



Pig Identification Based on MXNet

CMPS 242 PRESENTATION

Xiaotong Li, ID:1634362
Yuchen Yuan, ID:1633572
Diyang Gong, ID:1635066
Yi Ru, ID:1635532

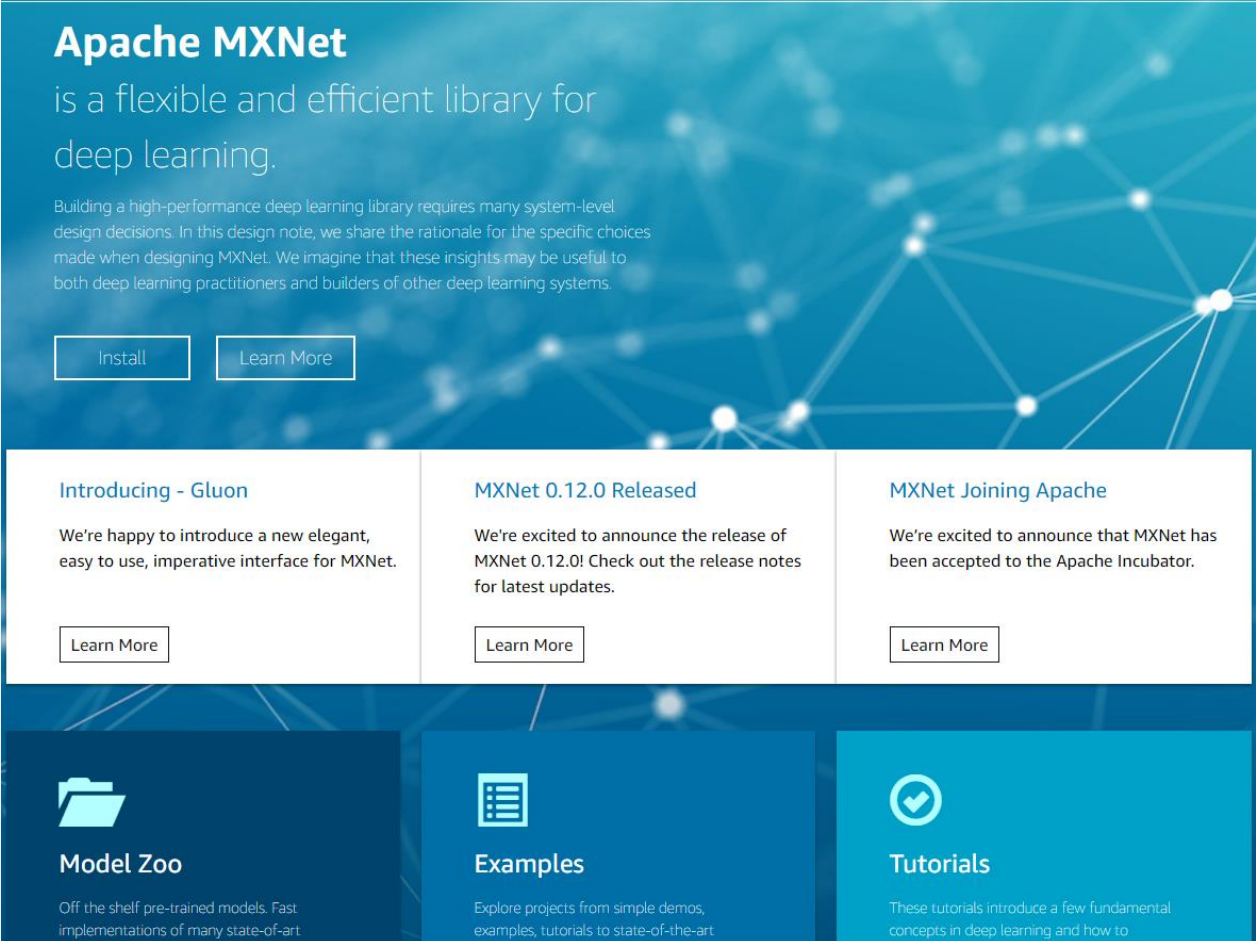
Task –Pig identification

- 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.






