DEEP LEARNING PYTORCH FINAL PROJECT
INFO 6147(01) – WINTER 2025 – LAM TRINH DINH

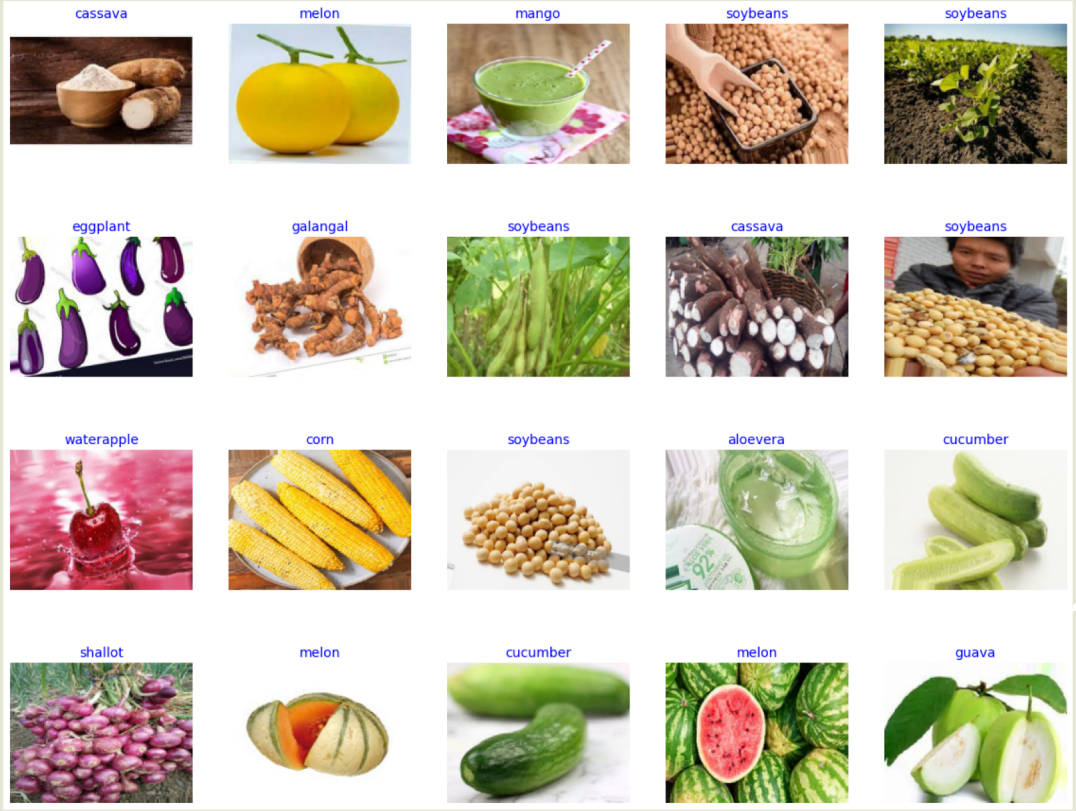
Plant Type Classification Project

Contents

Project Goal	To develop a deep learning model for classifying plant types using image data.
Dataset	Plants Type Datasets from Kaggle
Preprocessing	Normalization, image transformation, cropping. Images resized to 224x224 pixels
Models	A Custom CNN and pre-trained models
Results	Accuracies between models and comparision
Visualization	GradCAM Visualization

Dataset

Dataset


cassava
melon
mango
soybeans
soybeans
eggplant
galangal
soybeans
cassava
soybeans
waterapple
corn
soybeans
aloevera
cucumber
shallot
melon
cucumber
melon
guava

Normalization

- transform = transforms.Compose([
- transforms.Resize((224, 224)),
- transforms.ToTensor(),
- transforms.Normalize(mean=[0.5, 0.5, 0.5], std=[0.5, 0.5, 0.5])
-])

$$\text{Normalized Value} = \frac{\text{Pixel Value} - \text{Mean}}{\text{Standard Deviation}}$$

Models

- Custom CNN (2 convolutional layers)
- Resnet18
- Squeeze and Excitation – Resnet18
- Convolutional Block Attention Module – Resnet18
- Efficient Convolutional Attention – Resnet18
- ECA + Spatial – Resnet18

Custom CNN

Input: 224x224x3 (RGB image)
Conv Layer 1: 32 filters of size 3x3, ReLU activation
MaxPooling Layer: 2x2
Conv Layer 2: 64 filters of size 3x3, ReLU activation
MaxPooling Layer: 2x2
Flatten layer
Fully Connected Layer: 128 units, ReLU activation
Output Layer: 30 classes (Softmax activation)

