UNIVERSITY OF CALIFORNIA
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Pig Identification Based on MXNet

CMPS 242 PRESENTATION

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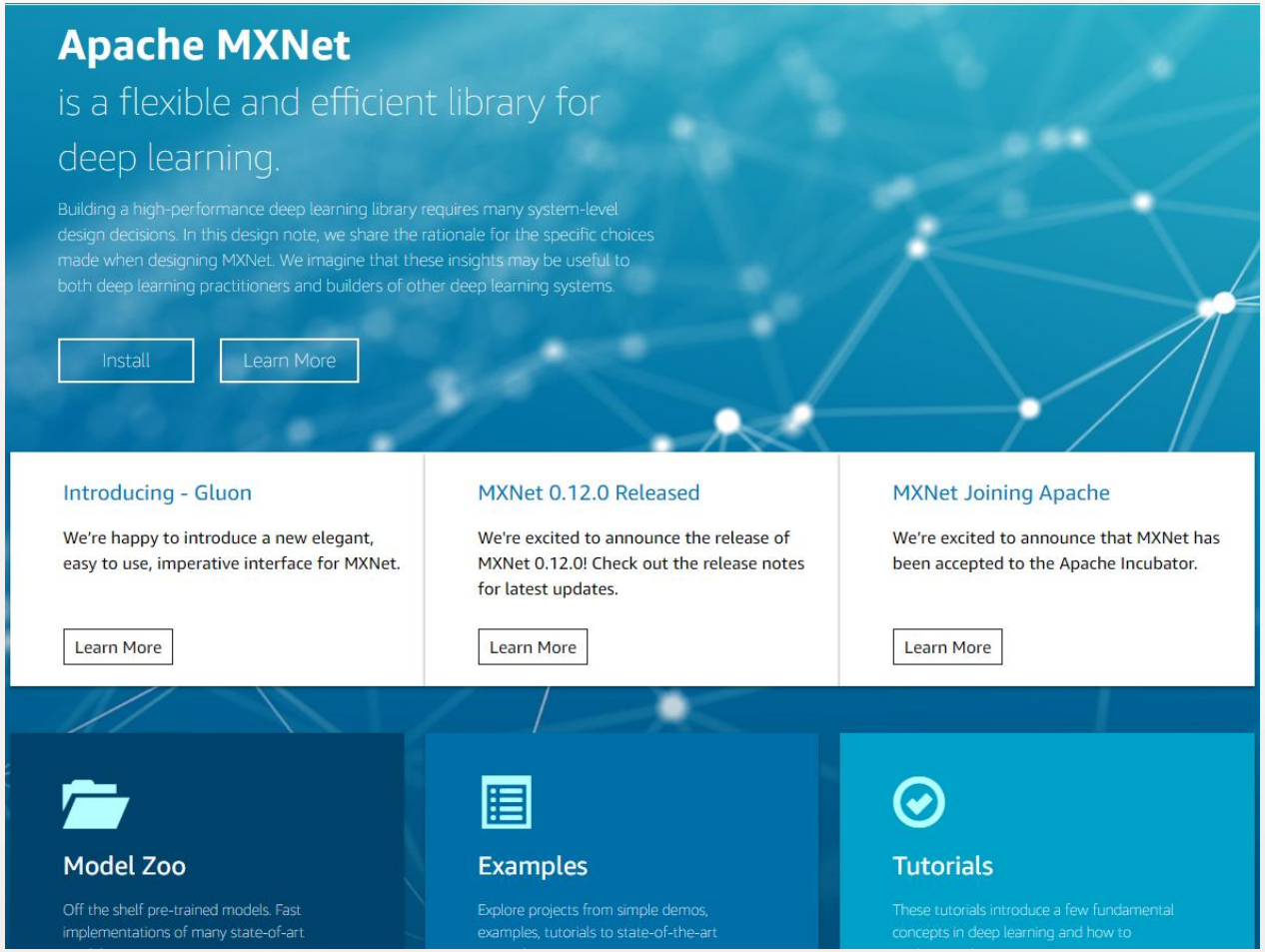
Task –Pig identification