Apache MXNet

is a flexible and efficient library for deep learning.

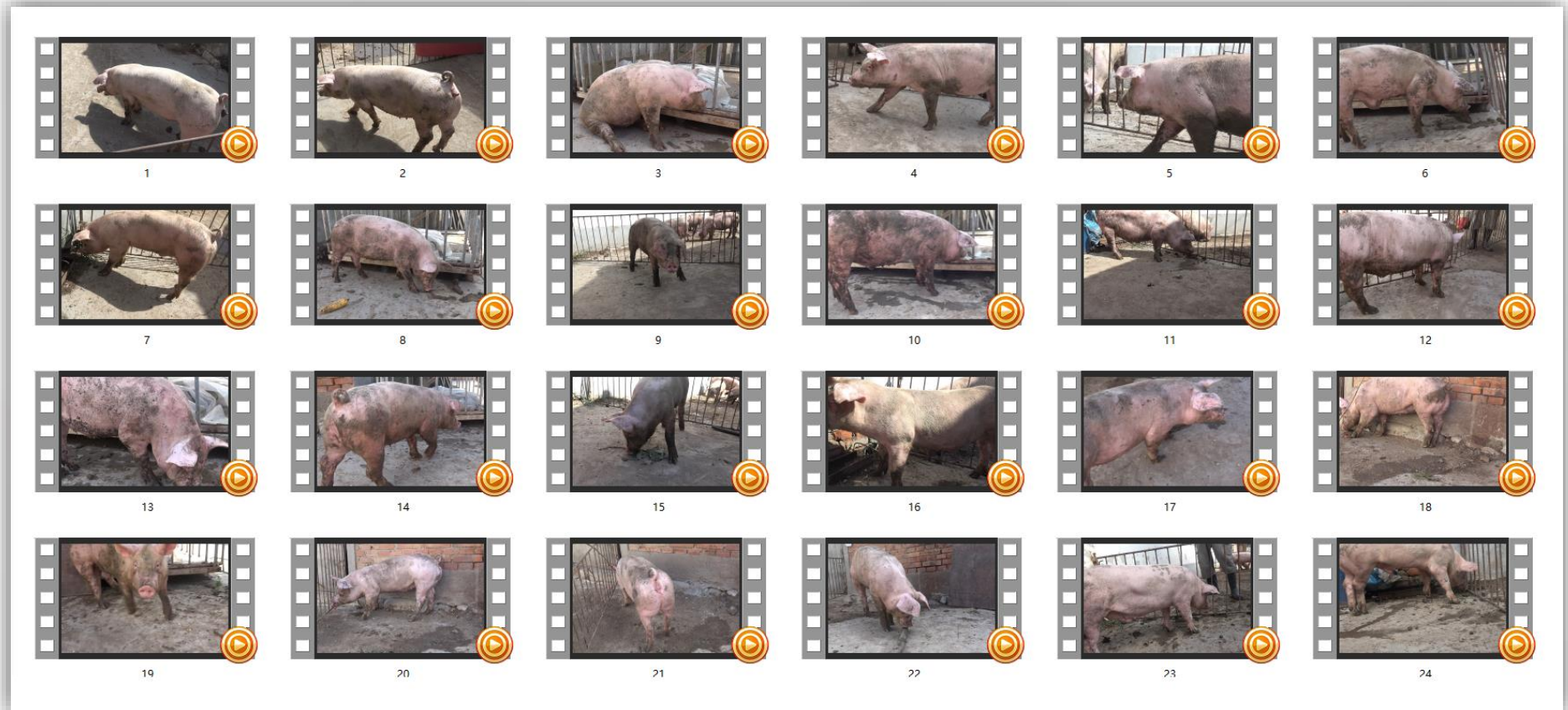
Building a high-performance deep learning library requires many system-level design decisions. In this design note, we share the rationale for the specific choices made when designing MXNet. We imagine that these insights may be useful to both deep learning practitioners and builders of other deep learning systems.

