CASSAVA LEAF DISEASE CLASSIFICATION

Presented by Group 11

cassava leaves

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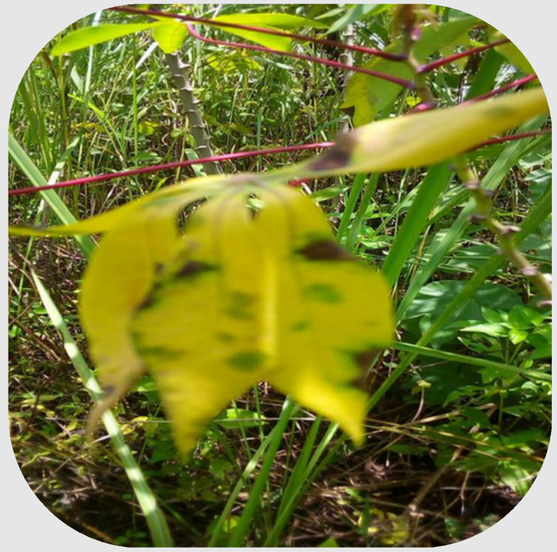
INTRODUCTION



1. Bacterial Blight

2. Brown Streak Disease

3. Green Mottle

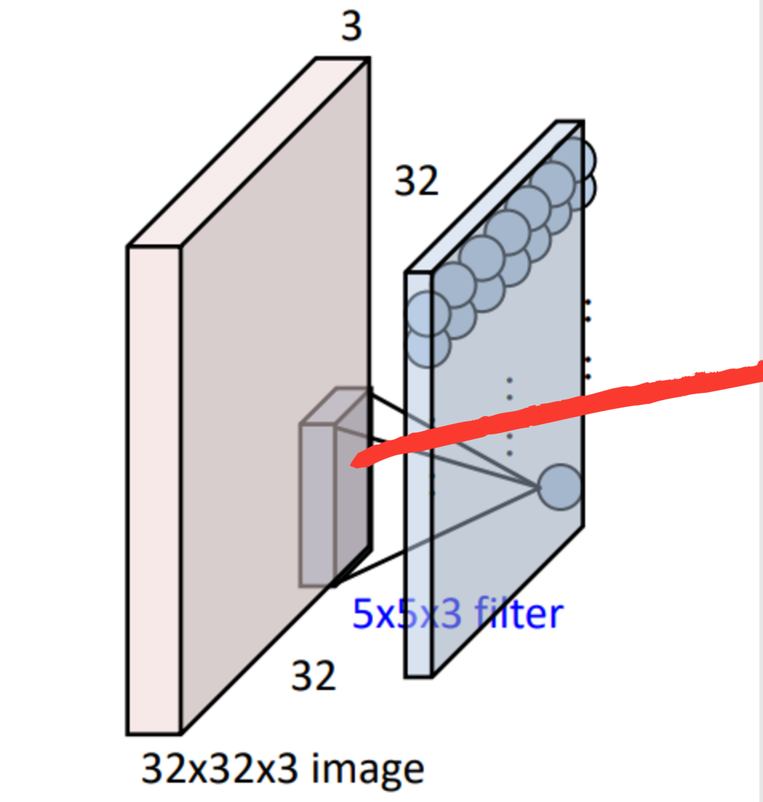
4. Mosaic Disease

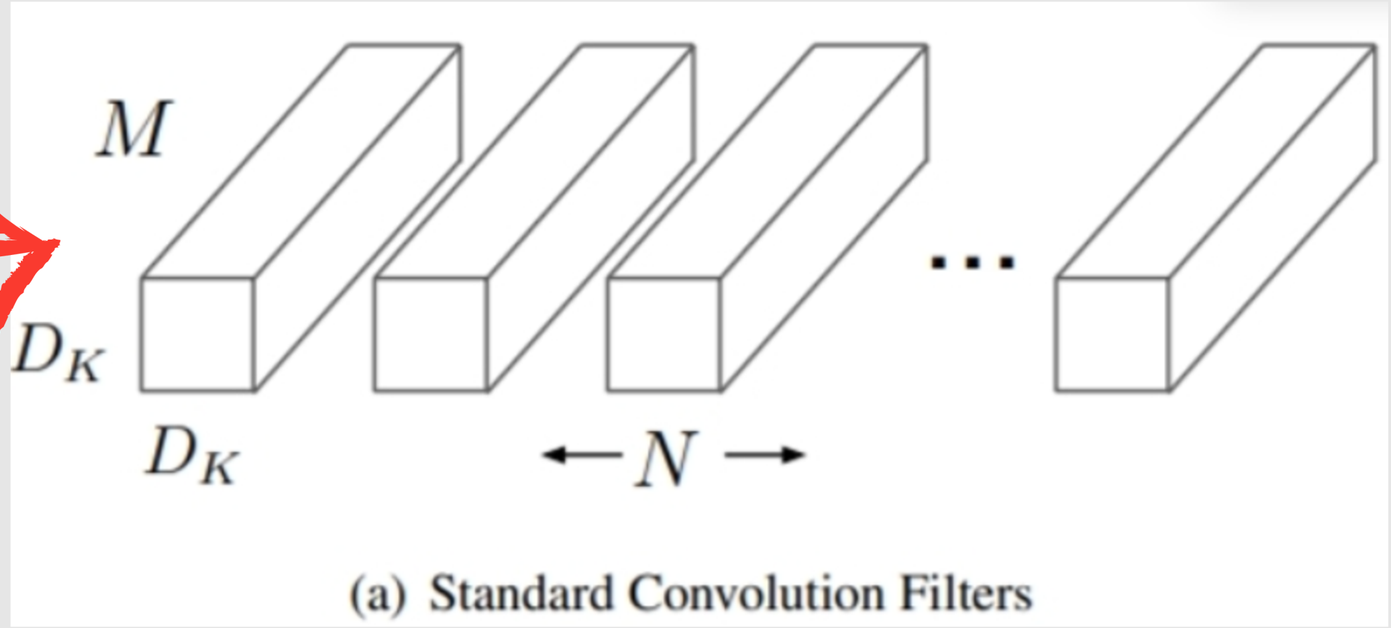
5. Healthy

RELATED WORKS

Convolutional Neural Networks (CNN)

Well known model architecture for image processing