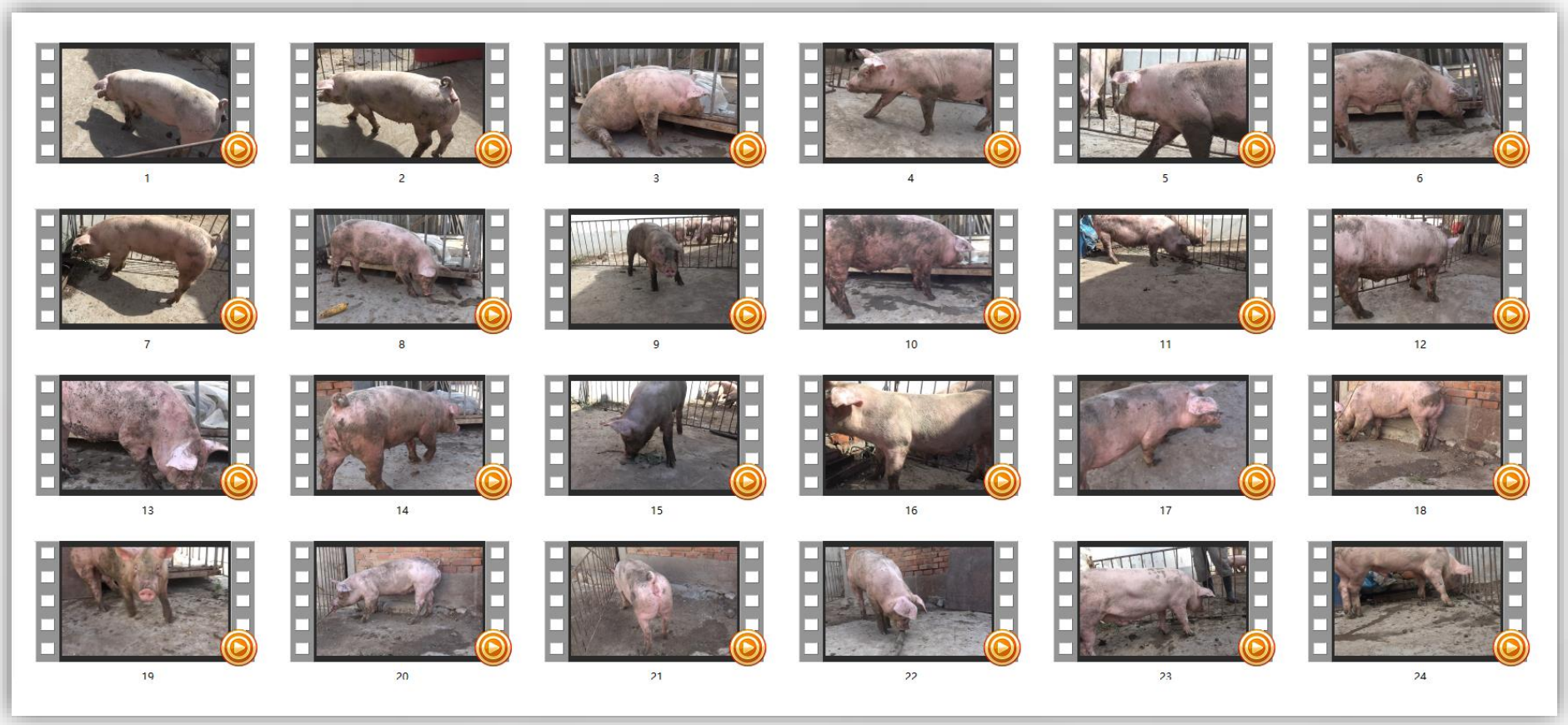
- Training dataset: 30 types of domestic pigs, 1-minute videos
- Test dataset: 3000 images of pig
- Goal: To find the probability of each pig picture belonging to every type of pig.

Why MXNet?

- Efficiency. It allows parallel processing.
- Flexibility. It supports both imperative frame and symbolic frame, makes the best of both flexibility and higher speed.
- Interface convenience. The latest interface Gluon could easily switch between imperative and symbolic frame.



