DeepDWBA results

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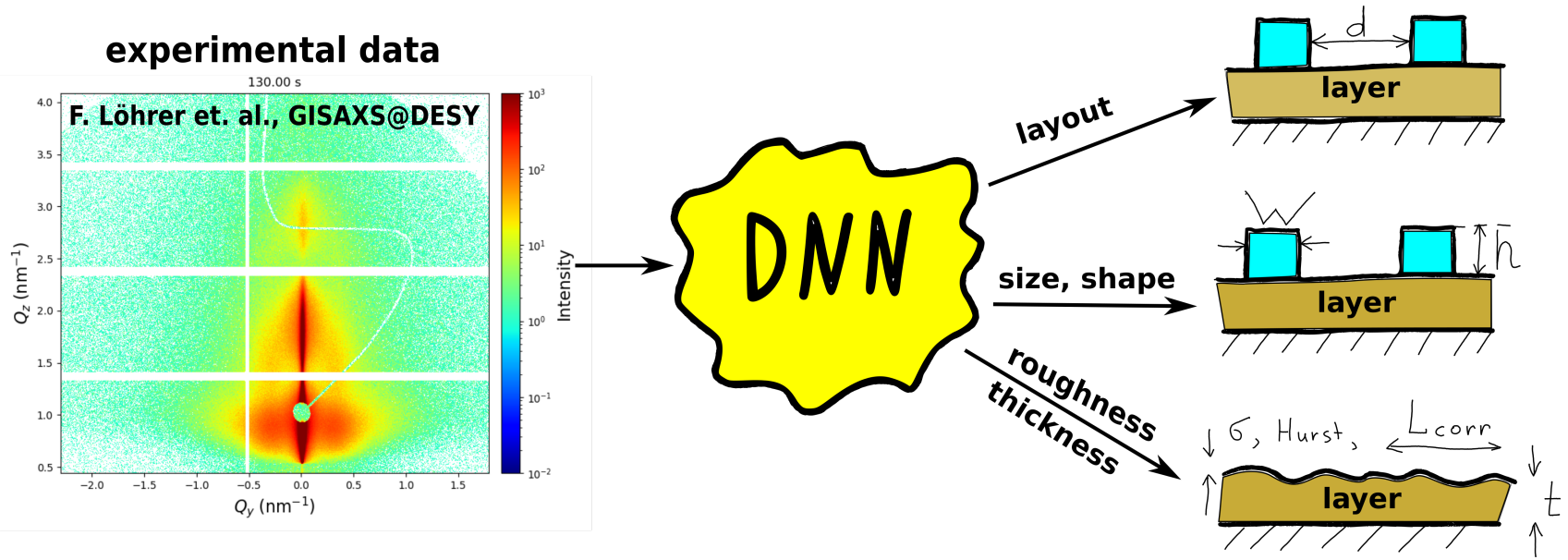
DeepDWBA: plans for hackathon

train the neural network on synthetic data; apply to experimental data



Expected result:

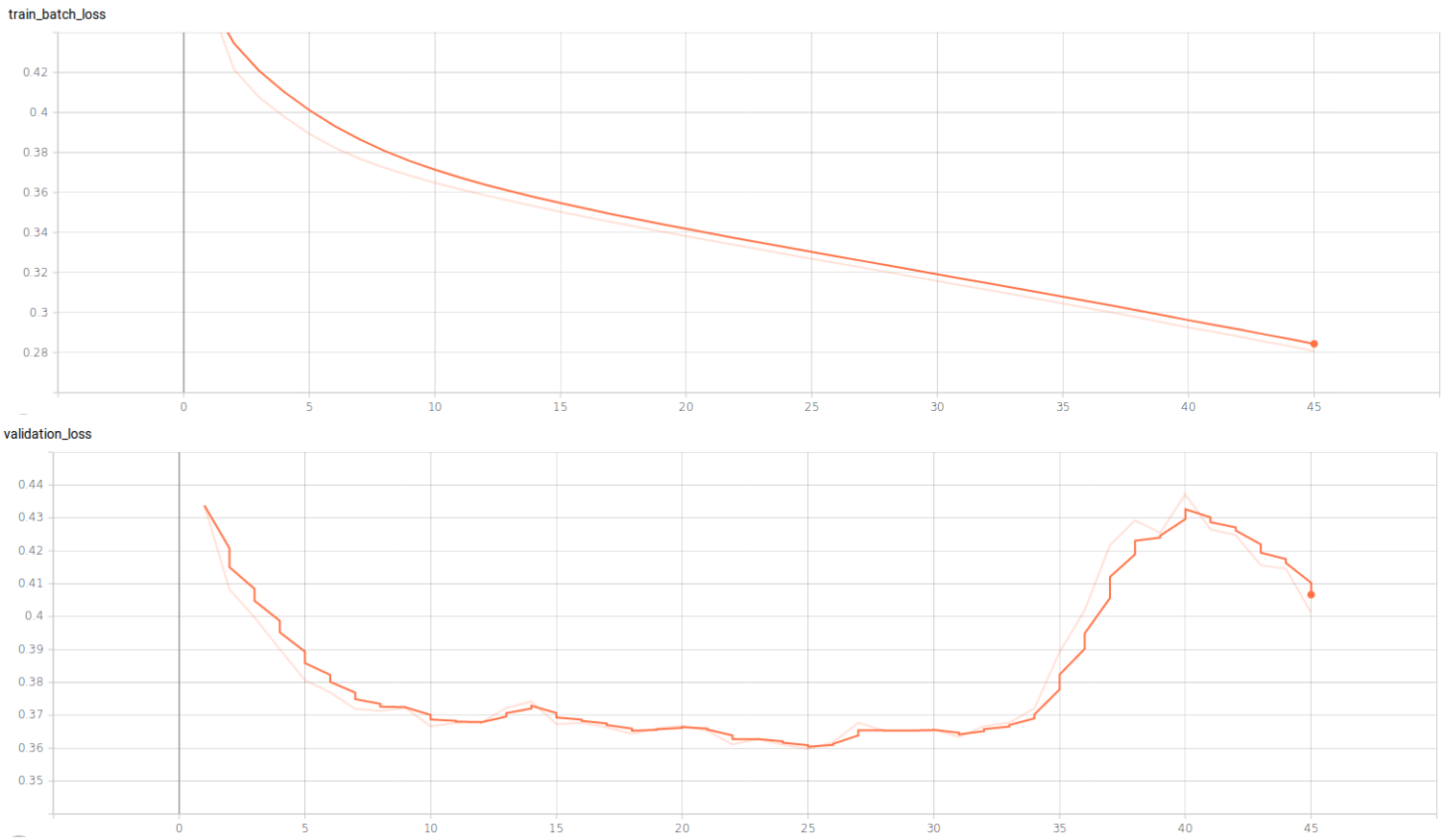
- **fast feedback on thin film morphology**
- **understanding of film growth mechanism**