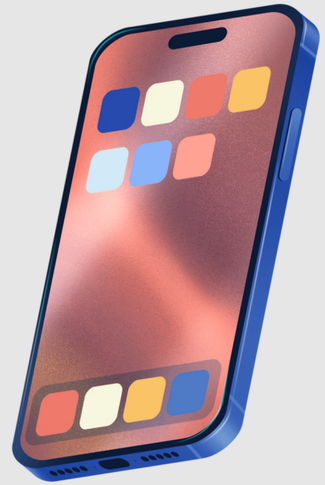
METHOD

Crop Net

A convolutional neural network family specified for plant disease classification. Specifically, it use mobile net as its backbone, which is designed for embeddings system and other low computational devices.

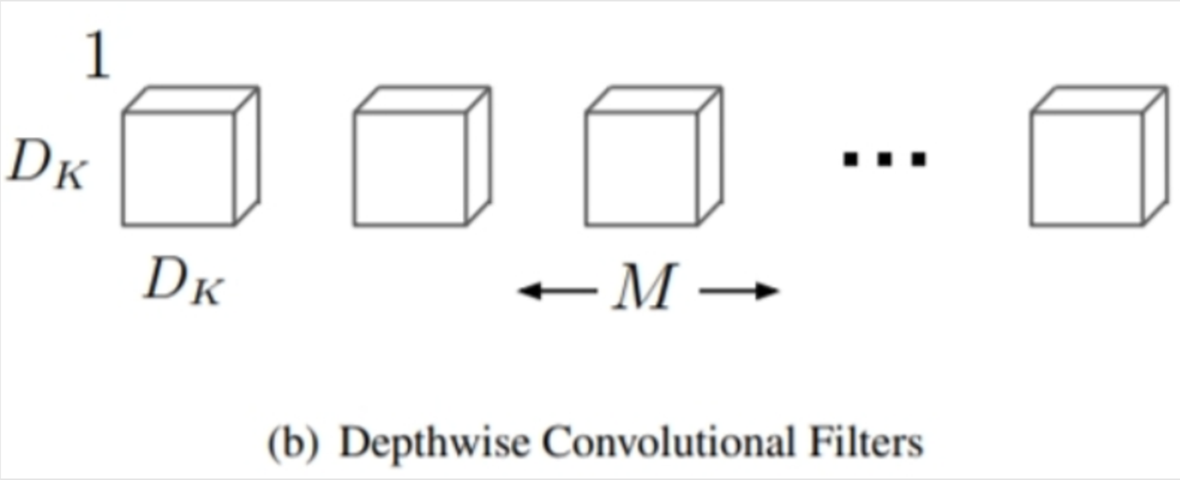
Mobile Net

- Depthwise Separable Convolution (V1)
- Linear Bottleneck & Inverted Residual Structure (V2)
- Squeeze and Excitation with NAS (V3)