Sample Data



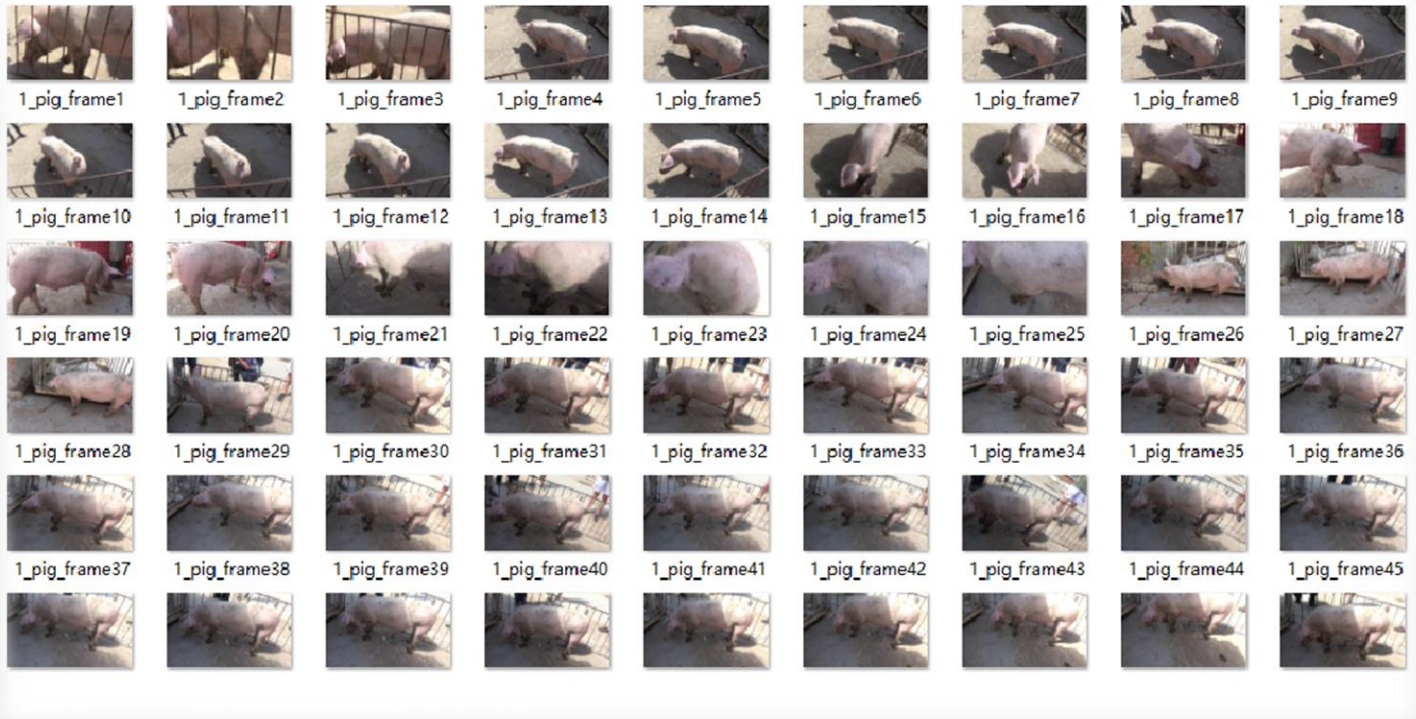
Video Property:30 1-minute videos, 50 frame/s

Preprocessing

Image Extraction(OpenCV)

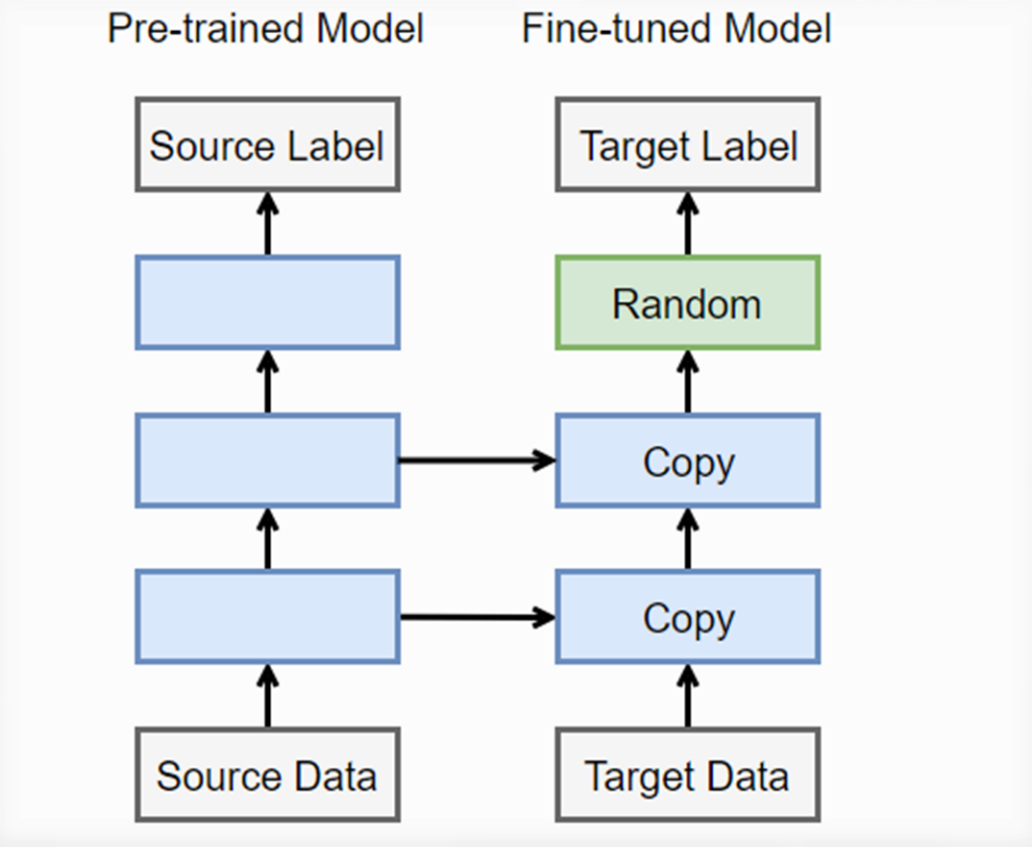
- Extract 1 picture per 49 Frames – in total 1800 pictures

- Resize each picture to 224*224 and 299*299(inceptionv3)



Transfer learning

Fine-tuning



Pan, Sinno Jialin, and Qiang Yang. "A survey on transfer learning." *IEEE Transactions on knowledge and data engineering* 22.10 (2010): 1345-1359.