Resnet18

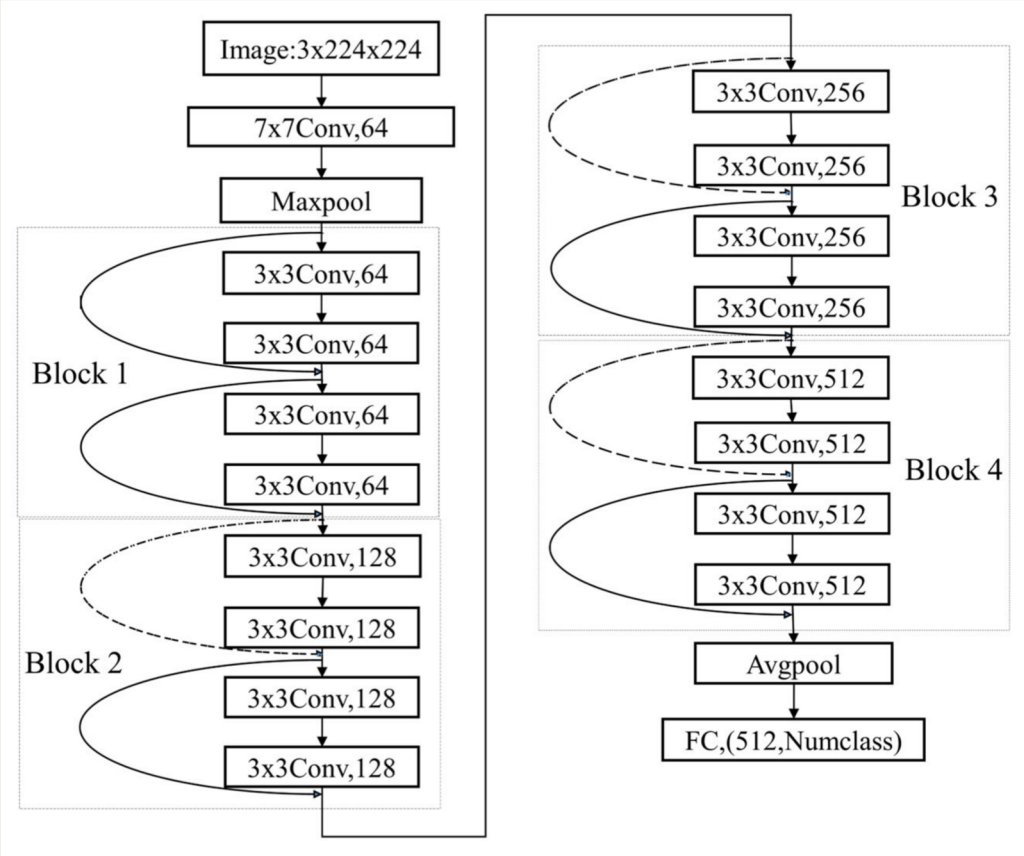


Image:3x224x224
7x7Conv,64
Maxpool
3x3Conv,64
3x3Conv,64
3x3Conv,64
3x3Conv,64
Block 1
3x3Conv,128
3x3Conv,128
3x3Conv,128
3x3Conv,128
Block 2
3x3Conv,256
3x3Conv,256
3x3Conv,256
3x3Conv,256
Block 3
3x3Conv,512
3x3Conv,512
3x3Conv,512
3x3Conv,512
Block 4
Avgpool
FC,(512,Numclass)