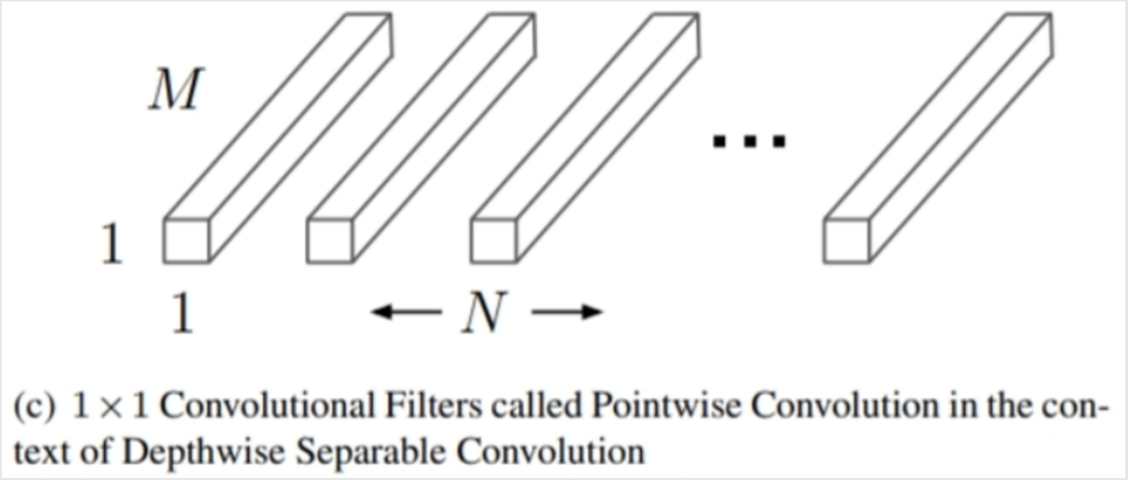


Depthwise Separable Convolution

Depthwise Convolution + Pointwise Convolution



(b) Depthwise Convolutional Filters

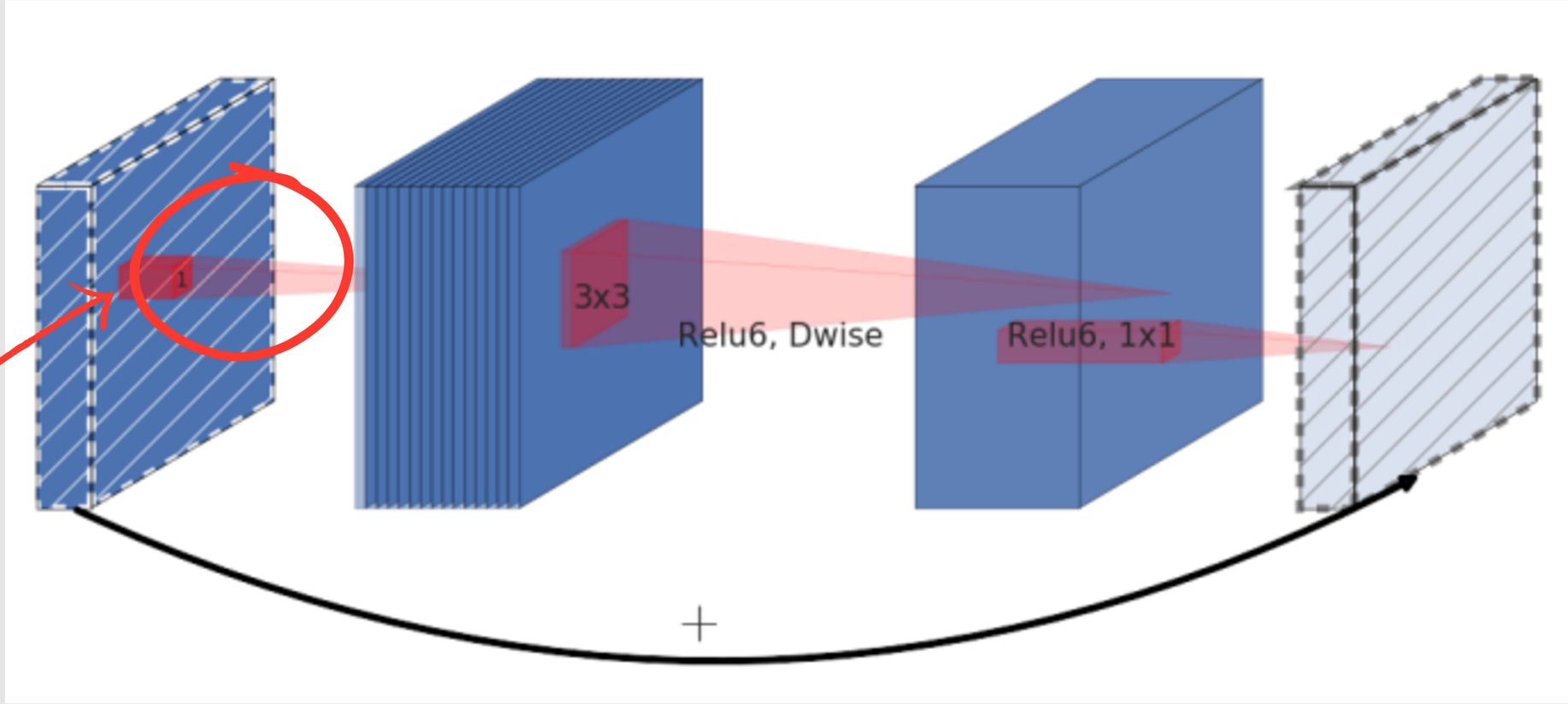


(c) 1×1 Convolutional Filters called Pointwise Convolution in the context of Depthwise Separable Convolution

Linear Bottleneck & Inverted Residual Structure

