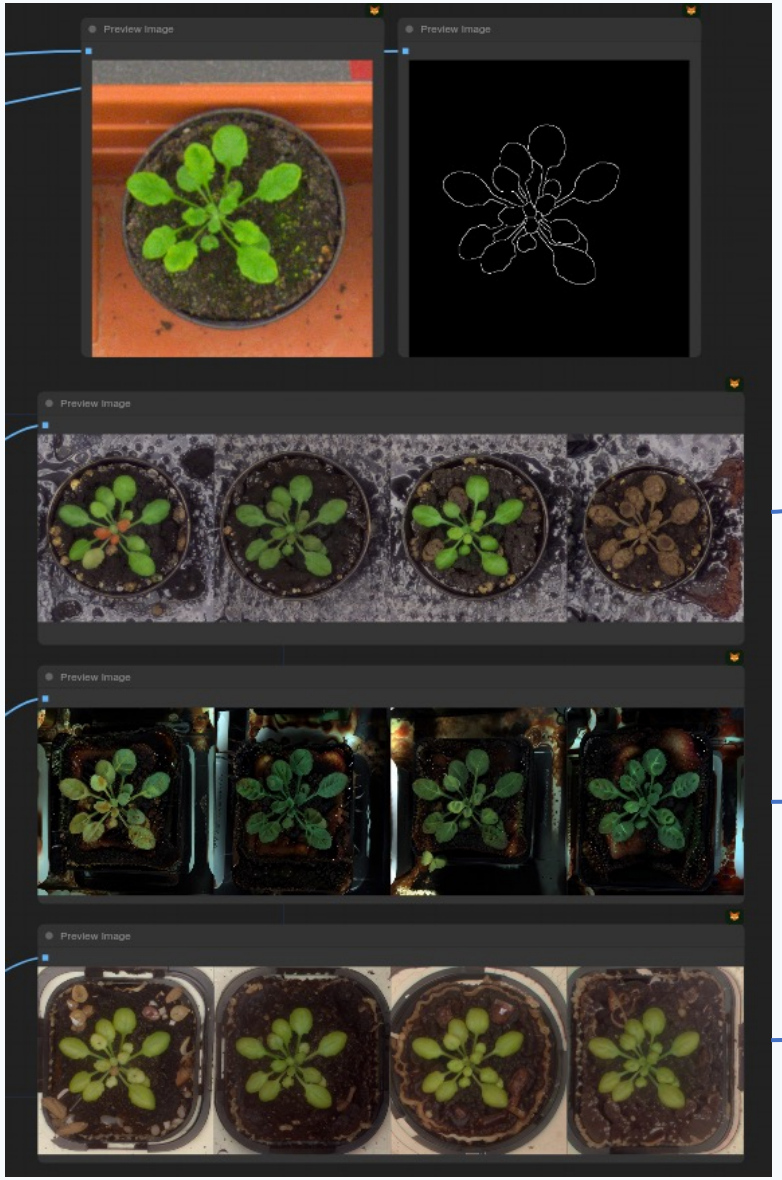


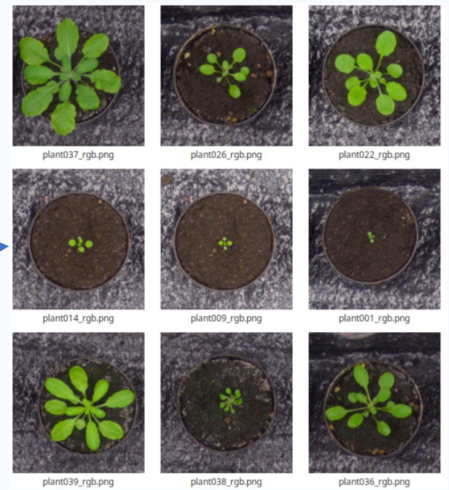
Type #2

Type #3

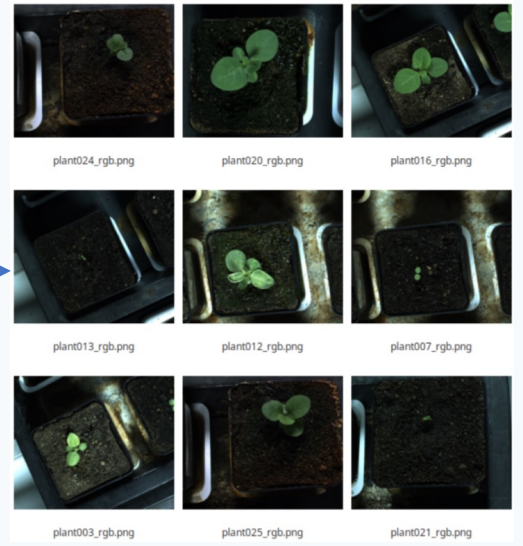