Squeeze and Excitation - Resnet18

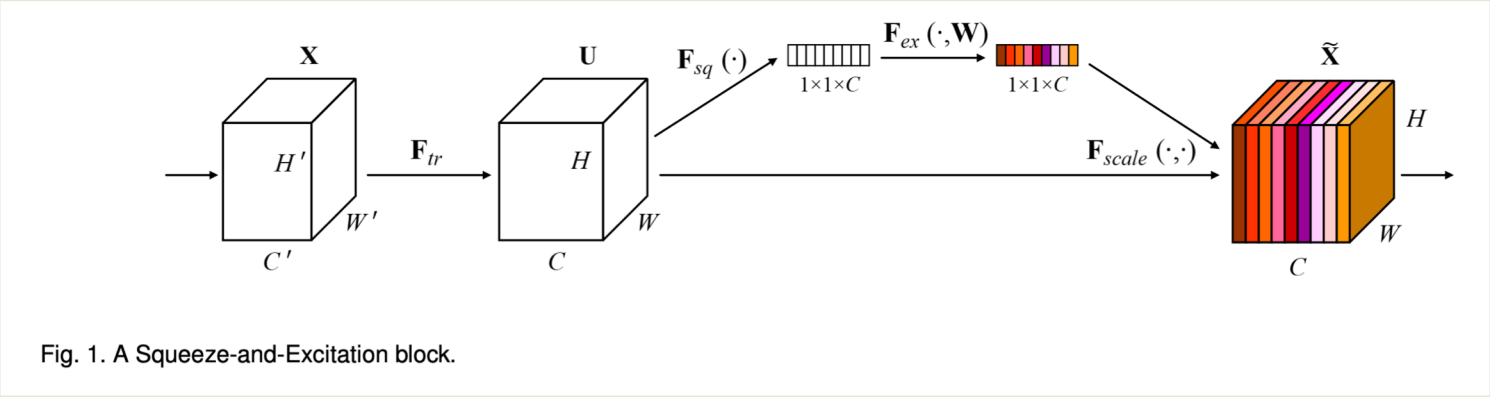
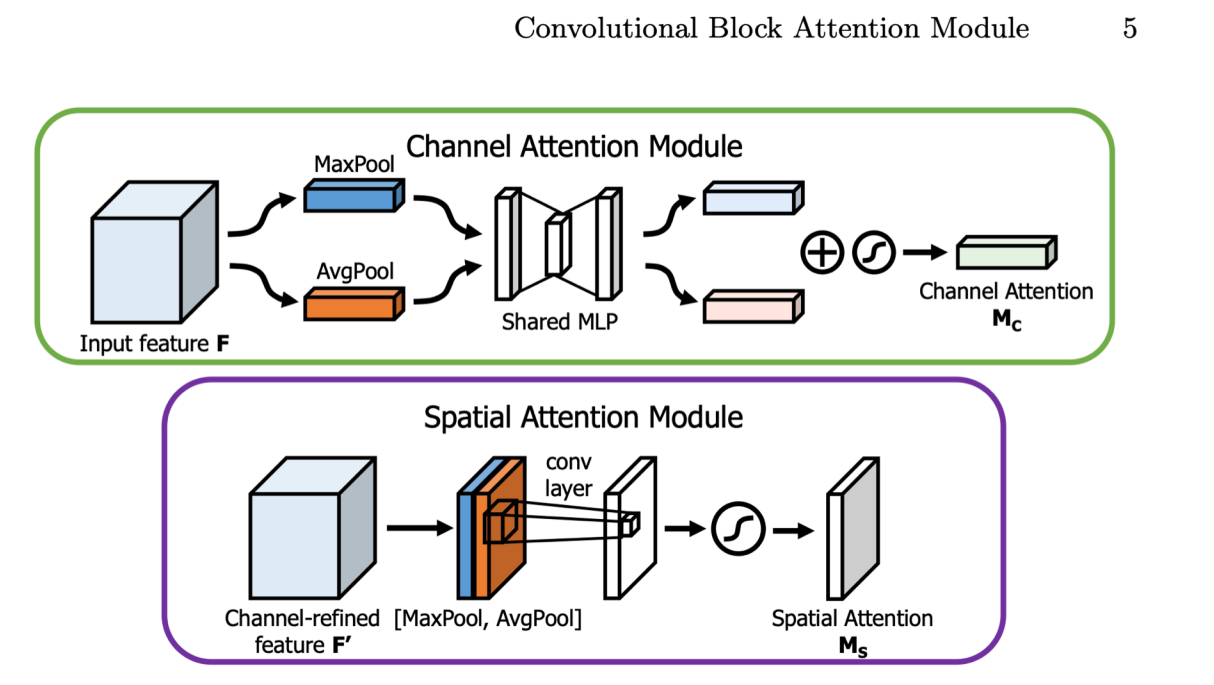
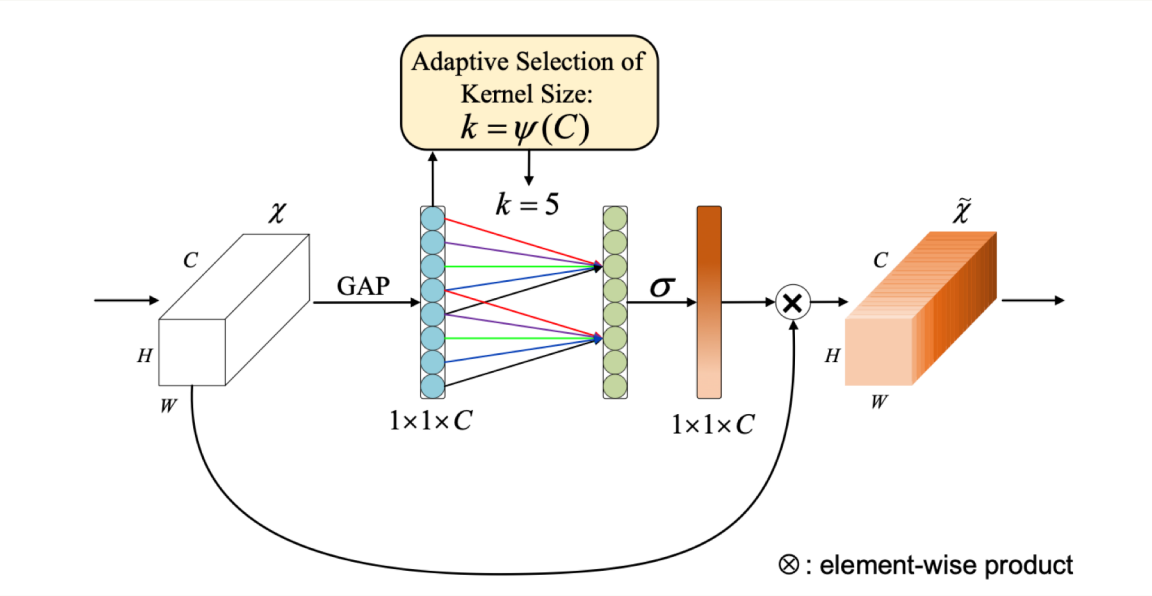