Training data

- training samples: 100k arrays / 100gb
- validation samples: 10k arrays / 10gb
- labels: 19 floats
- data loading: 1h

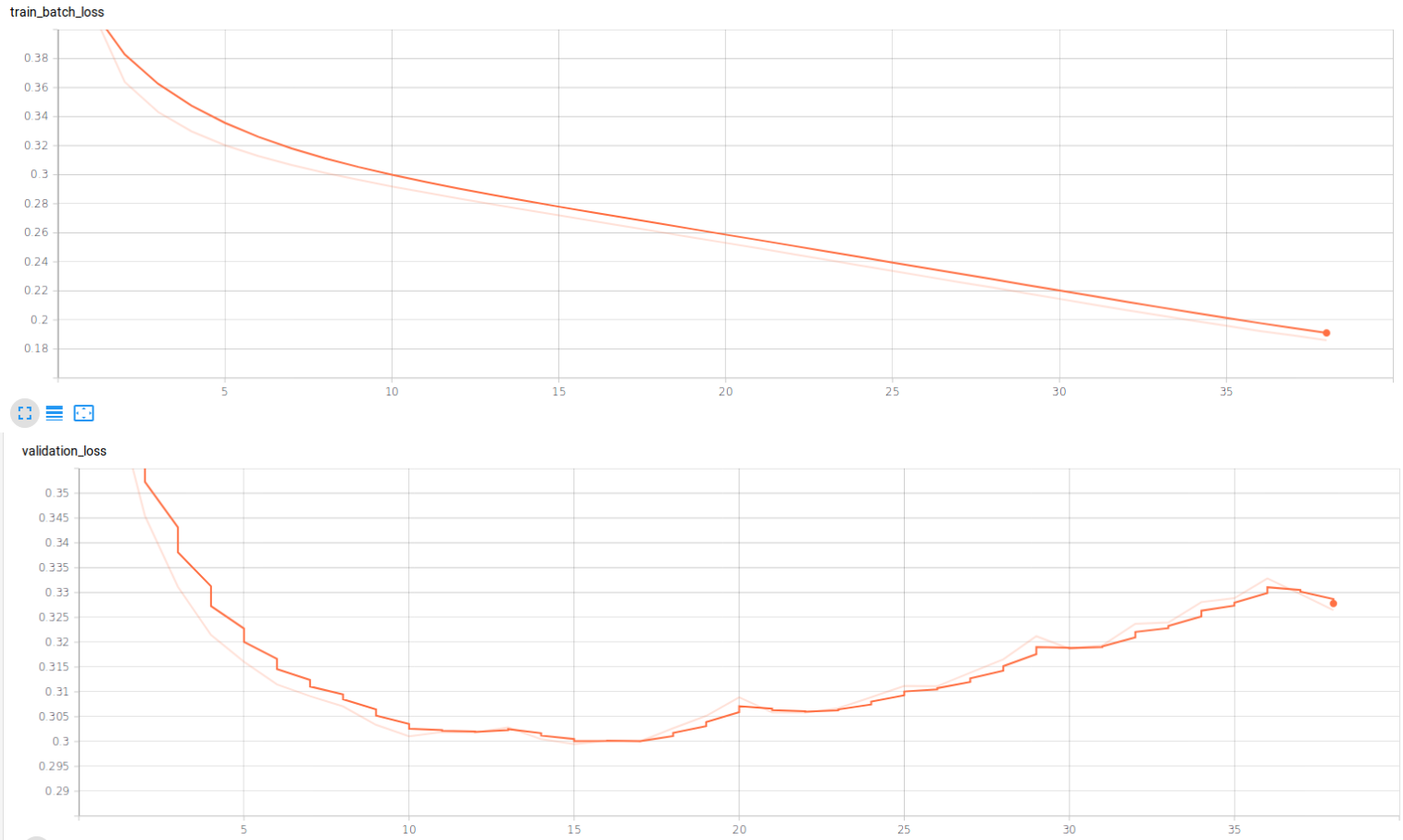
Tested architectures

DenseNet121



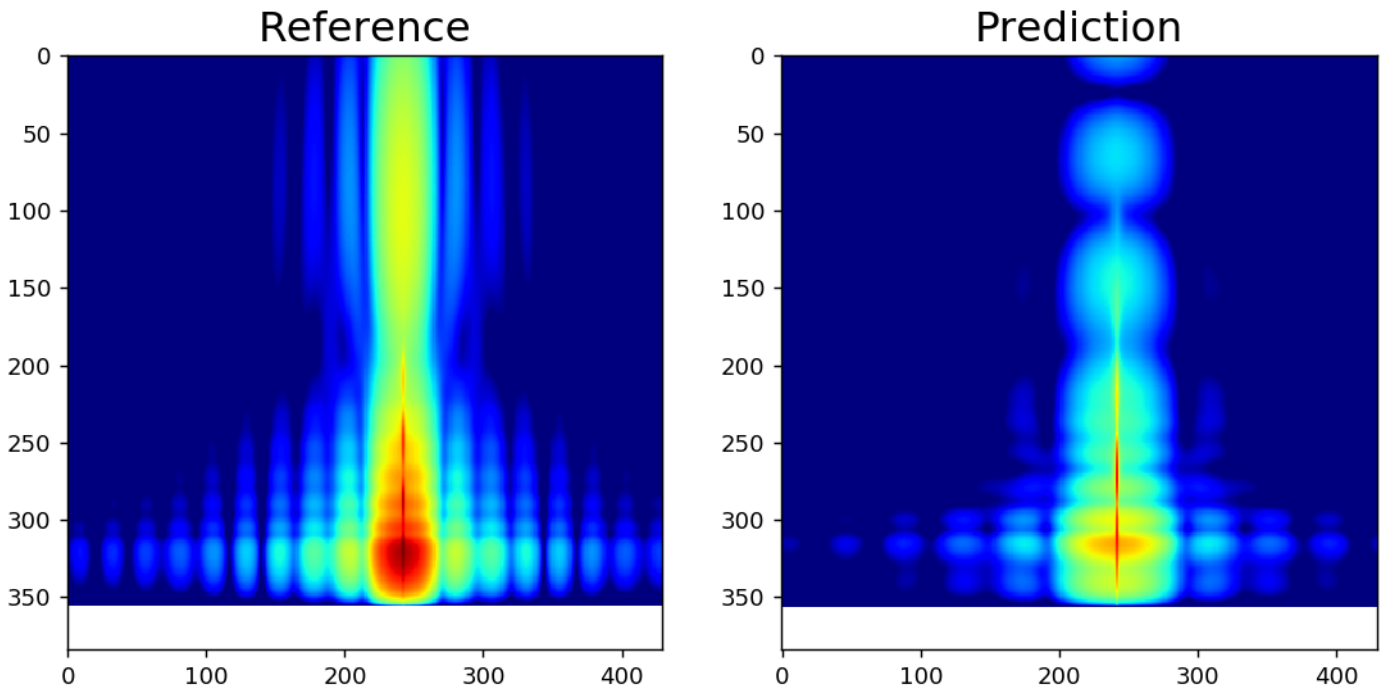
Tested architectures

DenseNet121 pretrained