Comparison of real and synthetic

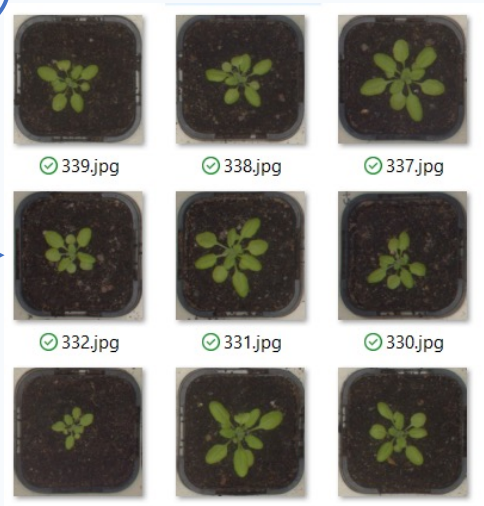




Real



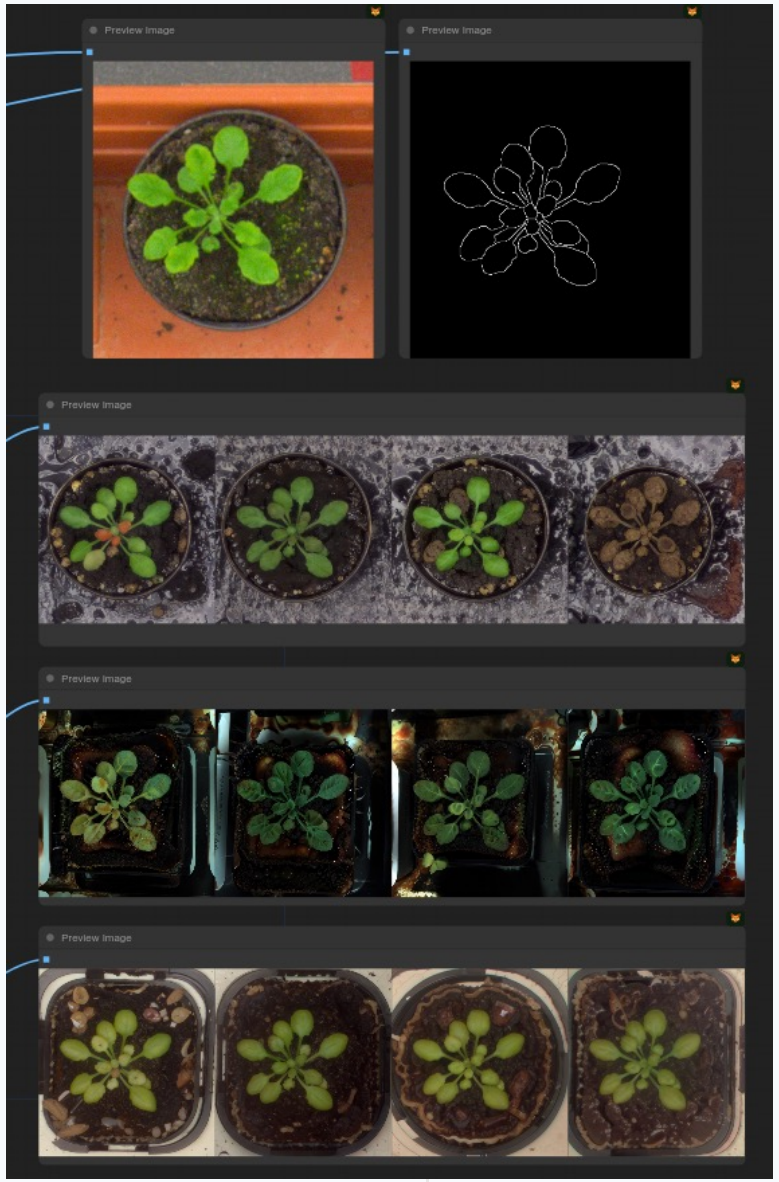
Real



Real

Fake

Zane Hartley