Fig. 1. A Squeeze-and-Excitation block.

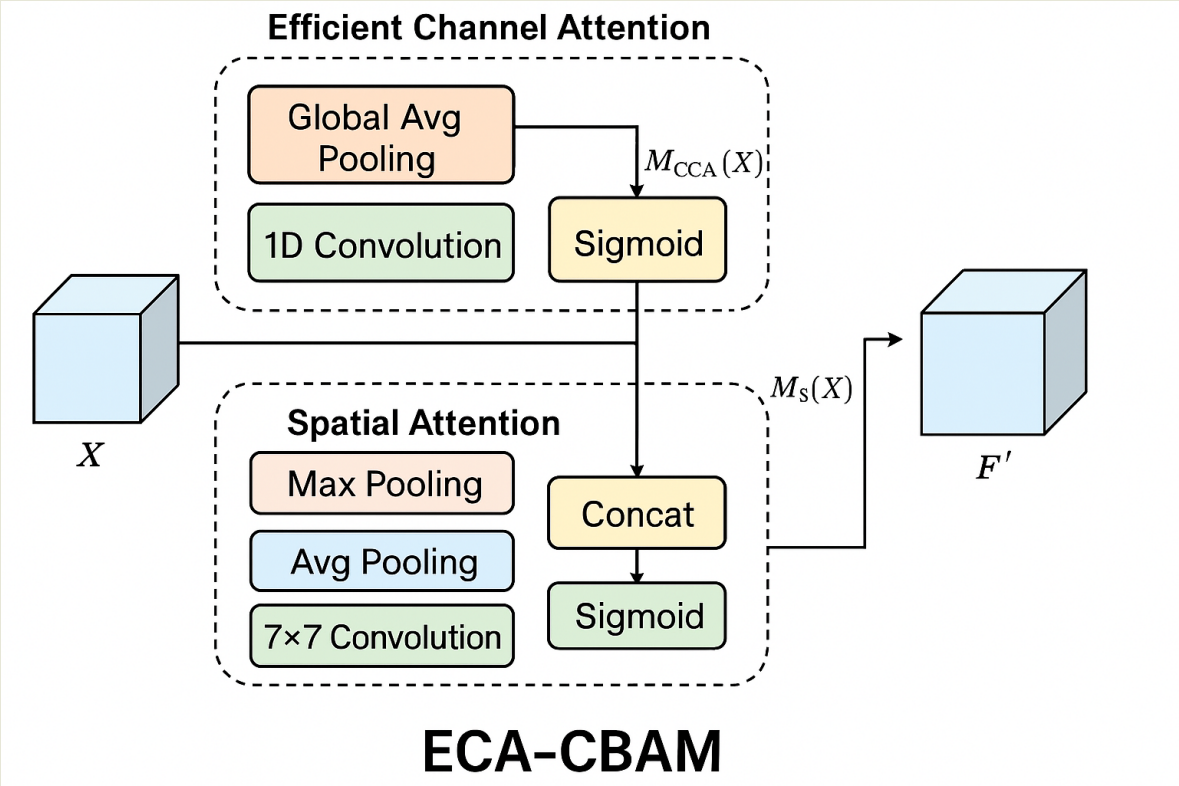
Convolutional Block Attention Module – Resnet18