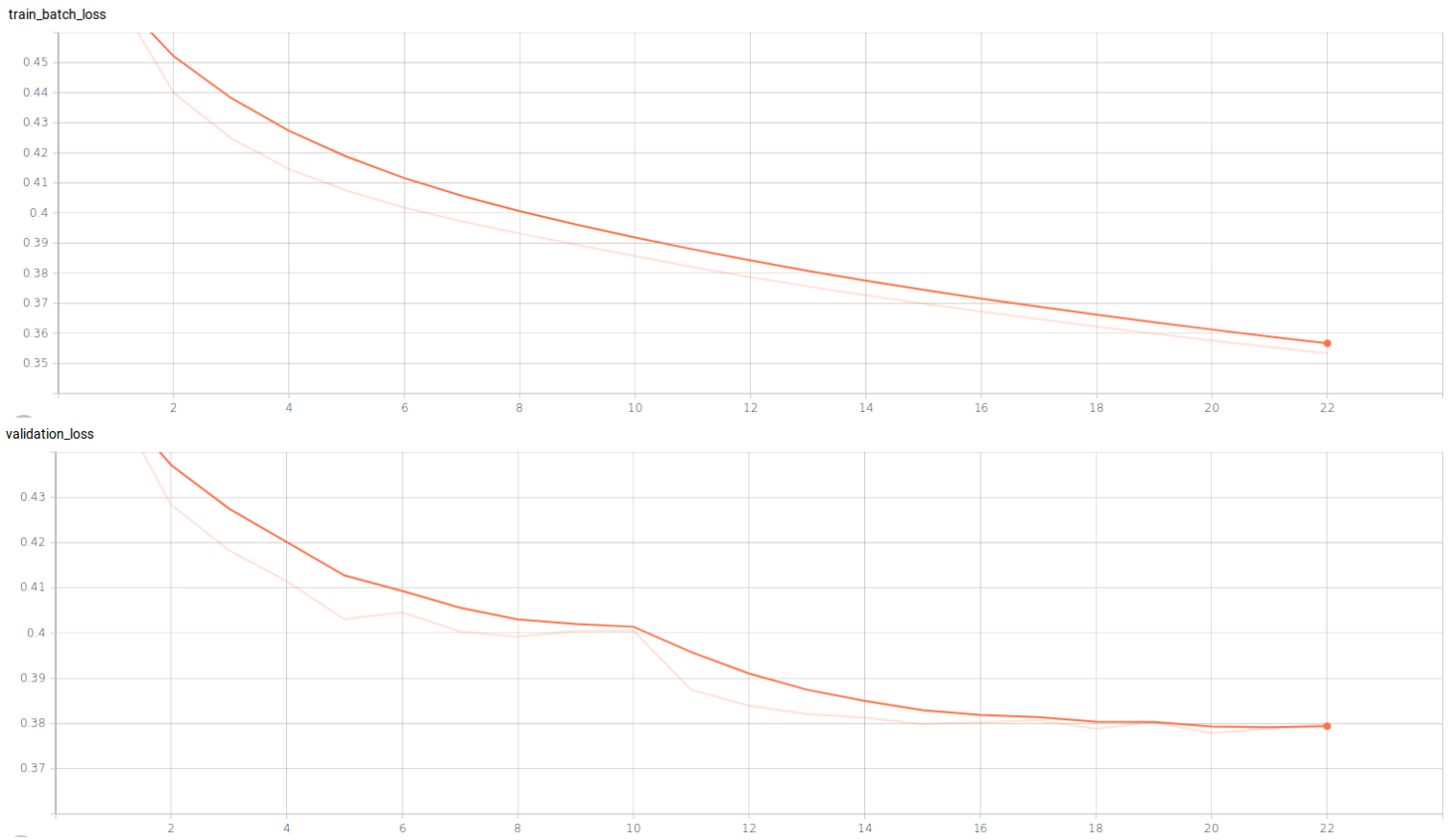
Pretrained DenseNet121

prediction



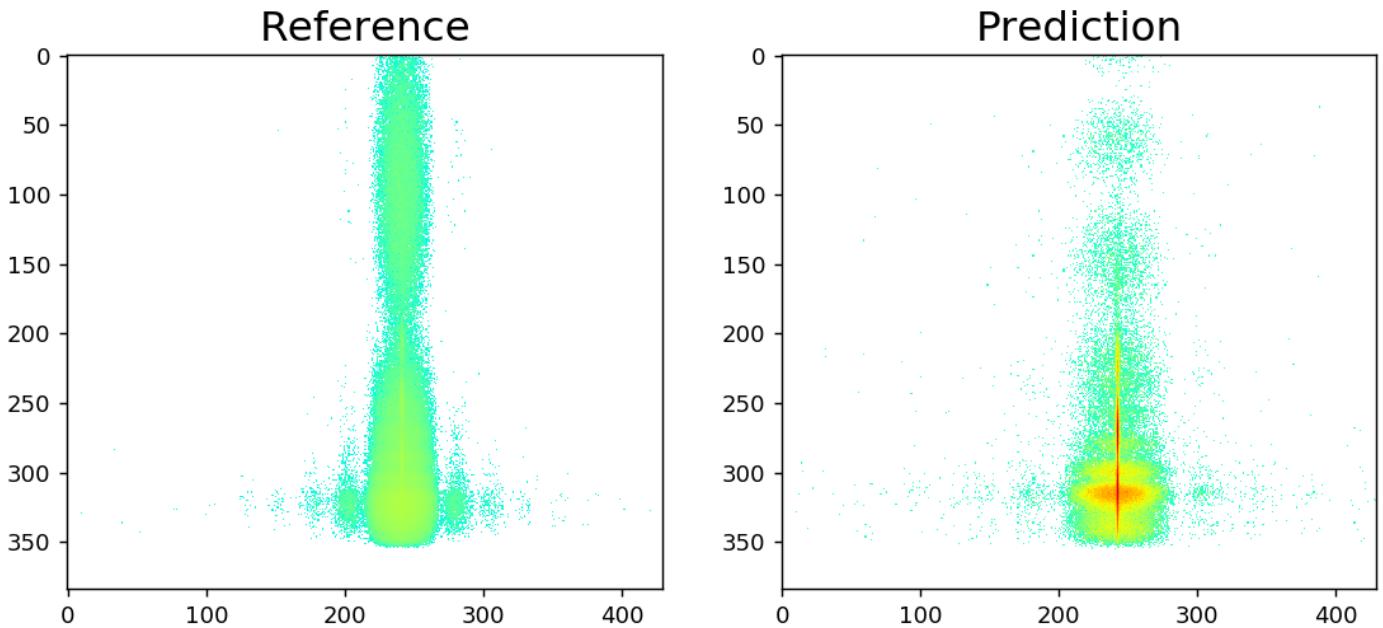
Tested architectures