Preview Image
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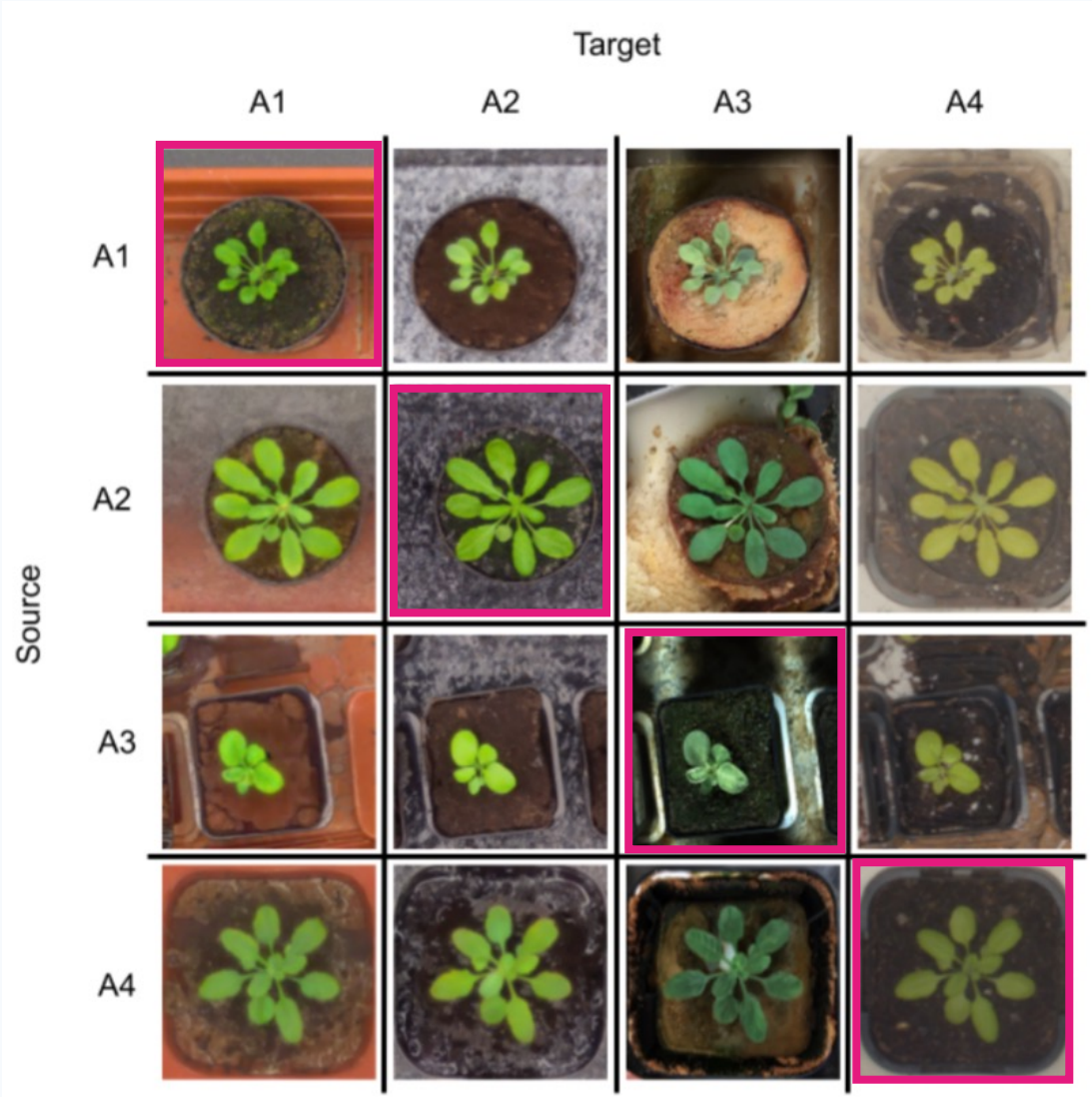
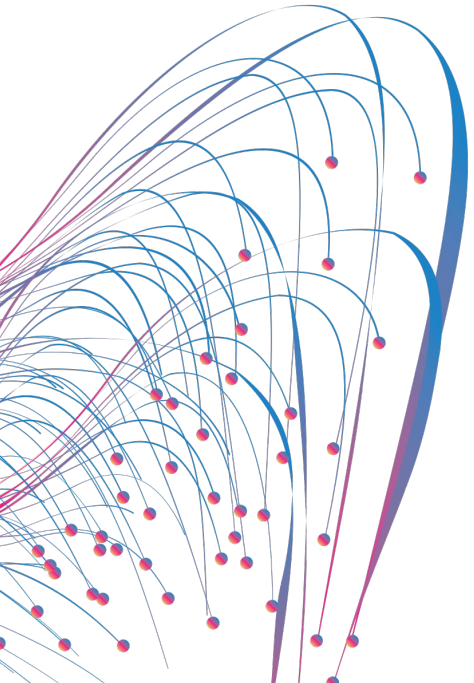

