# Cats vs Dogs

Bertol Kensese, Jessie Ren

# Introduction

- Classifying pictures of cats and dogs is a trivial activity for humans but not so for computers
- In 2013, an attempt at solving this classification problem with a computer yielded poor results
- After 2013, novel image classification architectures were invented such as Resnet in 2015, DenseNet in 2016 and inception in 2015 that yielded better results than those previously obtained with other architectures

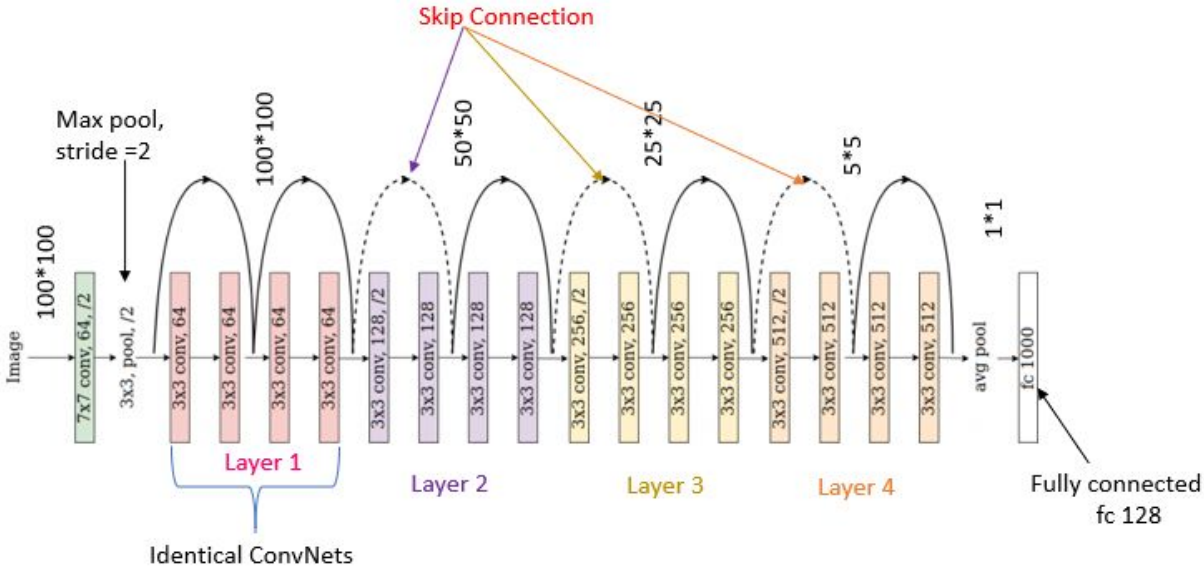
# Dataset

- We use a subset of Assira (Animal Species Image Recognition for Restricting Access) dataset
- It is unique because of its partnership with Petfinder.com, the world's largest site devoted to finding homes for homeless pets. They have provided Microsoft Research with over three million images of cats and dogs.
- There are 12500 images for cats and 12500 images for dogs in training set
- We use 80:20 ratio to split training set

# Data Augmentation

- We resized all images to 224 X 224 when using ResNet and DenseNet architects and used images of size 299 X 299 when using Inception architecture
- We used a random horizontal flip with probability of 0.5 on the training set and did not use normalization on any of our models.