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<p>Introducing - Gluon</p> <p>We're happy to introduce a new elegant, easy to use, imperative interface for MXNet.</p> <p>Learn More</p>	<p>MXNet 0.12.0 Released</p> <p>We're excited to announce the release of MXNet 0.12.0! Check out the release notes for latest updates.</p> <p>Learn More</p>	<p>MXNet Joining Apache</p> <p>We're excited to announce that MXNet has been accepted to the Apache Incubator.</p> <p>Learn More</p>
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<p> Model Zoo</p> <p>Off the shelf pre-trained models. Fast implementations of many state-of-art</p>	<p> Examples</p> <p>Explore projects from simple demos, examples, tutorials to state-of-the-art</p>	<p> Tutorials</p> <p>These tutorials introduce a few fundamental concepts in deep learning and how to</p>
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Sample Data

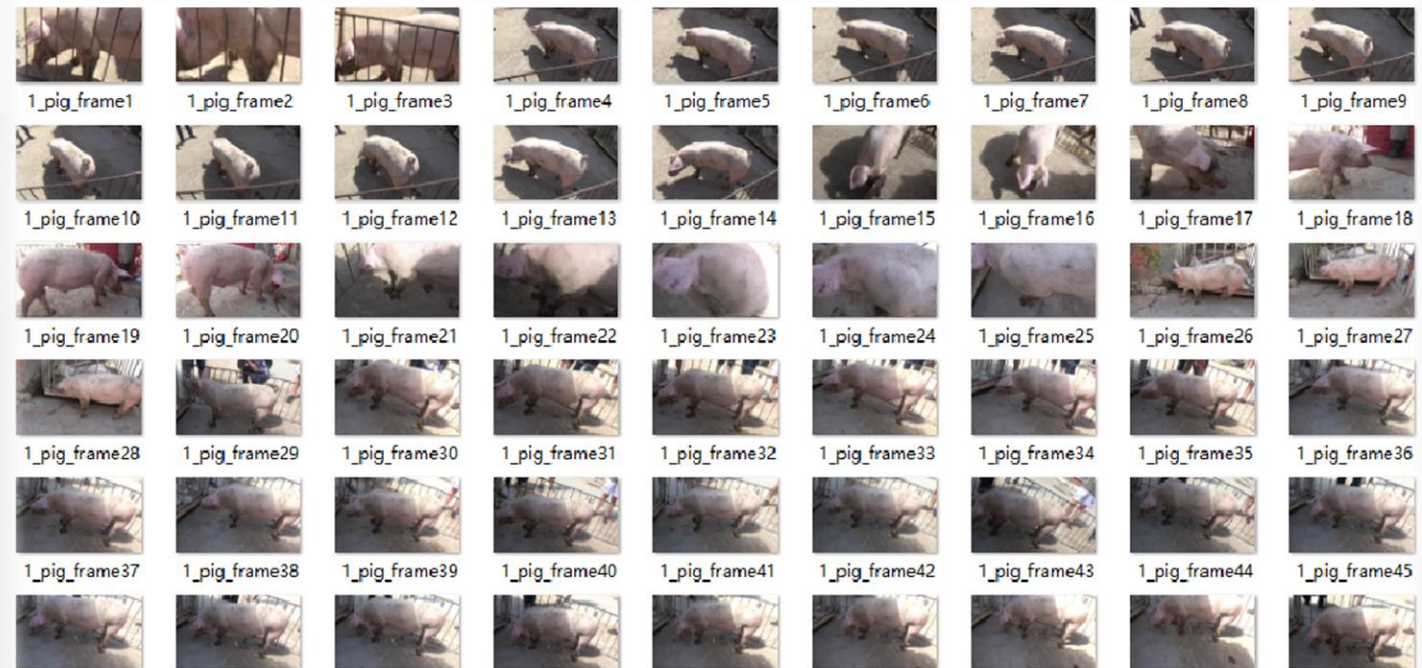


Video Property: 30 1-minute videos, 50 frame/s

Preprocessing

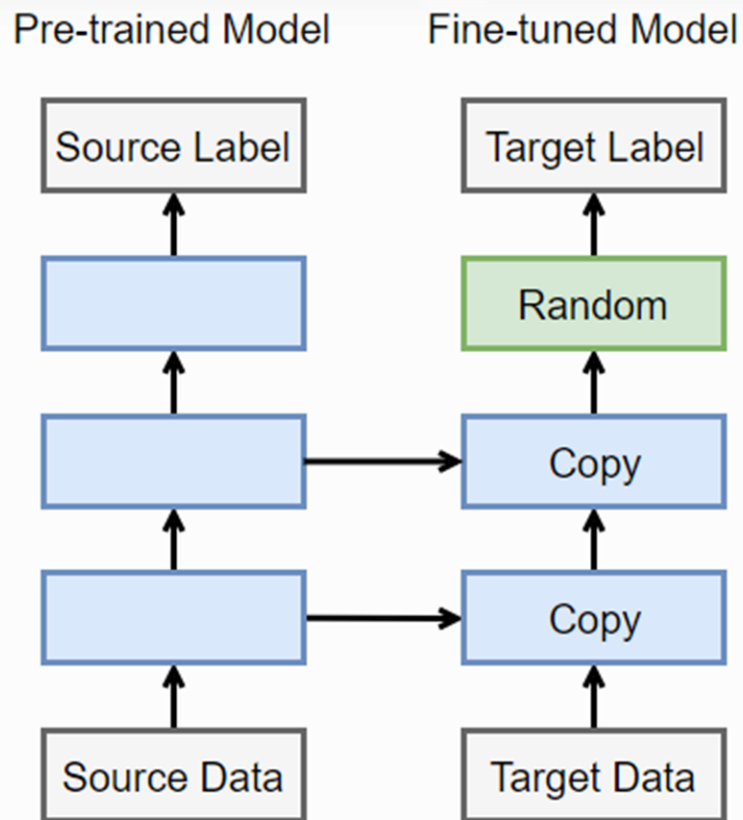
Image Extraction(OpenCV)

- 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.

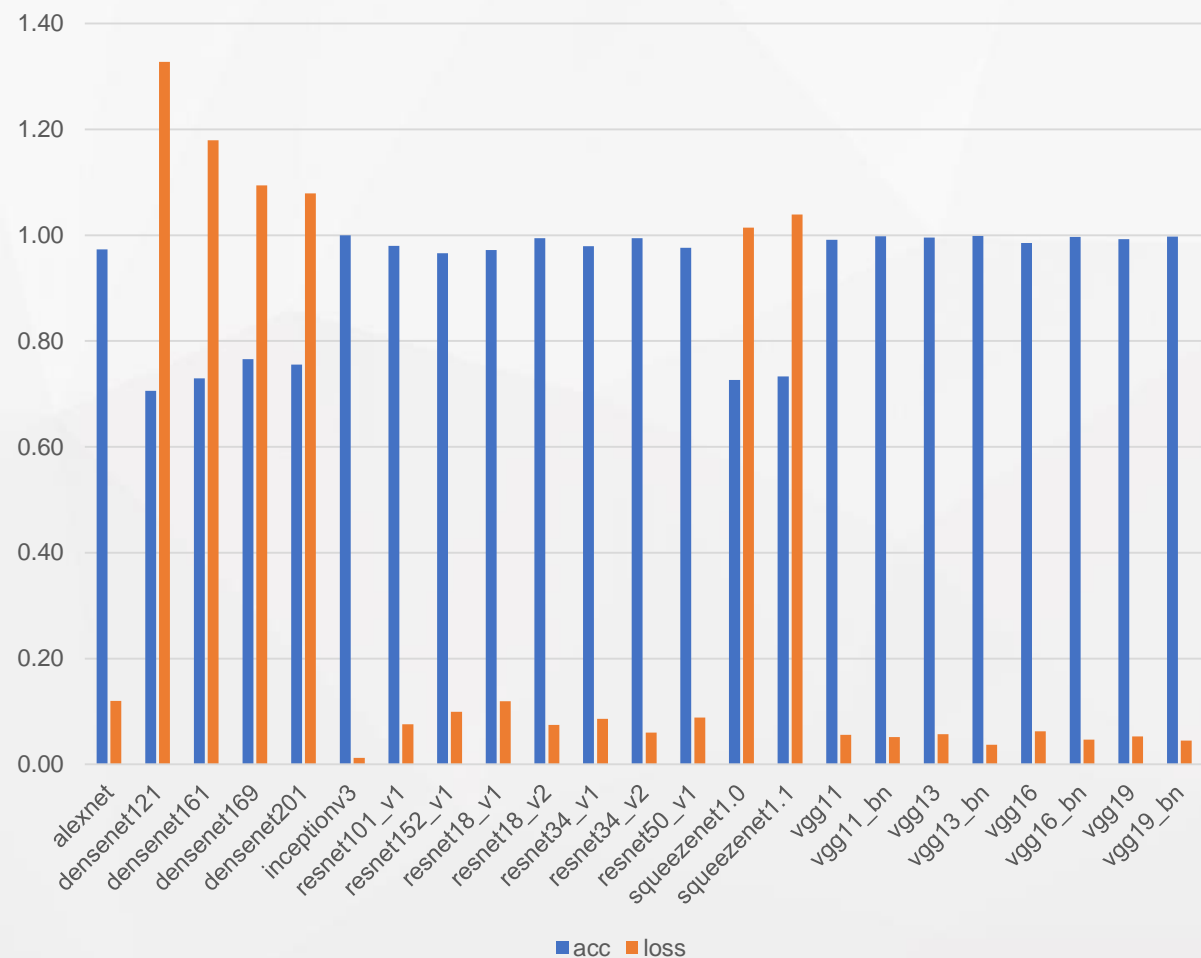
We choose two kinds of models with best performance:

ResNet

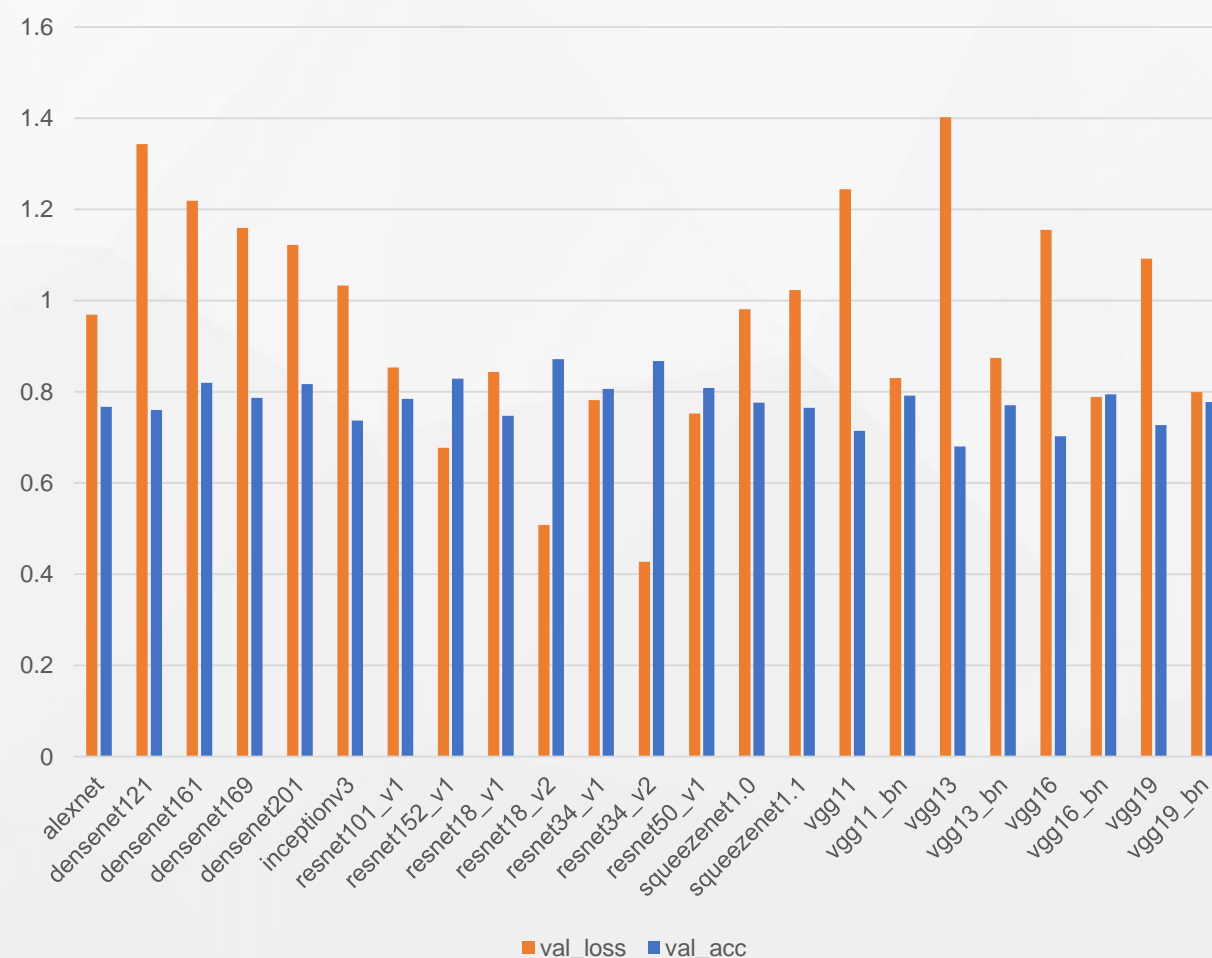
VGG

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