DenseNet121 on noisy data



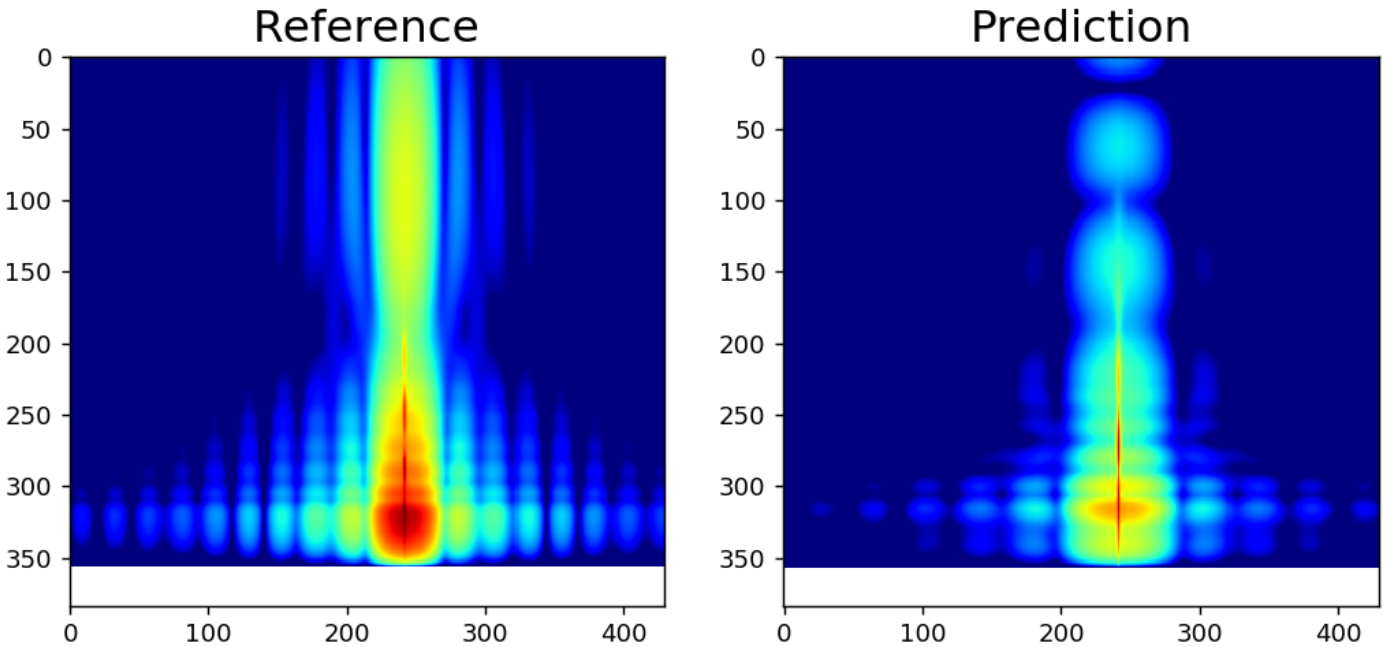
DenseNet121 on noisy data

prediction



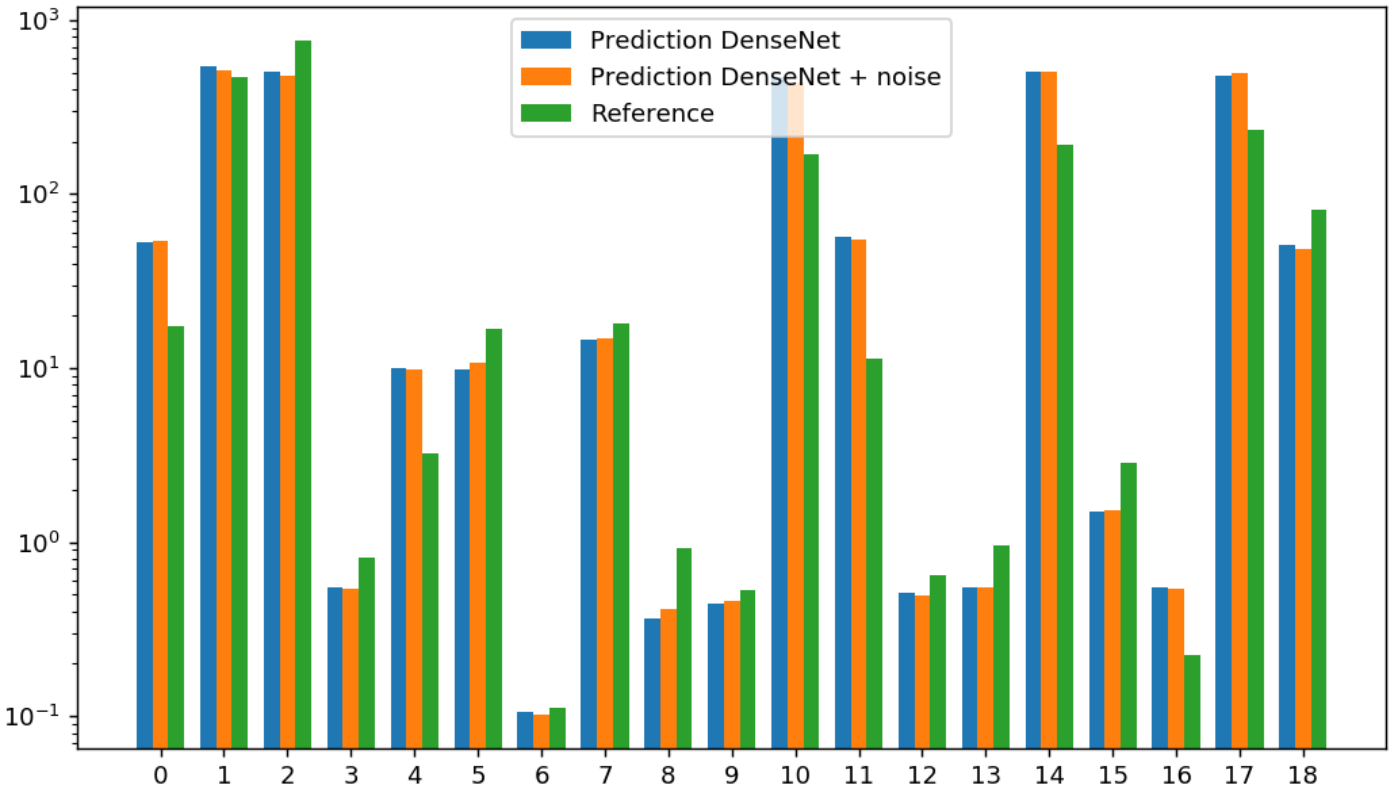