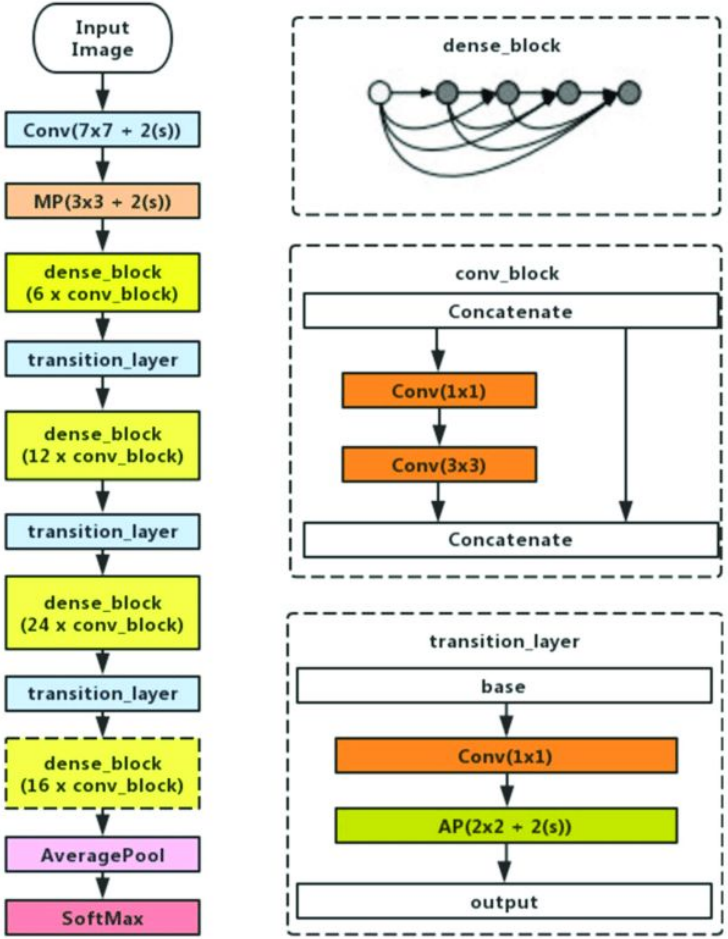
# Techniques: ResNet18



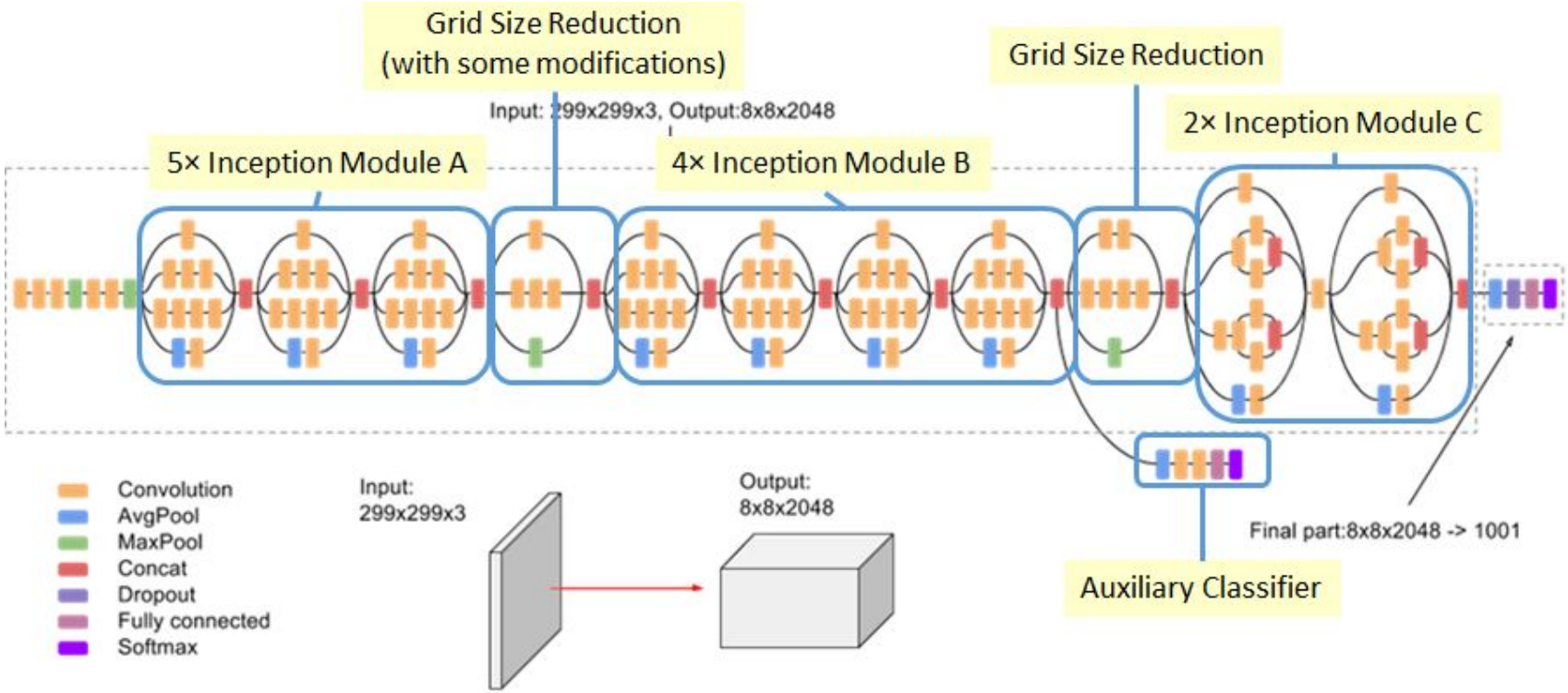

ResNet-18 Architecture

Fruit 360 Input Image size= 100*100 px

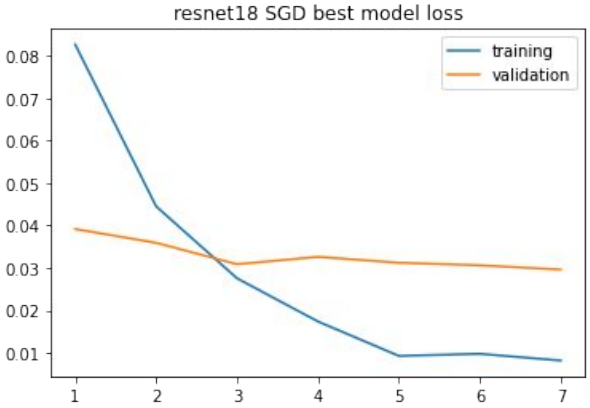
# Techniques: DenseNet121

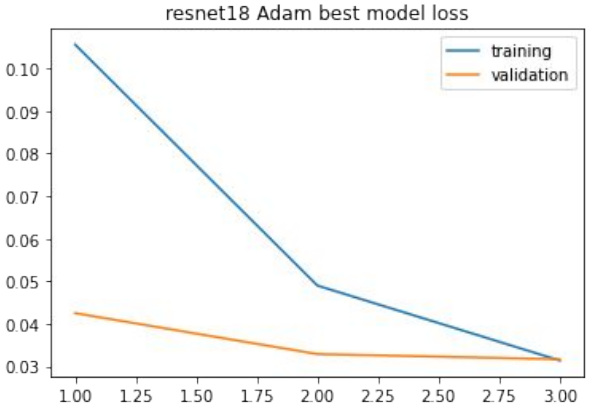


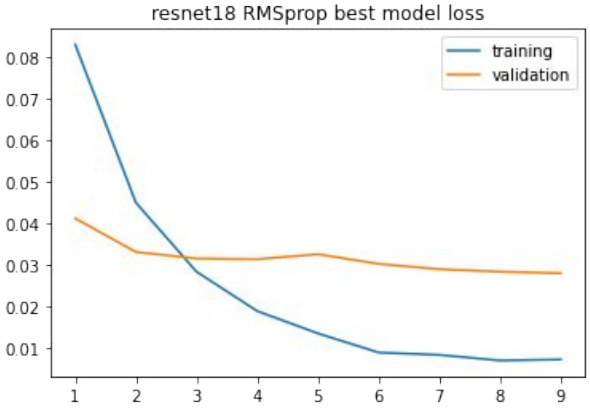
# Techniques: Inceptionv3



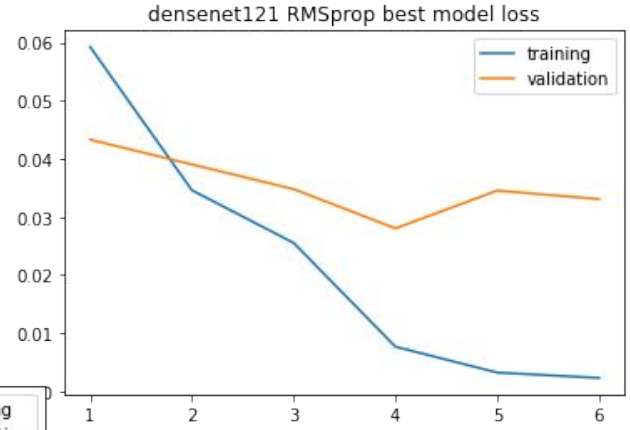
# Evaluation Loss - ResNet18

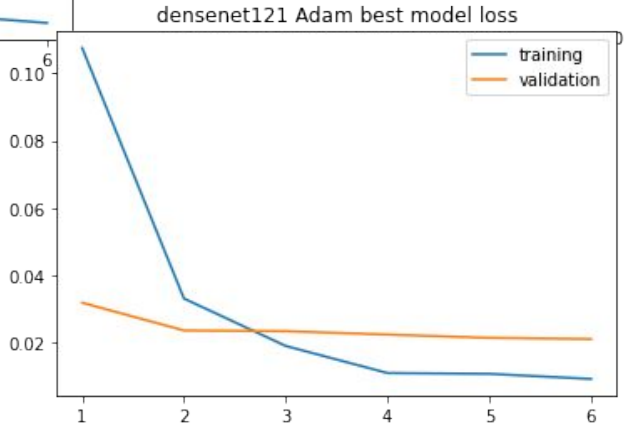