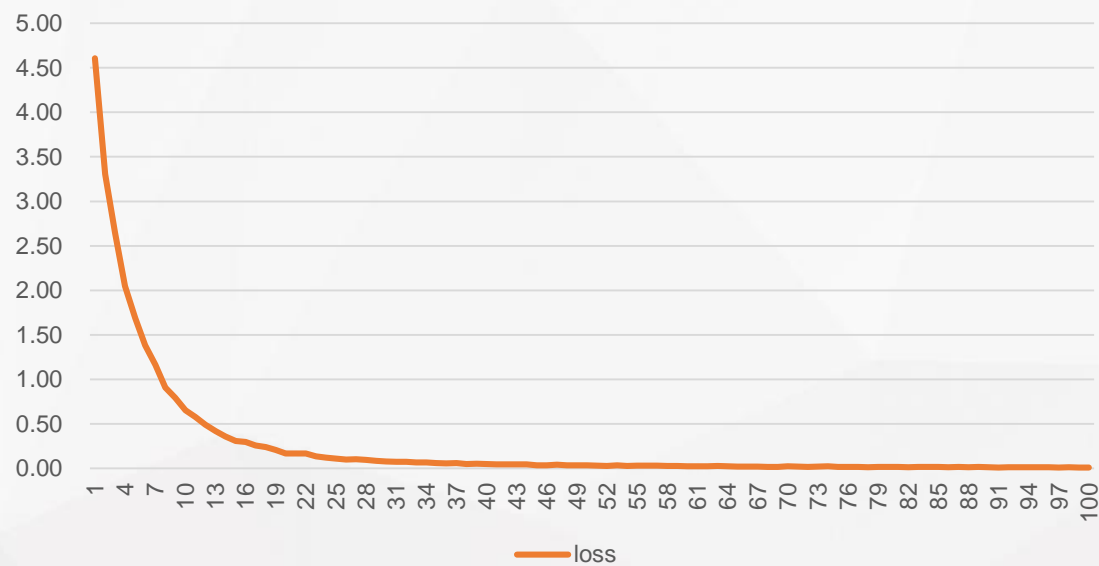
Train



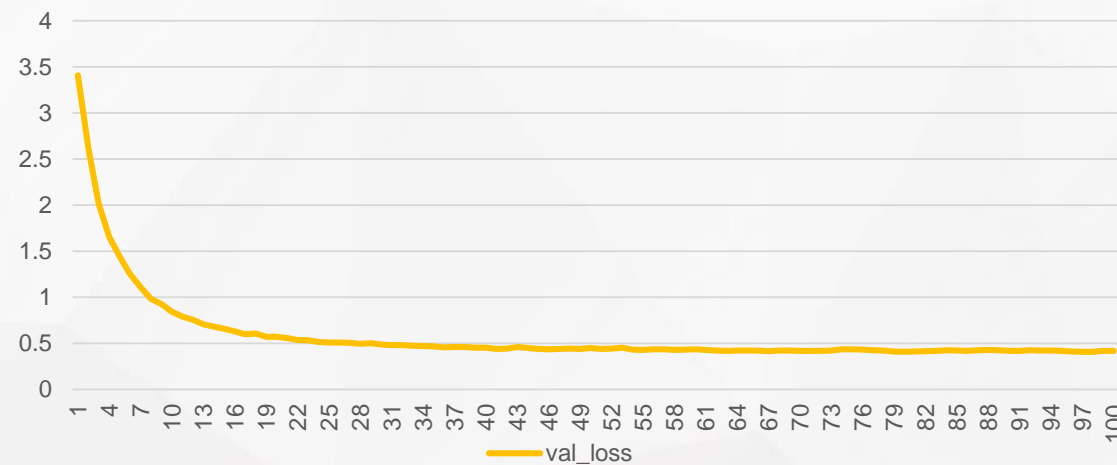
Val



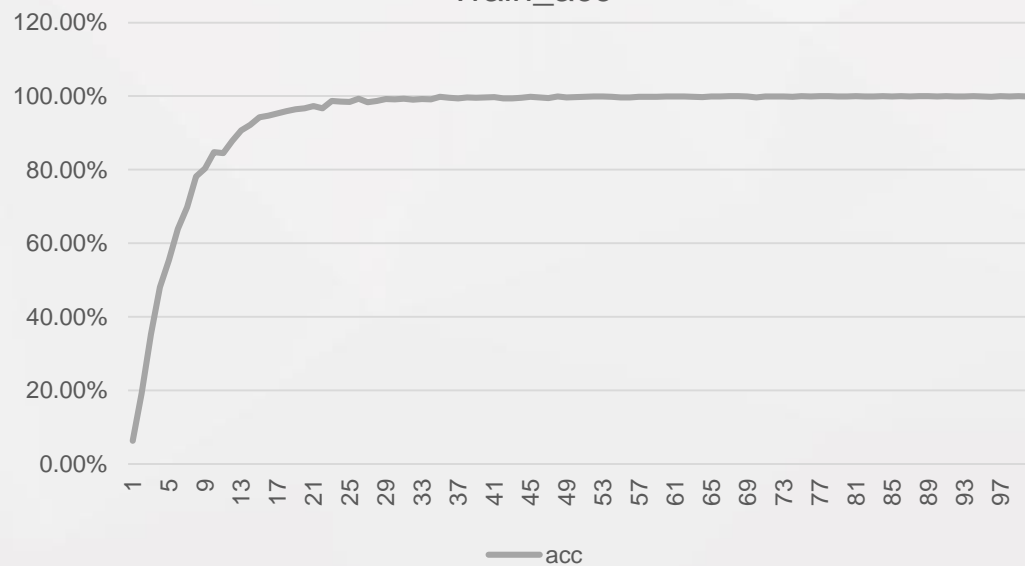