Efficient Convolutional Attention – Resnet18

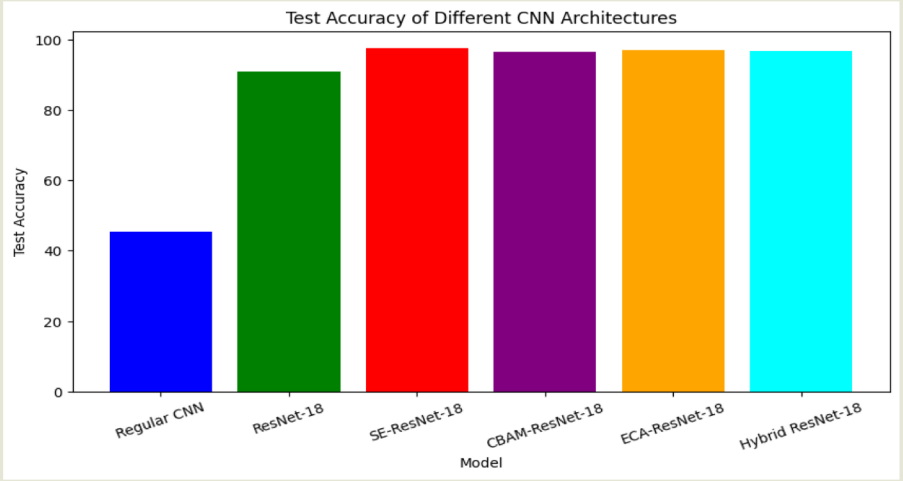


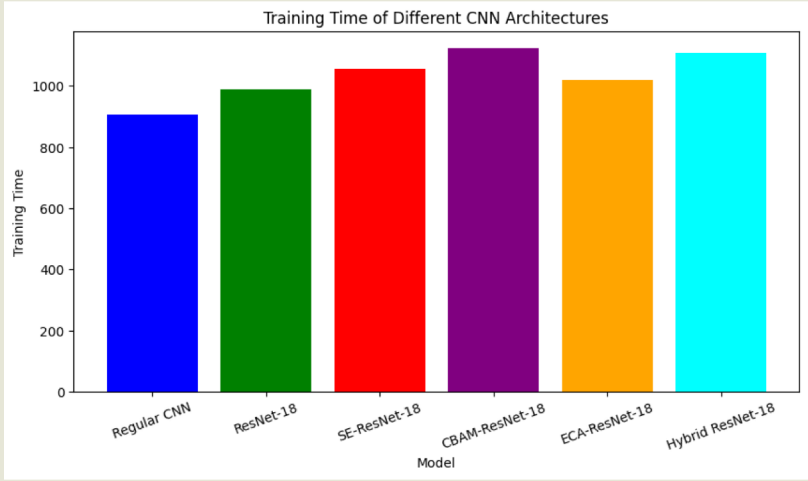
ECA + Spatial – Resnet18



Results

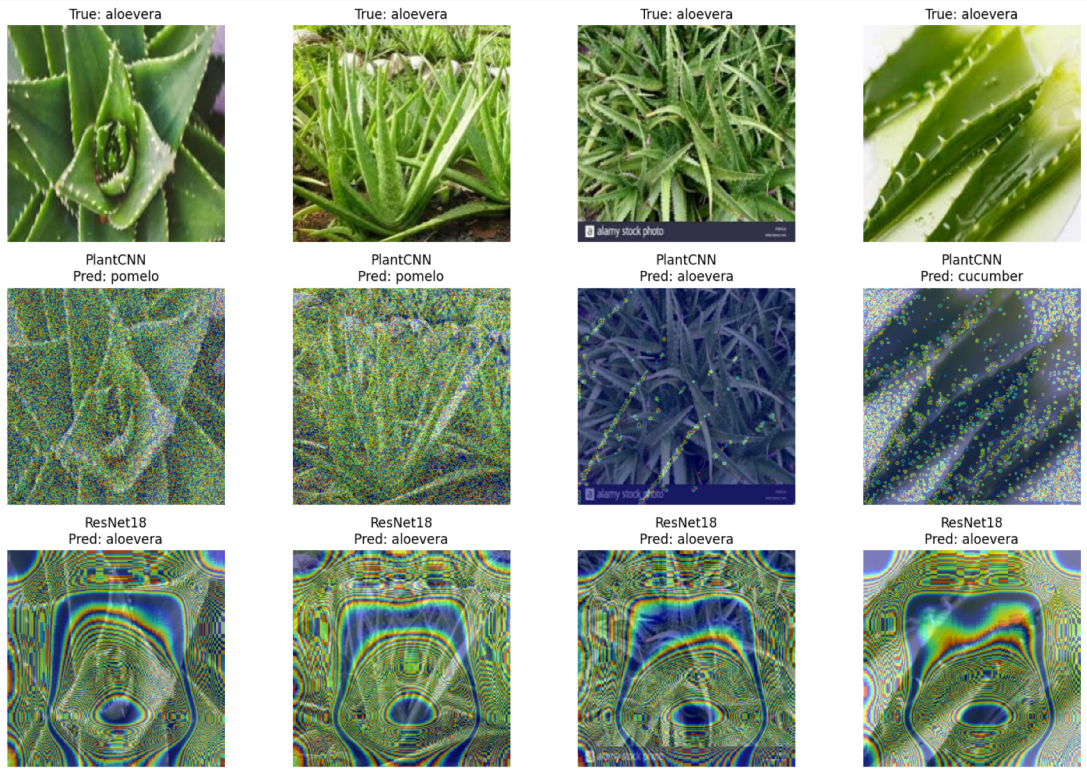
Model	Test Accuracy	Training Time (s)
Regular CNN	45.50%	905
ResNet18	90.79%	989
SE-ResNet18	97.46%	1033
CBAM-ResNet18	96.36%	1190
ECA-ResNet18	97.06%	1104
ECA+Spatial-ResNet18	96.80%	1189



