

Annual APTRC Forum 2022

Pollination Project: Tomato Flower Classification using Machine Learning

~ taking the initiative to improve tomato flower cross-pollination...

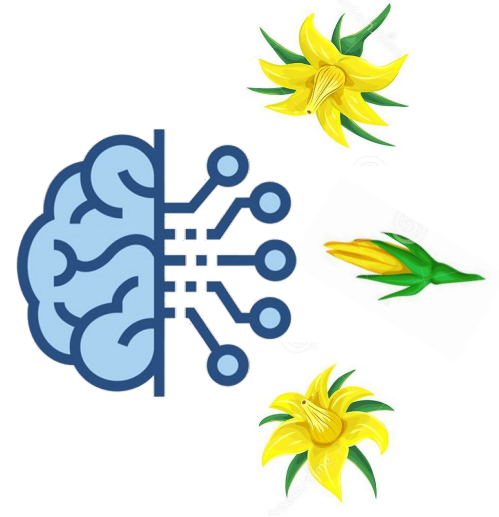
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Overview



- Our initiative:
Automating the flower selection process.
- Utilization of advanced machine learning approach for image classification.
- Easy-to-use deliverable (accessible through a smart phone).



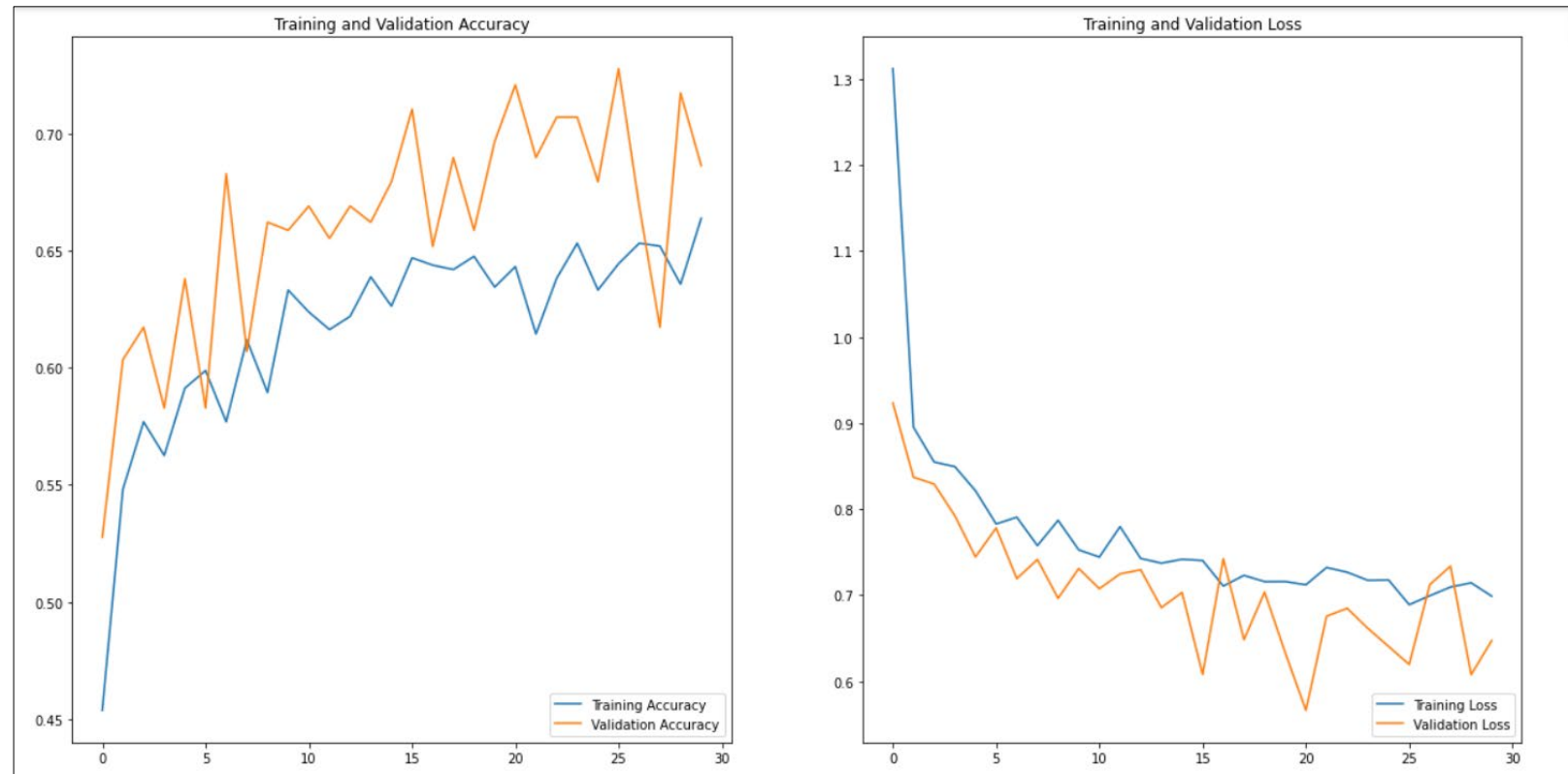
Project Implementation

- ▶ Feasibility check:
Tested with 200 self-obtained images.
- ▶ Collaboration with APTRC:
 - ▶ *Image dataset including 2000+ images of unopened, early-aged, matured, and old tomato flowers.*
- ▶ Data labelling and augmentation