Train_loss



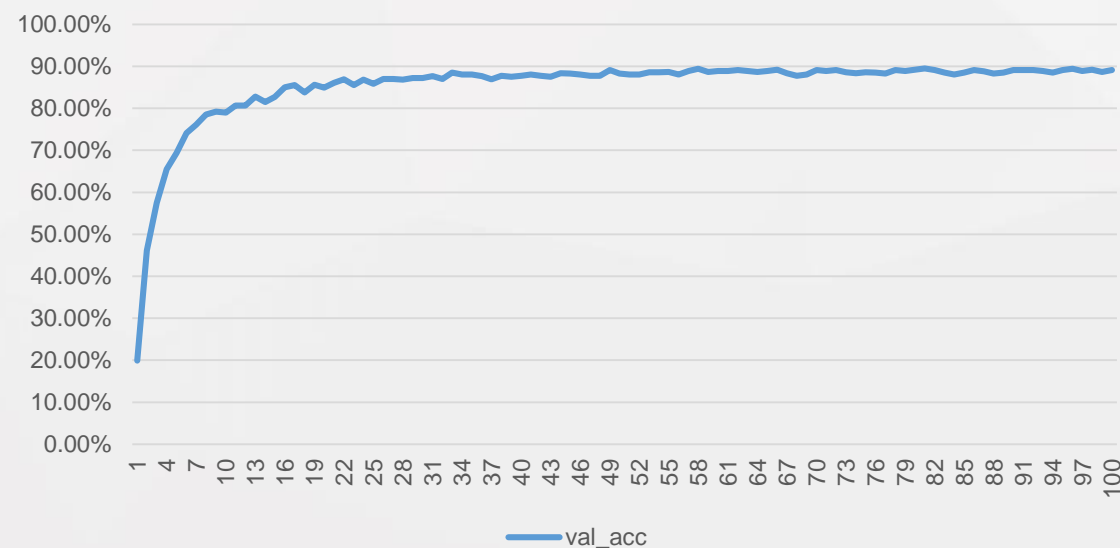
val_loss



Train_acc



val_acc



Optimization

Data augmentation