DenseNet121 on noisy data

prediction



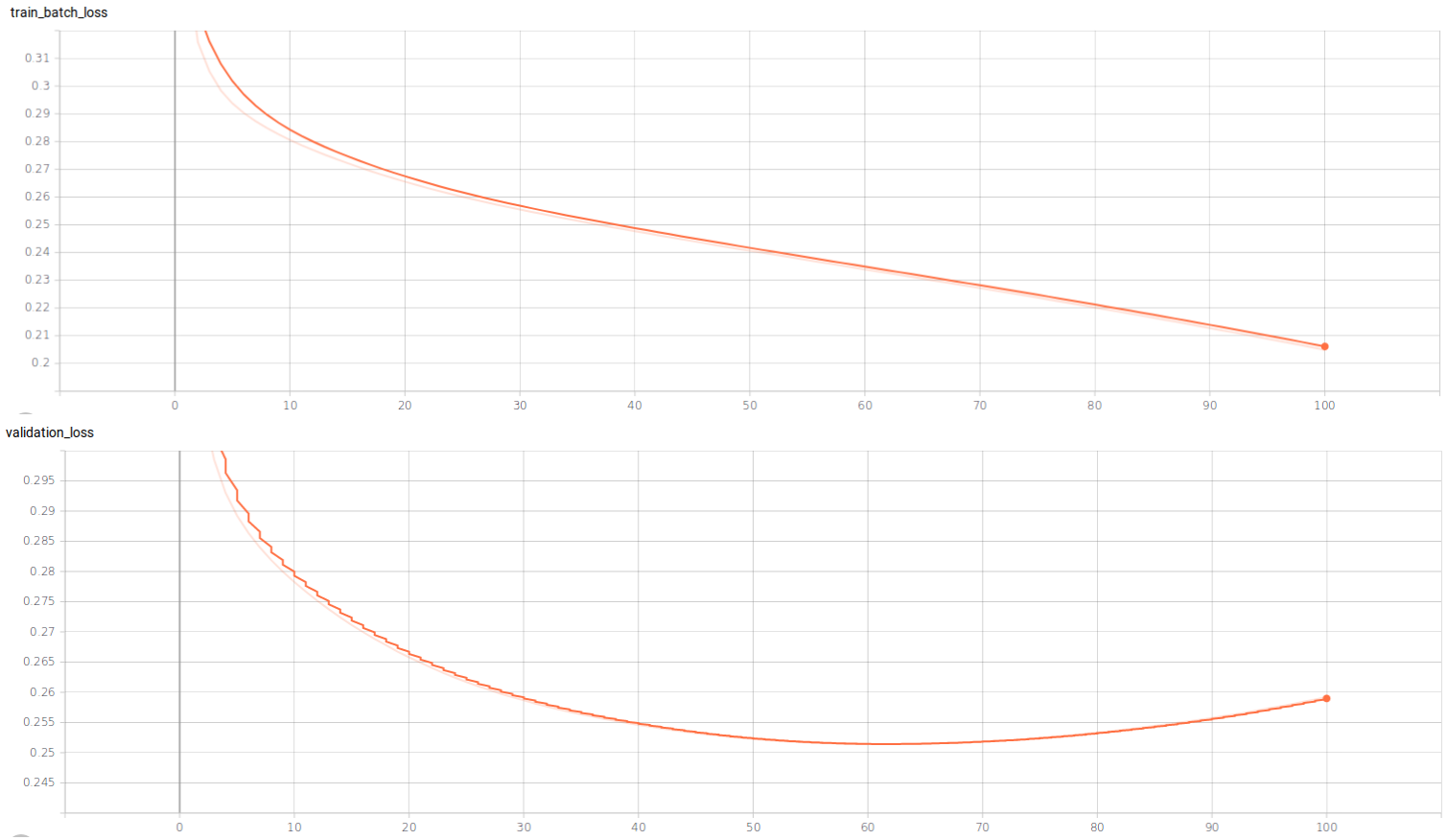
DenseNet121 for data with and without noise

