



# Challenges in Real-world Image Classification

ELEC5307 - Project 2

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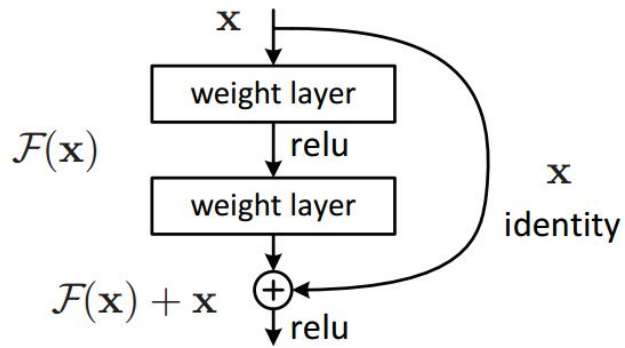
Pierre Segonne  
pseg5445



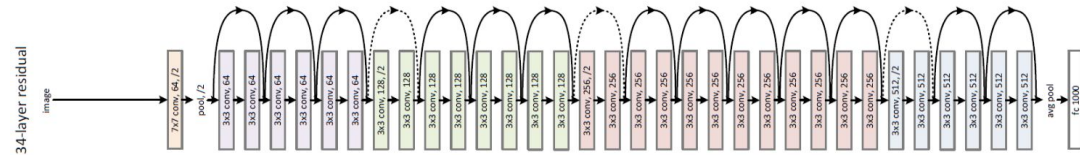
# 1. Image Classification

Reaching satisfactory accuracy on the custom *Fruit* dataset

# ResNet34



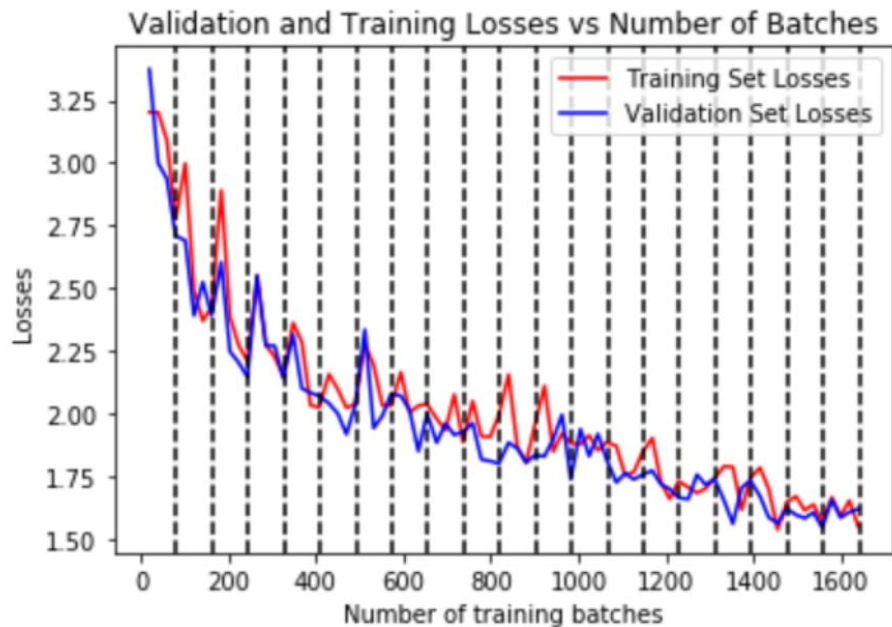
Residual Block



ResNet34 Model

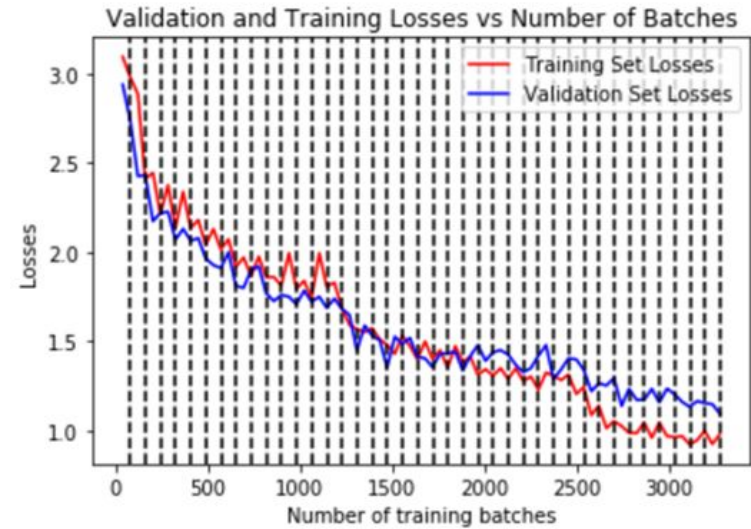
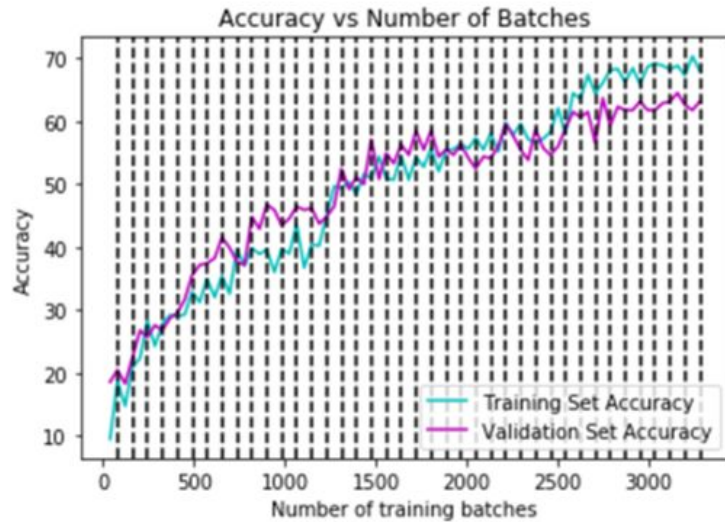
# Model Hyperparameters