1,800-pictures

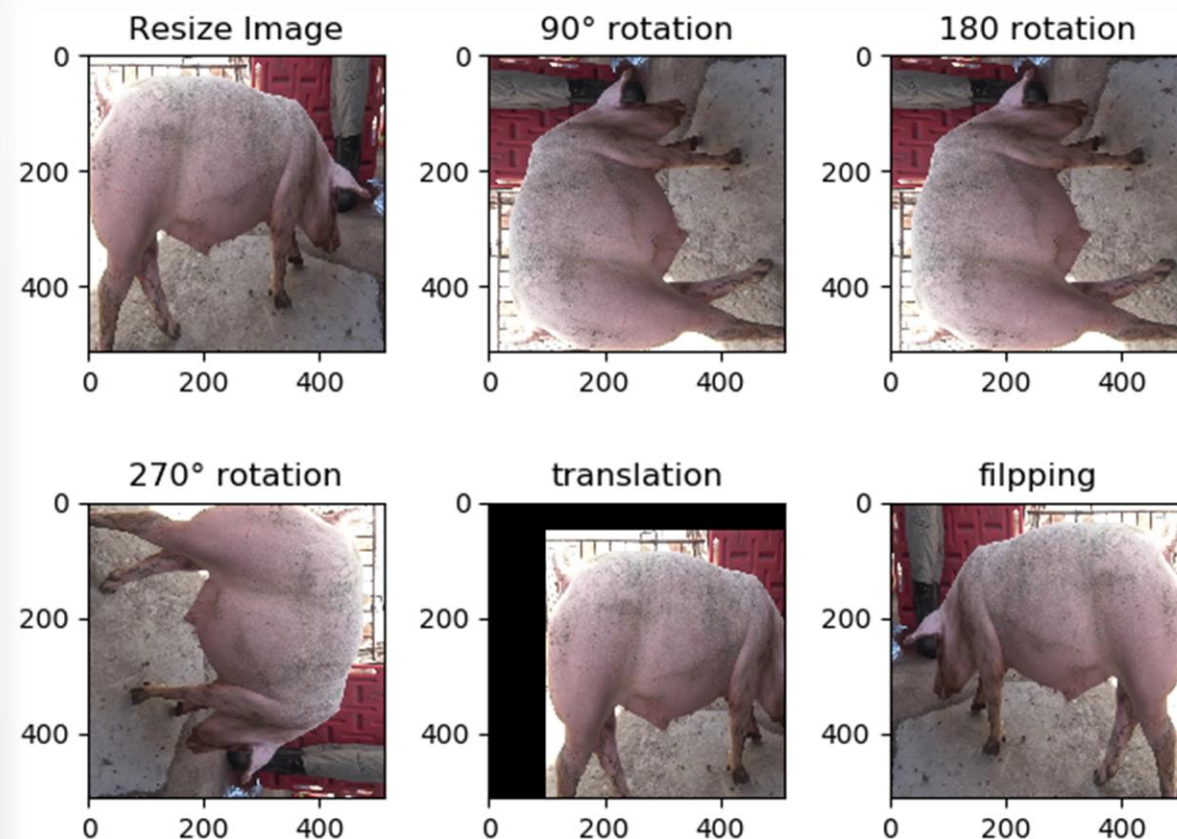


10,800 pictures

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?