predicted parameters



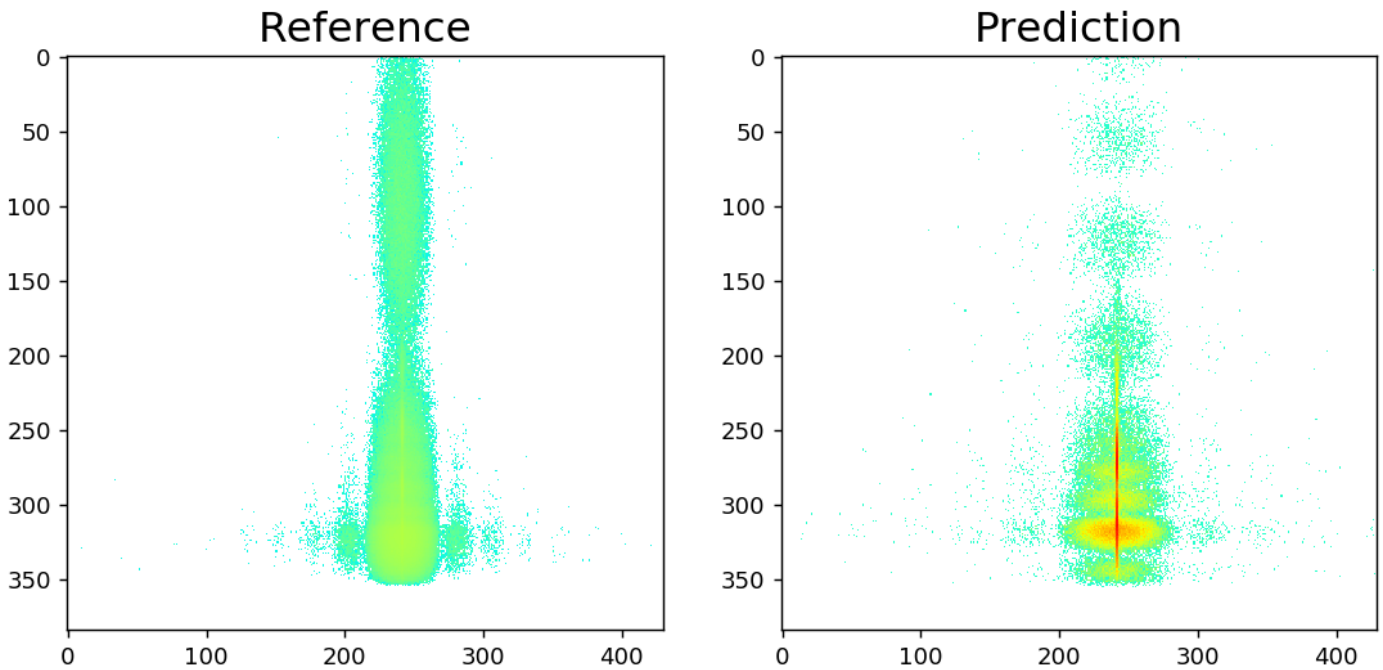
Tested architectures

ResNet18 on noisy data



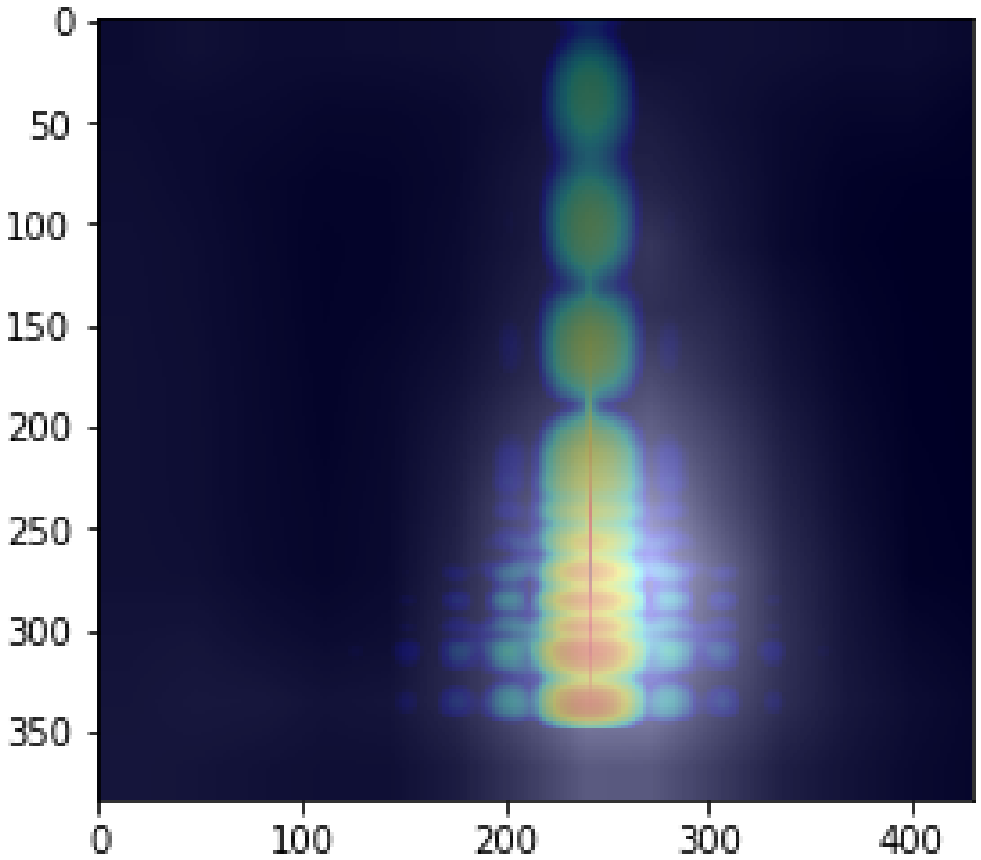
ResNet18 on noisy data

prediction



ResNet18 on noisy data

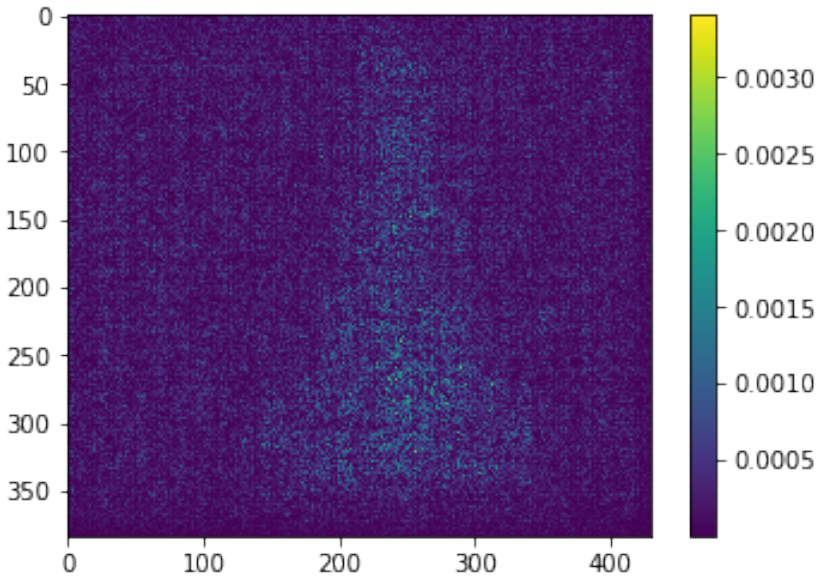
activation mapping



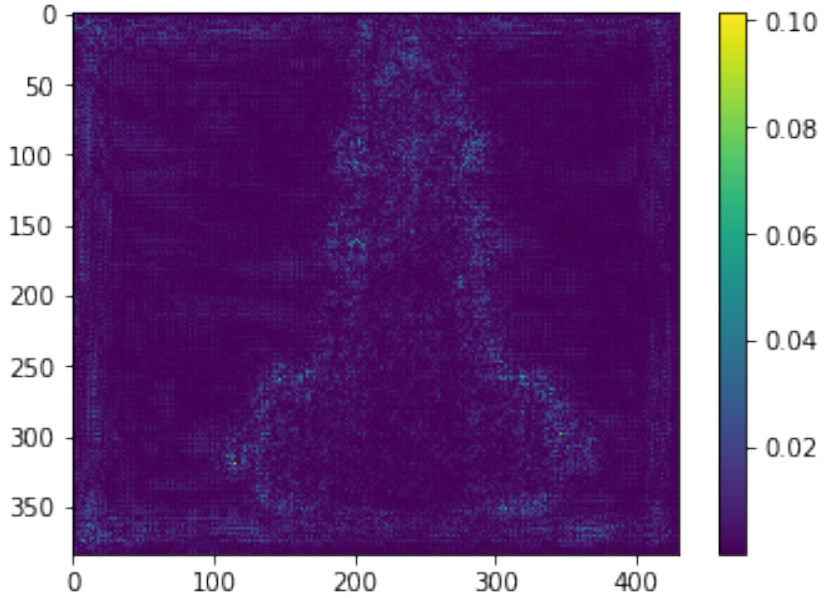