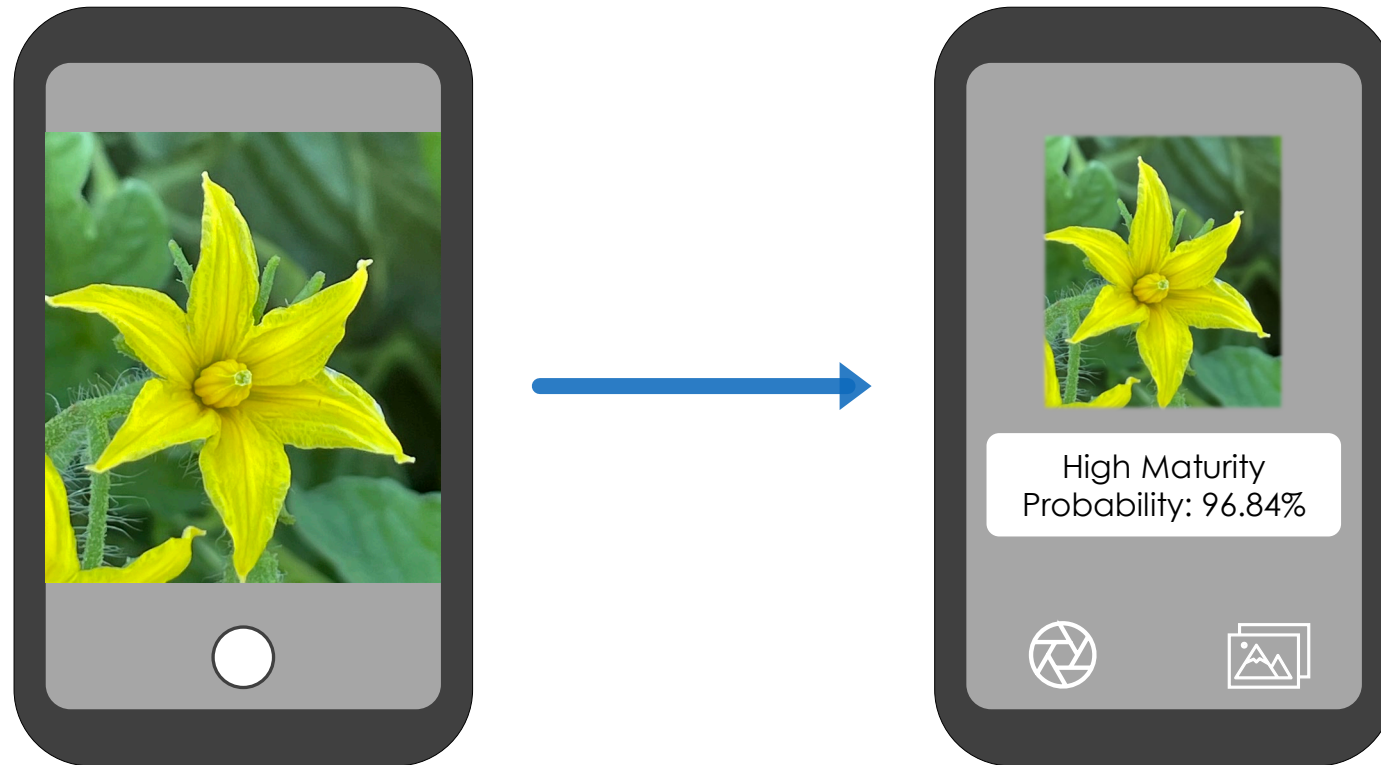
Integration with Deep Learning

- Machine learning basis focusing on testing and improving performance



Final Product

- ▶ An interactive mobile application based platform





Discussion



- ▶ Datasets used in this project is large and unique in the world.
- ▶ Advanced Machine Learning/Deep Learning algorithms have been implemented and produce reasonably accurate classification of tomato flowers.
- ▶ The classification program can be deployed as a standalone mobile phone (iOS or Android) app. This app can also be extended and use as a smart, continuous monitor of tomato bushes' growth.
- ▶ This project has implied applications, e.g., can function as a vision and recognition system for an autonomous pollination robot arm.
- ▶ Future works include improvement of classification and robustness by employing the latest deep learning algorithms. Further development of the iOS/Android app as a training tool is also a possibility.



Acknowledgement



- ▶ The project team would like to thank APTRC for the in-kind support in carrying out this proof-of-concept project.
- ▶ Special thanks also to Ann, Bill, and Matt for the enormous help in compiling the comprehensive and unique image dataset.