Target
A1
A2
A3
A4
Source
A1
A2
A3
A4

Research ecosystem thoughts – Computer Vision

- GPU Compute?
  - In house, cloud
- Annotation cost?
  - Expert time
  - Paid external
  - Citizen science
- End-user application?
  - Deployment
  - Explainability
  - Compute
- Interdisciplinary understanding
  - Capabilities
  - Expectations
  - Limitations
- Applied development
  - Understanding of AI
  - The future of coding…?

An Introduction to AIBIO-UK



Andrew French

Artificial Intelligence in the Biosciences UK

AIBIO-UK

- A community-building project
- Interdisciplinary between computing and biosciences

“Recent AI applications to the biosciences have been promising, but efforts have been uncoordinated, and limited to groups with specific expertise. Our vision is to bring together AI and core bioscience researchers to unravel biological fundamentals and tackle impeding societal challenges”

AIBIO-UK: The journey since Autumn 2022

Community workshops (Autumn 22)

Writing the proposal (Winter 22)

Interview (Spring 23)

Award (Summer 23)

Planning, recruitment (Autumn 23)

Kick off meeting (Winter 23)

Stable Diffusion (Aug 22)

DALLE 2 released (Sept 22)

Chat GPT 3 released (Nov 22)

Chat GPT 4 released (Mar 23)

The evolution of AI - perception

Hand-crafted tools

Learning systems (neural nets)

Large Language Models

Next…?

AIBIO-UK structure


Patrick Cai, Manchester


Andrew French, Nottingham (Director)


Robert Knight, Kings College London


Georgios Leontidis, Aberdeen


Lucia Marucci, Bristol


Dipali Singh, Quadram


Reyer Zwiggelaar, Aberystwyth (Co-director)