Training Model

Gluon provides models zoo includes 23 pre-trained CNN models.

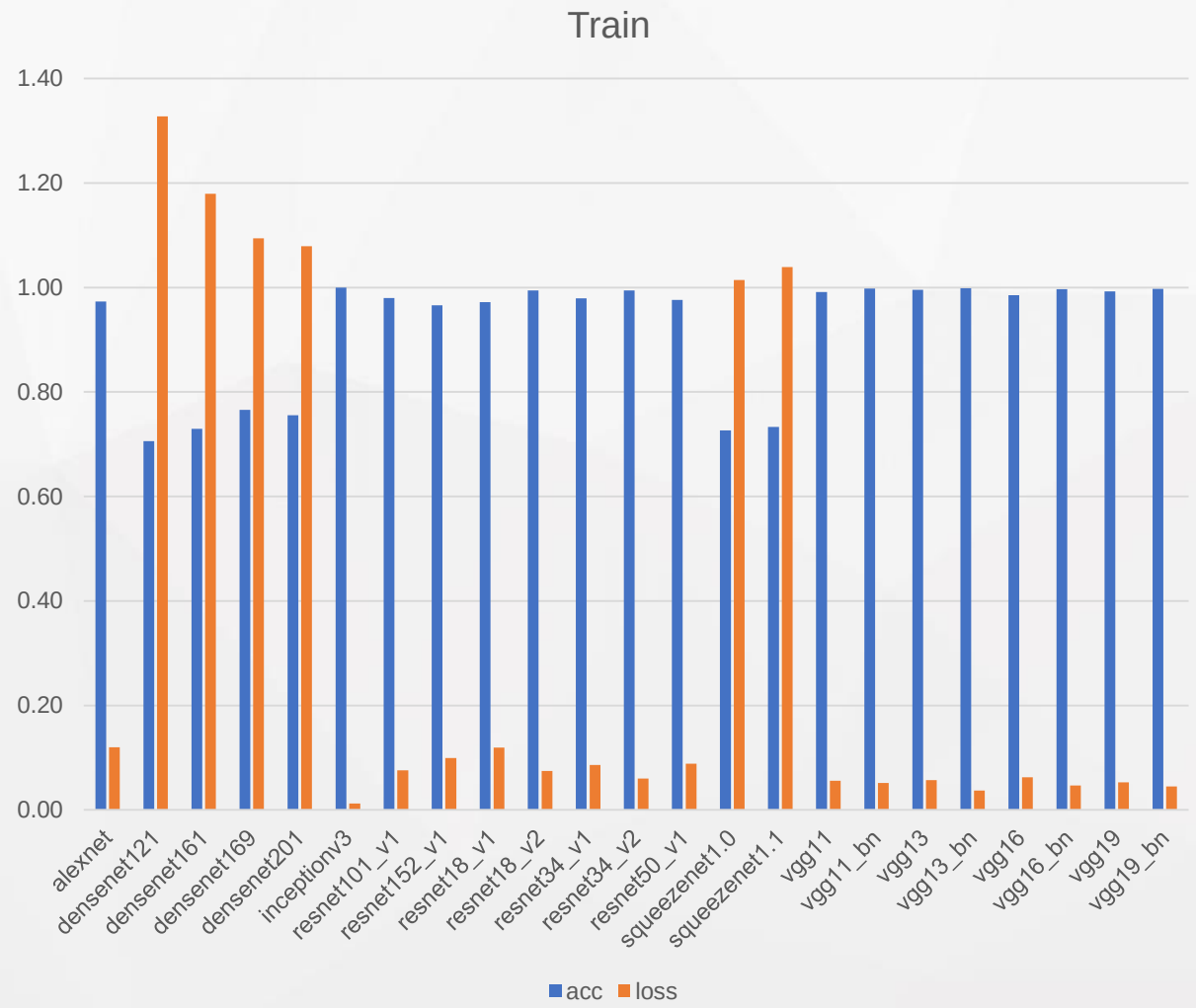
We choose two kinds of models with best performance:

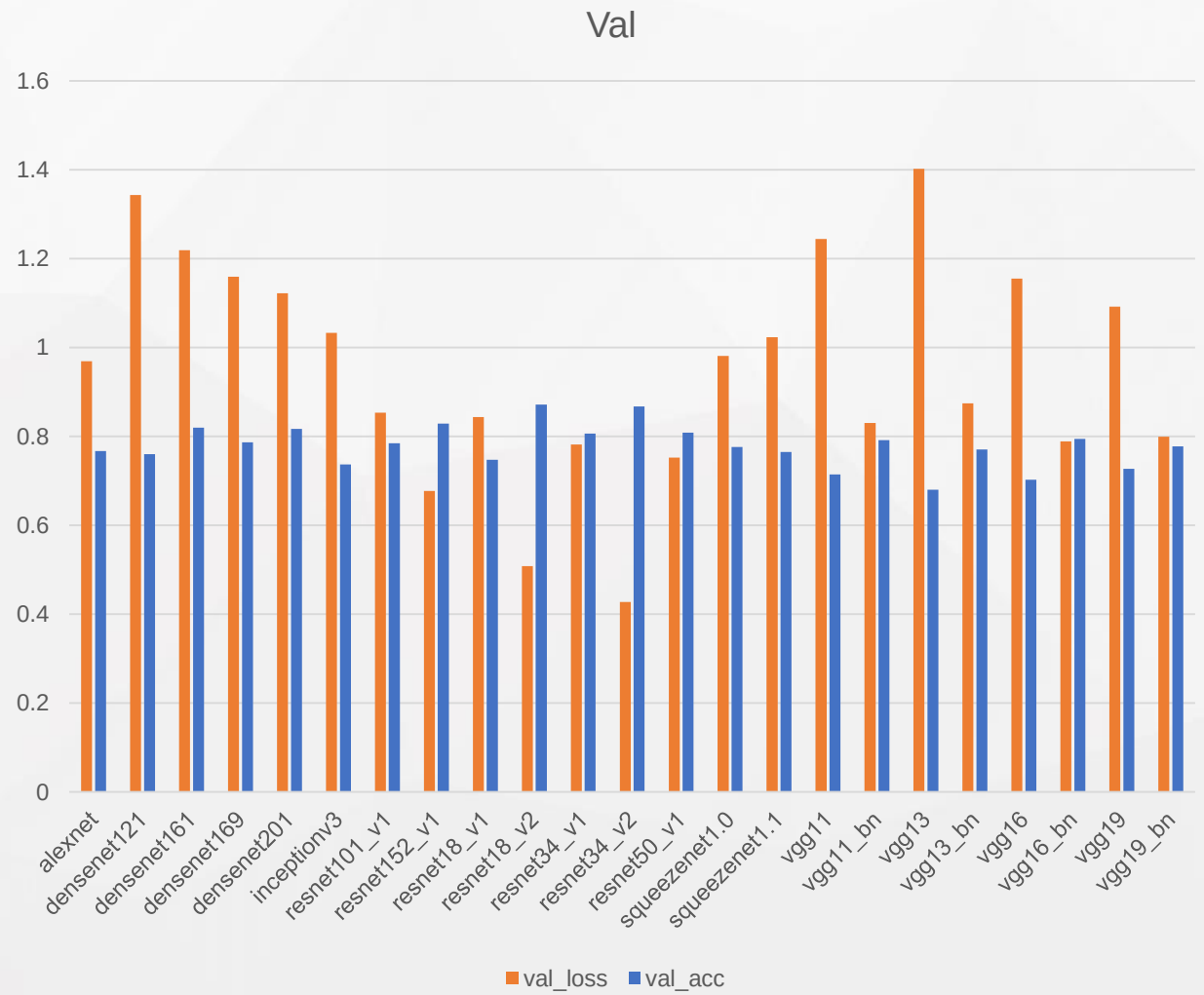
ResNet

VGG

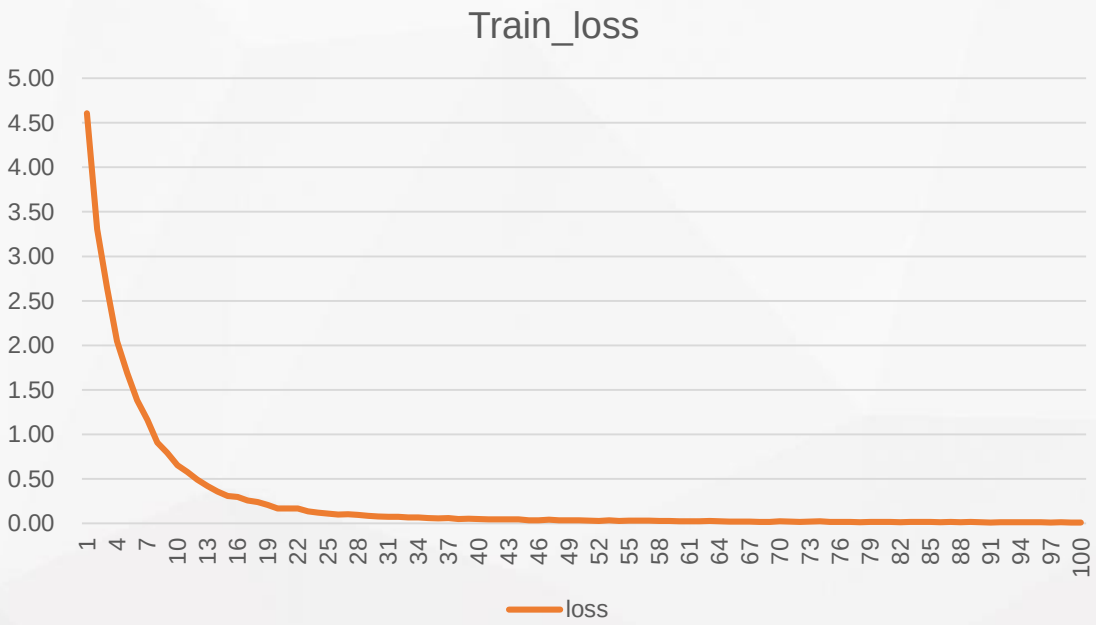
```
resnet34_v2 | 0.4972200890382131
resnet18_v2 | 0.5078153510888418
resnet152_v1 | 0.6772272189458212
resnet50_v1 | 0.7524495720863342
resnet34_v1 | 0.7814714312553406
vgg16_bn | 0.7888141870498657
vgg19_bn | 0.7992375890413921
vgg11_bn | 0.8299247622489929
resnet18_v1 | 0.8435645103454591
resnet101_v1 | 0.8530370990435282
vgg13_bn | 0.8742475112279257
alexnet | 0.969298283259074
squeezenet1.0 | 0.980705757935842
squeezenet1.1 | 1.0228662292162578
inceptionv3 | 1.0326079527537029
vgg19 | 1.091732641061147
densenet201 | 1.1217530965805054
vgg16 | 1.1551291545232136
densenet169 | 1.1591972510019941
densenet161 | 1.218744158744812
vgg11 | 1.2438867886861165
densenet121 | 1.3429047664006548
vgg13 | 1.4020016590754192
```