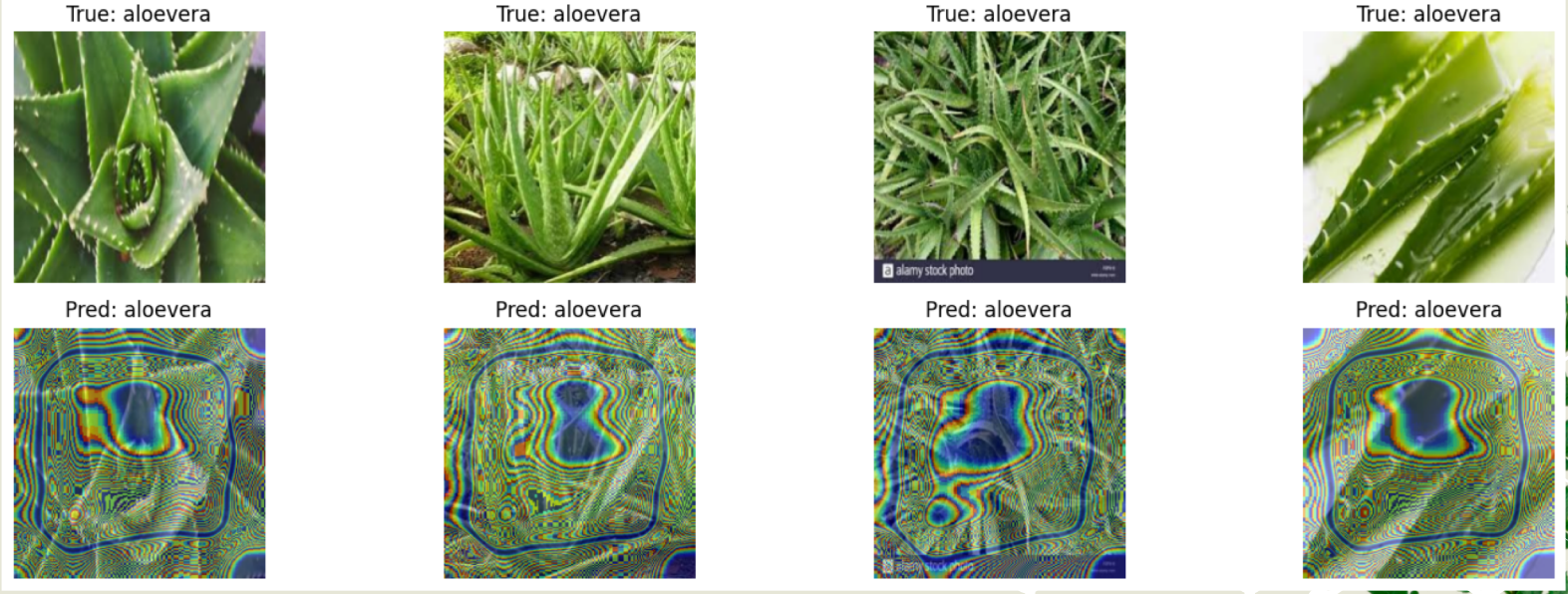


Visualization

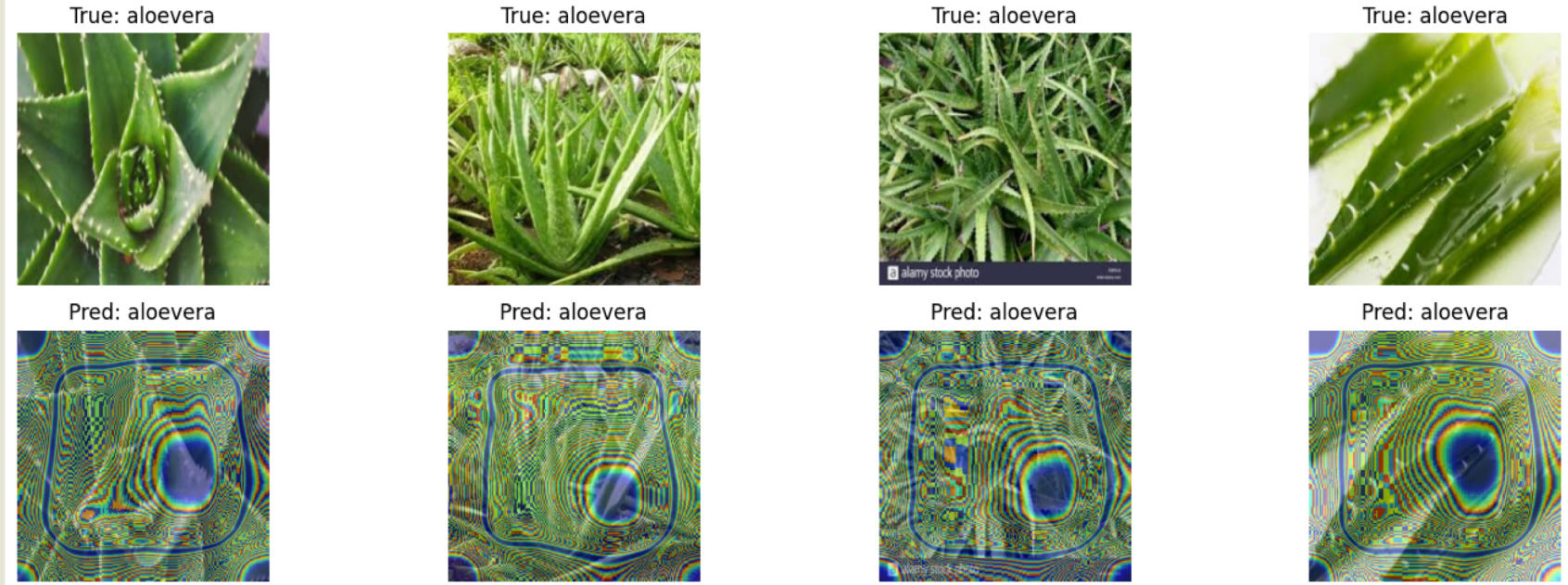
Custom CNN vs Resnet18



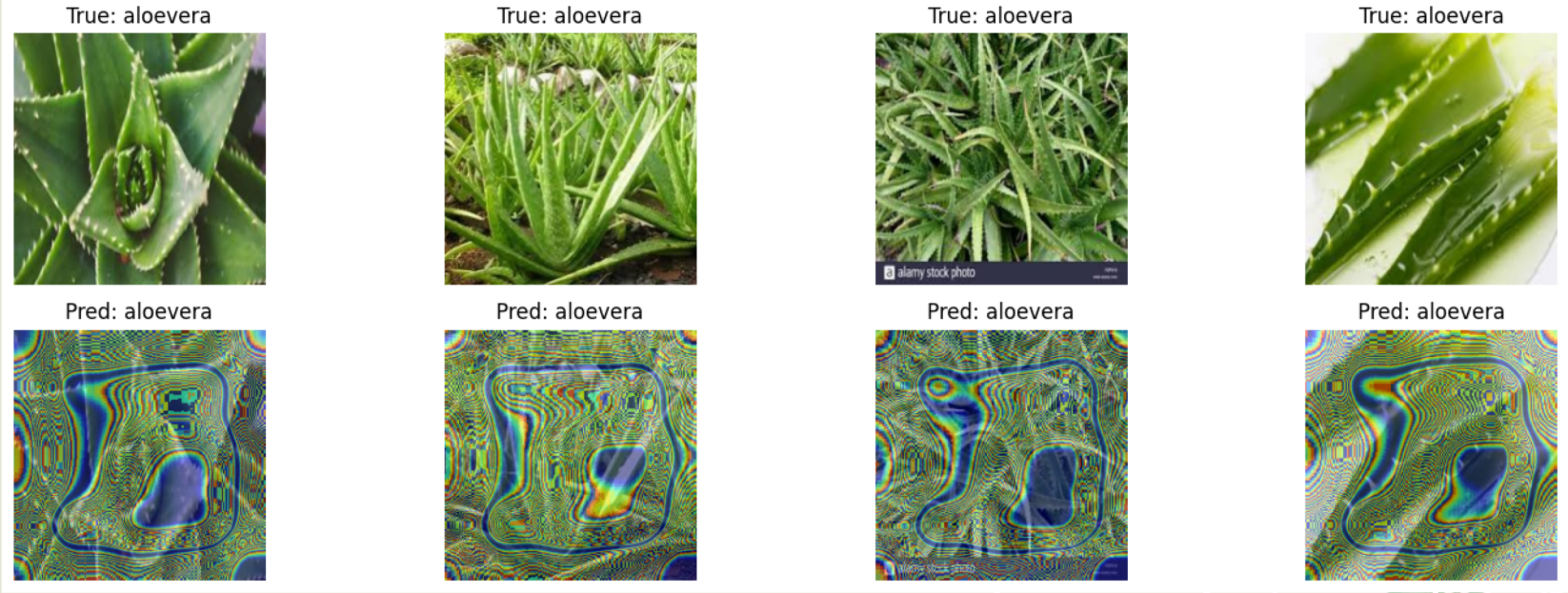
SE-Resnet18


True: aloevera
True: aloevera
True: aloevera
True: aloevera