Problem: ReLu will lose information in lower dimension

- Use linear function instead of ReLu
- Use Expansion layer to increase the dimension first

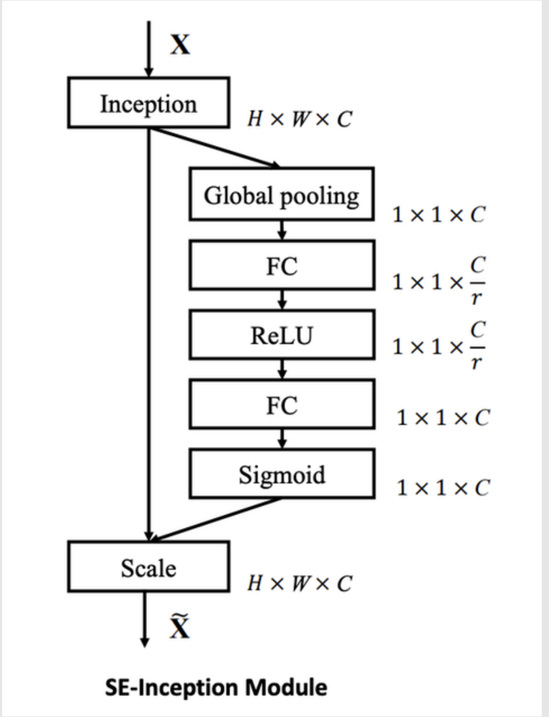


No ReLu applied

Squeeze and Excitation with NAS

Relationships between feature channels

- Makes the weighted feature map parameters learnable
- Use hard sigmoid function for speeding up