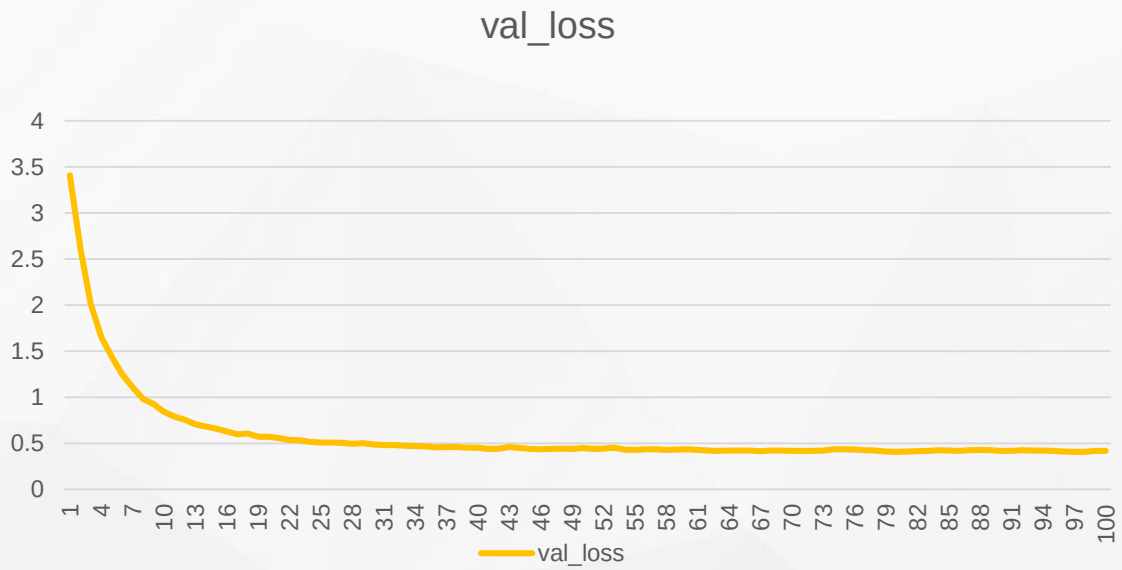
Performance

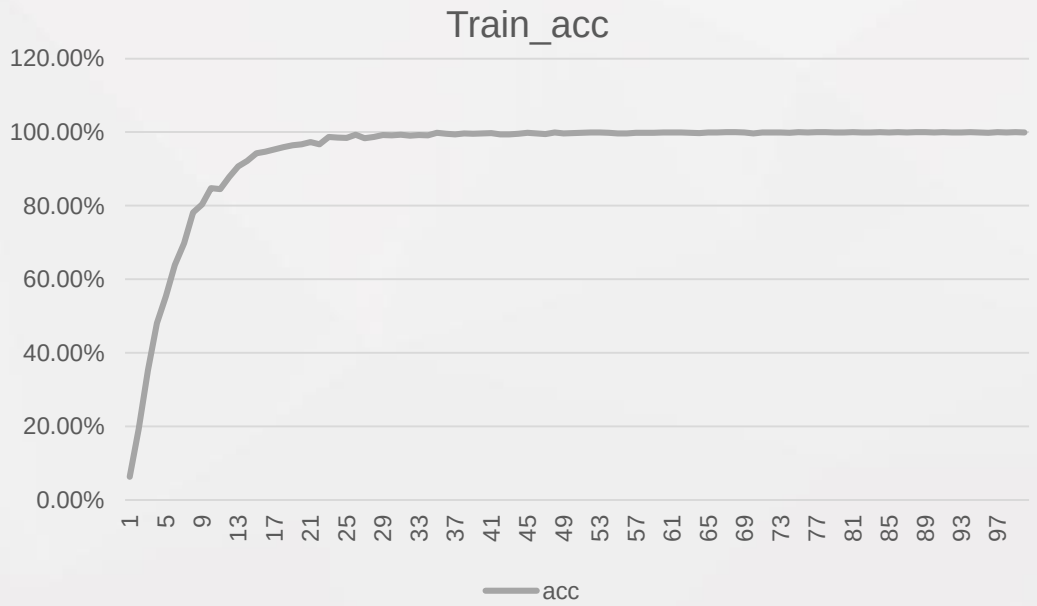


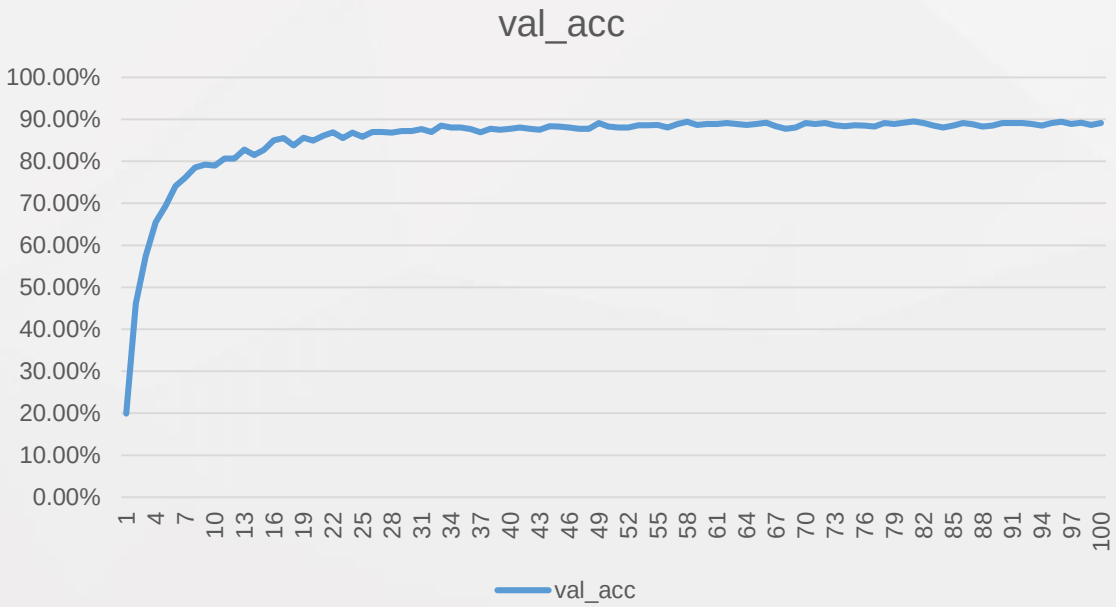


Performance