Pred: aloevera
Pred: aloevera
Pred: aloevera
Pred: aloevera

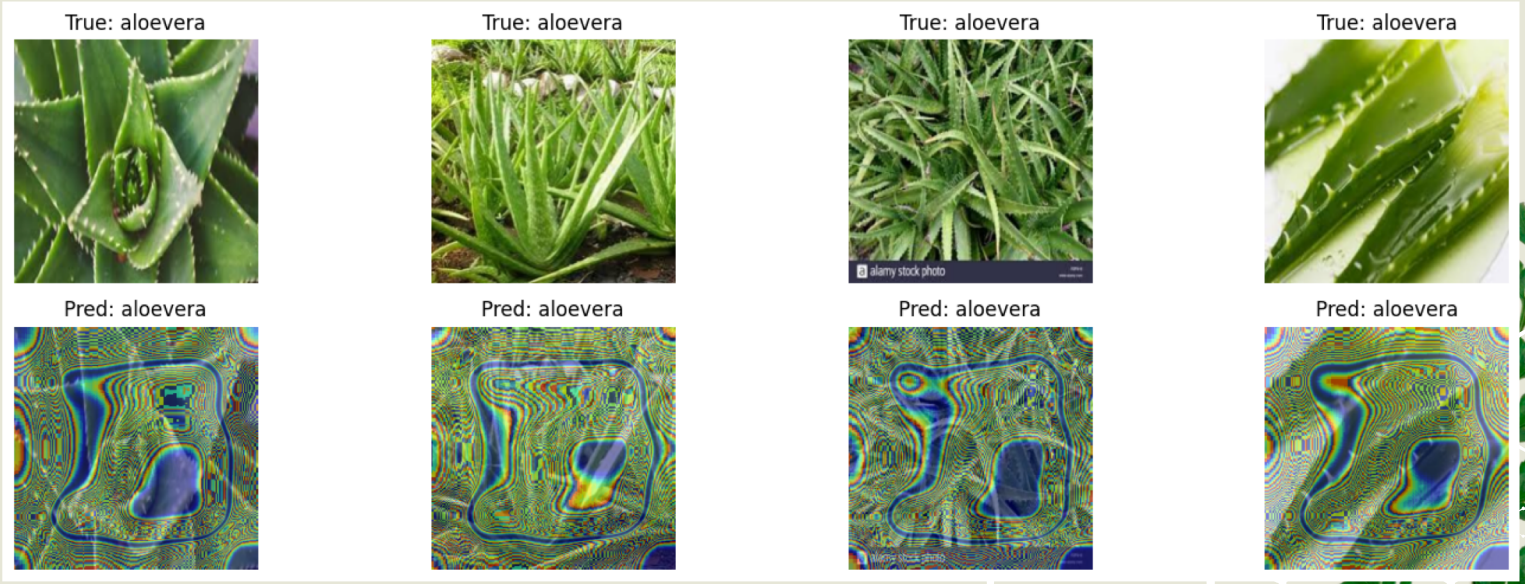
CBAM-Resnet18



ECA-Resnet18



CBAM-Resnet18



THANKS FOR WATCHING!

REFERENCE:

- Data: https://www.kaggle.com/datasets/yudhaislamisulistya/plants-type-datasets
- Convolutional Block Attention Module: https://arxiv.org/pdf/1807.06521
- Efficient Convolutional Attention: https://arxiv.org/pdf/1910.03151
- Squeeze and Excitation Network: https://arxiv.org/pdf/1709.01507