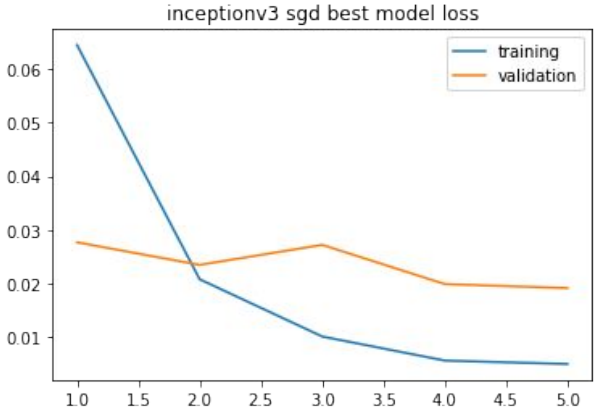



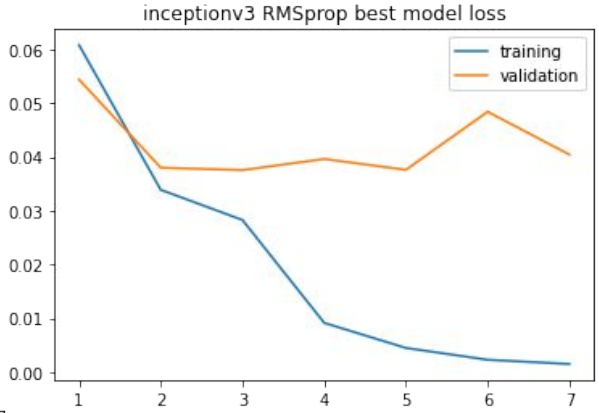
# Evaluation Loss - DenseNet121

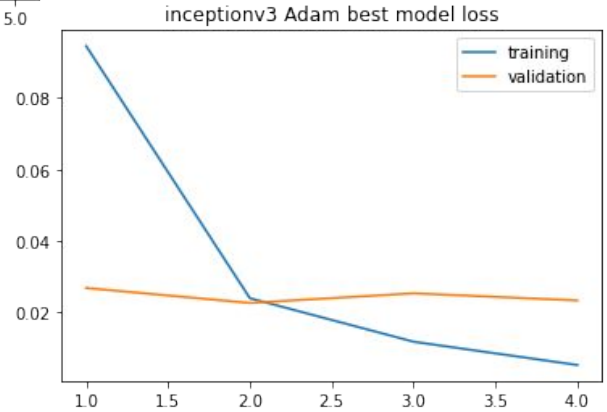



# Evaluation Loss - Inception v3



# Evaluation Accuracy

| | SGD | RMSprop | Adam |
|---|---|---|---|
| ResNet18 | 99.2% | 99.26% | 99.08% |
| DenseNet121 | 99.38% | 99.24% | 99.36% |
| Inception v3 | 99.50% | 99.32% | 99.28% |

# Problems encountered

- Non-deterministic training
- Speed
- Own architecture inferior performance

# Next Steps

- Tackle some more up-to-date image classification challenges with more than two categories, which are more difficult for computers
- Keep discovering other tasks in computer vision like instance segmentation and object detection

# How our approach differs from others

- More up-to-date network architectures
- Try three different optimizers
- Fine tune complex pretrained-models thanks to Colab Pro+