Optimization

Data augmentation

1,800-pictures

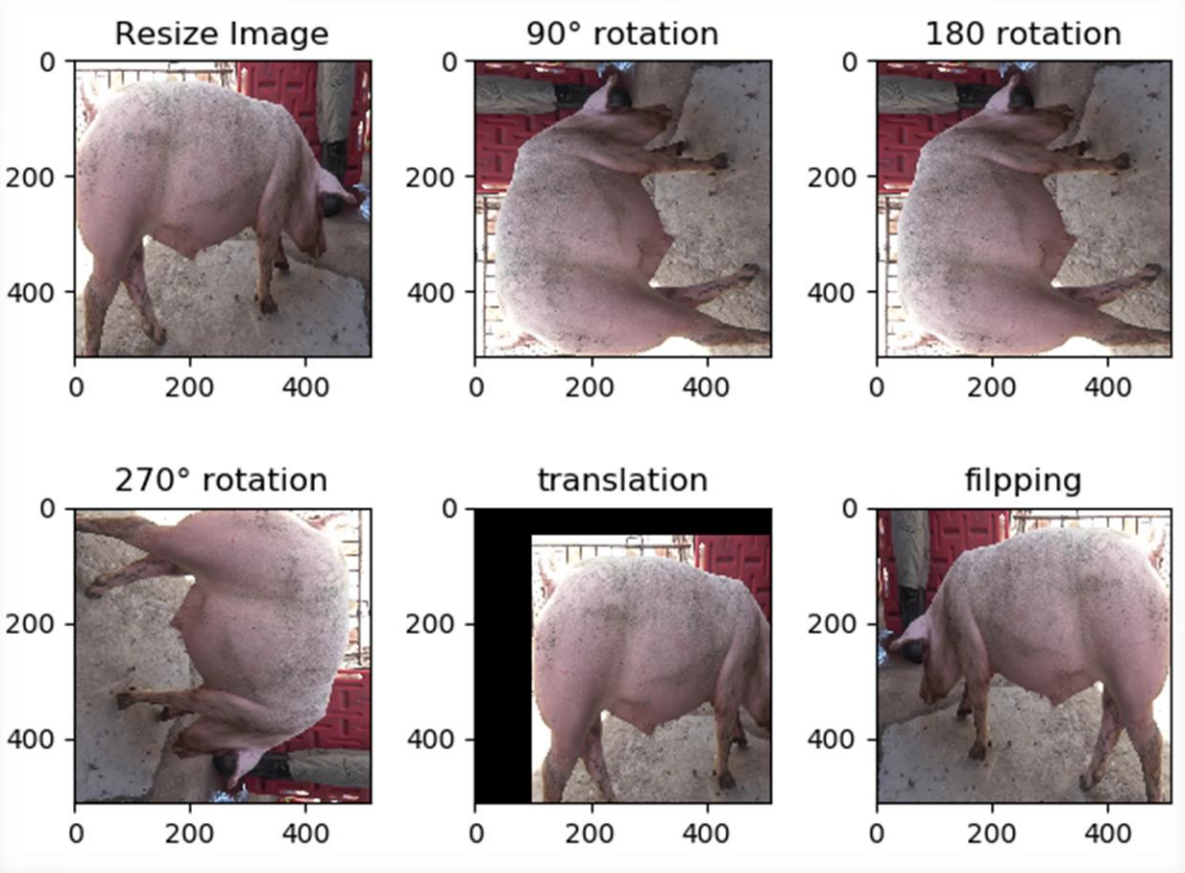
⬇

10,800 pictures

Test loss : 0.4607

⬇

Test loss : 0.4329