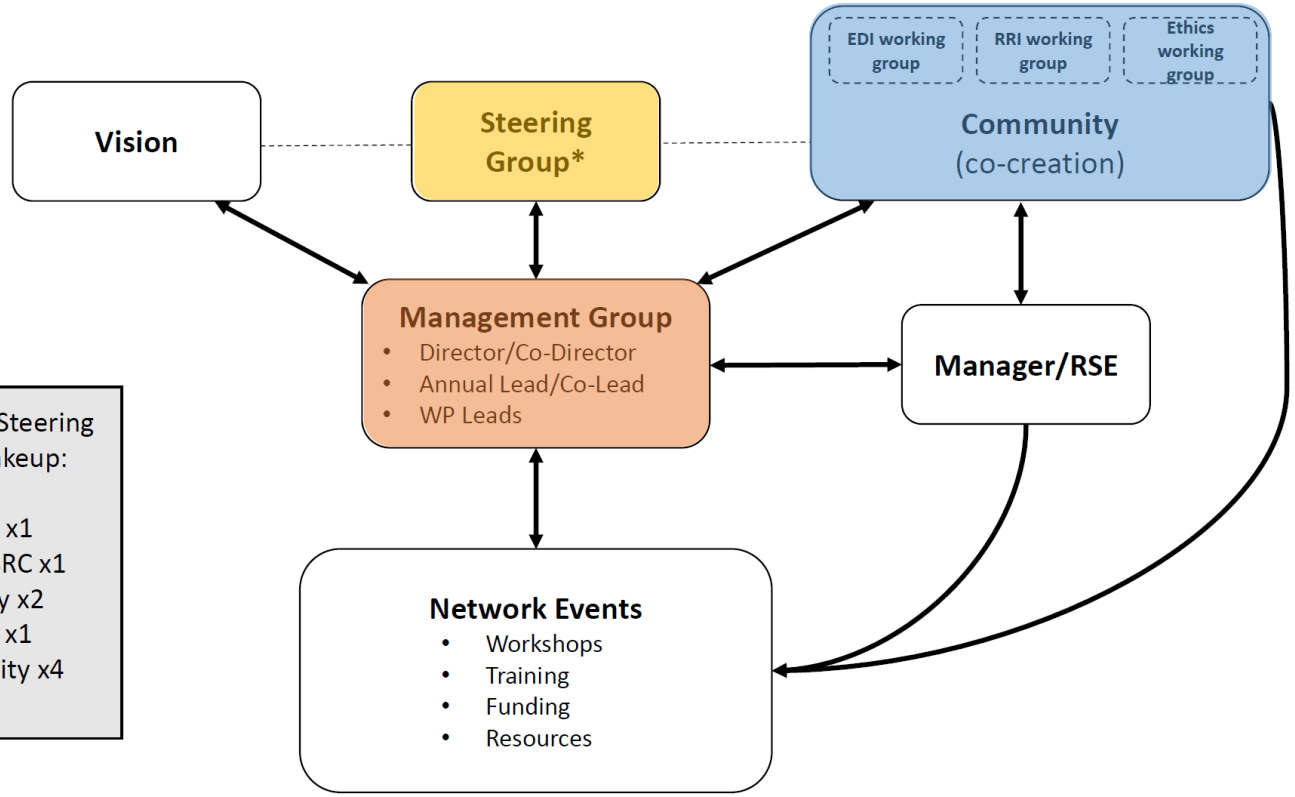
Two of the management team will **co-lead** each year on rotation (mixing bio and computational strengths)

Steering group to feed into management of the network (to be finalised after start)

Community to co-create events

*Proposed Steering group makeup:

BBSRC x1
UKRI/EPSRC x1
Industry x2
Turing x1
Community x4



What do we hope for from the network?

Inclusivity	Be fully inclusive of the bioscience and AI communities
Community	Bring together bioscience and AI communities
Provide	Provide events and activities to upskill bioscientists in AI
Reach	Reach as broad a field of bioscience disciplines as possible
Resources	Be the “go to” place for resources at the interface between AI and the biosciences
AI for good	Use AI to help make bioscience more quantitative and computational

Upcoming highlights

Pilot project funding Round #1

Event FlexiFund

Specialist Topic workshops – e.g. Trusted Research

Community engagement

Direct involvement:

- Steering group
- Equality and Diversity (EDI) working group
- Responsible Research and Innovation (RRI) and Ethics working group

Schemes for:

- Pilot projects
- Placements
- Event support

Linking with other groups and networks

Working with industry

AI IN THE BIOSCIENCES

Bringing the bioscience and AI communities together.

Web: aibio.ac.uk

UKRI
Biotechnology and
Biological Sciences
Research Council