SE-Inception Module

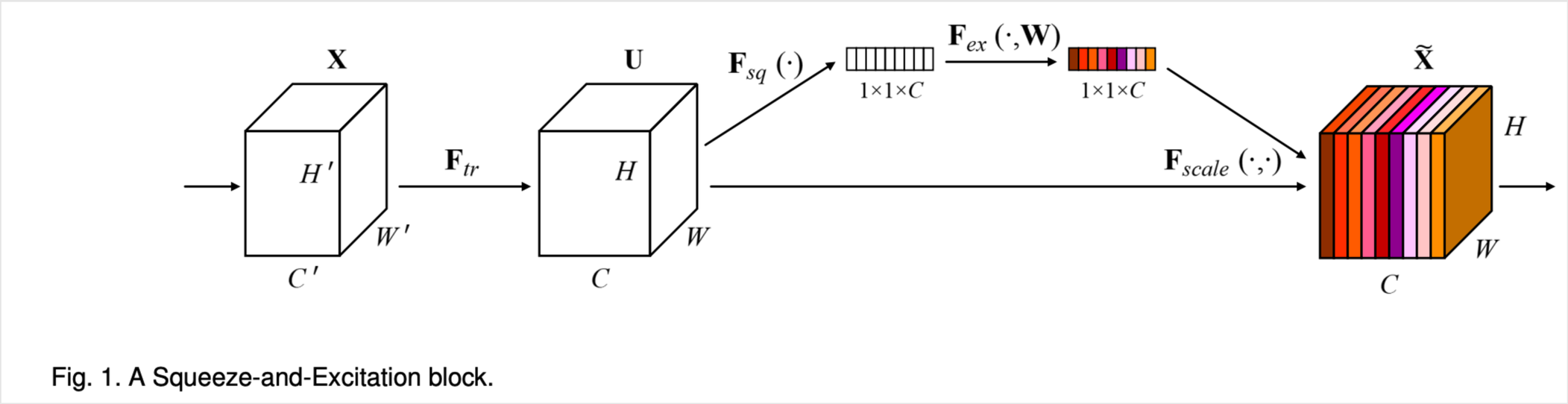
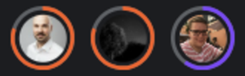


Fig. 1. A Squeeze-and-Excitation block.

RESULTS

Submission and Description	Private Score	Public Score	Selected
notebook2d7cf1b992 - Version 20 Succeeded (after deadline) · 9m ago · Notebook notebook2d7cf1b992 | best	0.9048	0.9070	☐

#	△	Team	Members	Score	Entries	Last	Solution
1	—	golddiggaz		0.9132	131	4y	
2	▲ 658	Devon Stanfield		0.9043	3	4y	
3	▲ 26	T0m		0.9028	244	4y	

CONCLUSION

Task:

- Cassava Leaf Disease Classification

Models:

- Crop Net Backbone: Mobile Net
  - Depthwise Separable Convolution
  - Linear Bottleneck & Inverted Residual Structure
  - Squeeze and Excitation with NAS

Model Performance

- Accuracy: 90.7%
- Training Time: 20 minutes

ADDITIONAL EXPERIMENT

Late Fusion – Weighted Average

- ViT
- Efficient Net

Model Performance

- Training Time: 2 hours

Late_fusion_infer - Version 2 Succeeded (after deadline) · 4d ago · Notebook Late_fusion_infer | Version 2	0.8760	0.8718
EfficientNet_infer - Version 1 Succeeded (after deadline) · 6d ago · Notebook EfficientNet_infer | Version 1	0.8683	0.8688
ViT infer - Version 4 Succeeded (after deadline) · 6m ago	0.8026	0.8008

REFERENCE

[1] Andrew G. Howard, Menglong Zhu, Bo Chen, Dmitry Kalenichenko, Weijun Wang, Tobias Weyand, Marco Andreetto, Hartwig Adam. MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications . CVPR 2017

[2] Mark Sandler, Andrew Howard, Menglong Zhu, Andrey Zhmoginov, Liang-Chieh Chen. MobileNetV2: Inverted Residuals and Linear Bottleneck. CVPR 2019

[3] Andrew Howard, Mark Sandler, Grace Chu, Liang-Chieh Chen, Bo Chen, Mingxing Tan, Weijun Wang, Yukun Zhu, Ruoming Pang, Vijay Vasudevan, et al. Searching for mo bilenetv3. In ICCV, 2019.

[4] Mingxing Tan and Quoc Le. Efficientnet: Rethinking model scaling for convolutional neural networks. In International conference on machine learning, pages 6105–6114. PMLR, 2019.

[5] Alexey Dosovitskiy, Lucas Beyer, Alexander Kolesnikov, Dirk Weissenborn, Xiaohua Zhai, Thomas Unterthiner, Mostafa Dehghani, Matthias Minderer, Georg Heigold, Syl vain Gelly, et al. An image is worth 16x16 words: Transform ers for image recognition at scale. In ICLR, 2021

Code Link: https://github.com/MwYuREZ/NYCU_CV_2025_Final_Project

	110550124	110550065	110550108	110550052
Literature survey	10	30	30	30
Approach design	20	20	50	10
Approach implementation (experiment)	20	20	50	10
Report writing	10	40	10	40
Slide making and oral presentation	70	10	10	10

THANK YOU