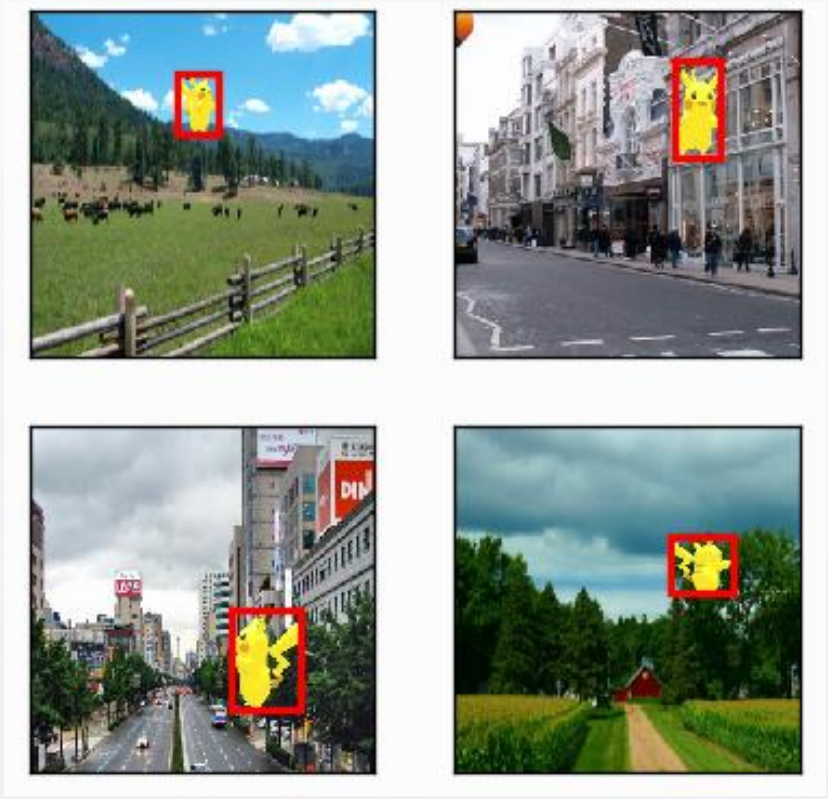
Future work

More on data augmentation

- Bounding box
- Add noise

Other improvements

- …



Thank You For Watching!

Any Questions?