- Adaptive learning rate
  - Start value: 0.01
- Batch size: 32
- Momentum : 0.9
- Epochs: 40
- Weight decay: 0.0001





# Training Accuracy and Losses





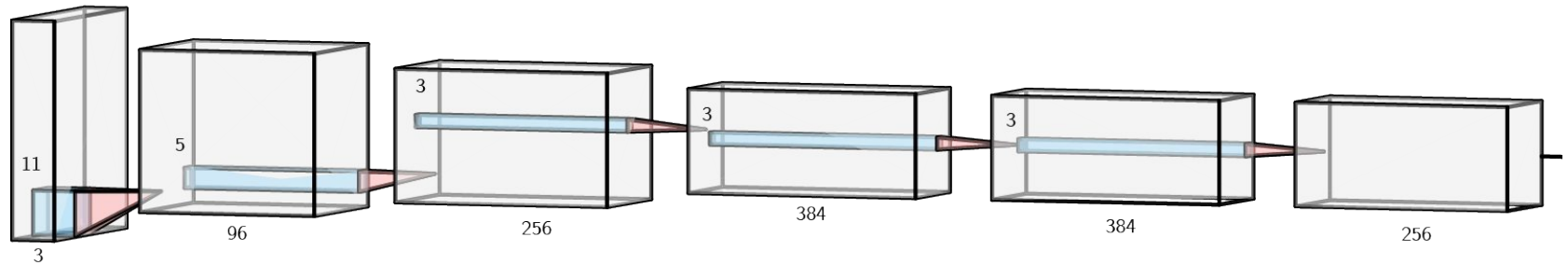
## 2. Domain Adaptation

How to match the features learned from both source  
and target distributions

# Architecture Comparison (1)



Feature Extractor from *AlexNet*<sup>1</sup>



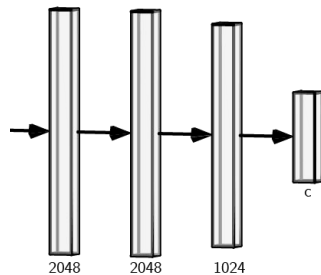
*A succession of convolutional and max-pooling layers*

<sup>1</sup>A. Krizhevsky, I. Sutskever, and G. E. Hinton. Imagenet classification with deep convolutional neural networks. In *Advances in neural information processing systems*, pages 1097–1105, 2012

## Architecture Comparison (2)

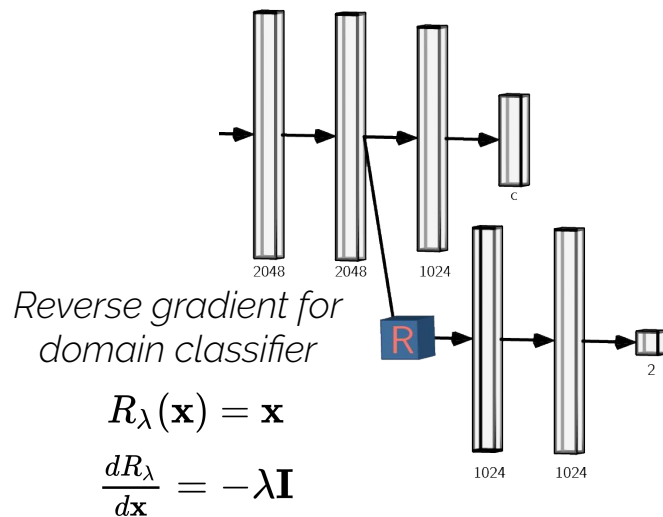


Baseline



*Additional fully connected layer for  
label predictor*

Domain Adaptation





## Results (1)



Method	Top-1 Accuracy	Top-3 Accuracy
<i>AlexNet</i>	44.0 $\pm$ 1.3	66.8 $\pm$ 1.1
Adapted <i>AlexNet</i>	61.6 $\pm$ 1.2	78.0 $\pm$ 0.9

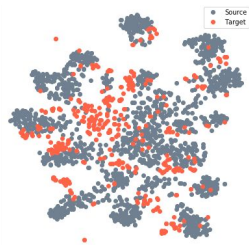
Table 1: Accuracy Results for both normal and domain adaptation ready *Alexnet*

## Results (2)

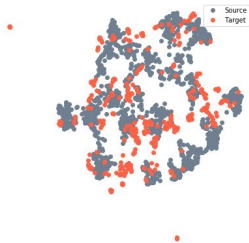


Baseline

t-SNE

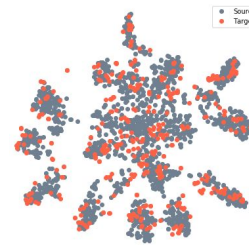


UMAP

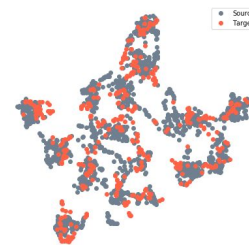


Domain Adaptation

t-SNE



UMAP



*Domain adaptation forces the learning of similar features across domains*

# Thanks!

*Any questions?*

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