Densenet121 vs. Resnet18

partial derivative

ResNet18



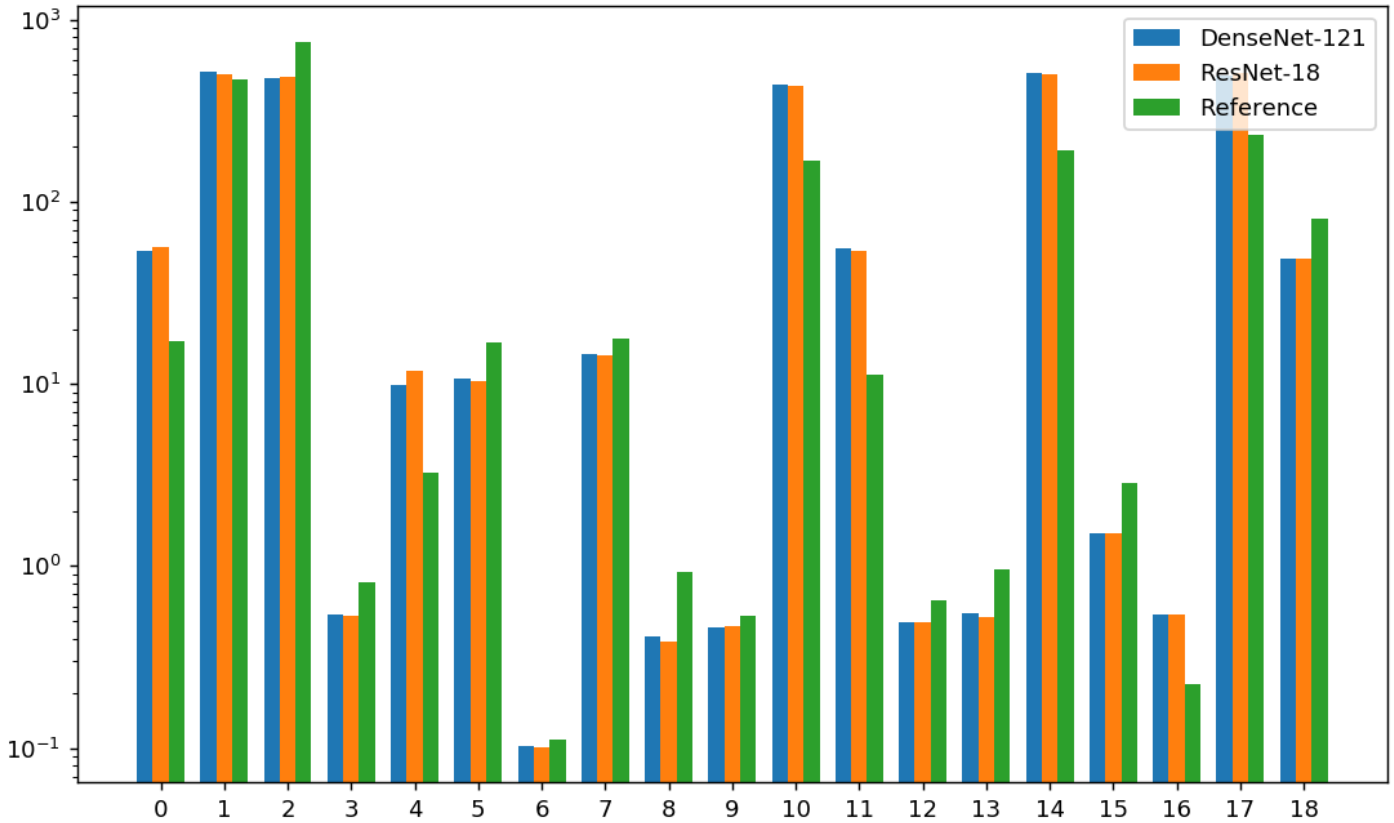
DenseNet121



The region of input data mainly contribution to the result

Densenet121 vs. Resnet18

predicted parameters



Conclusion

Lessons learned

- Challenge: work with large amount of data (100 Gb)
- Experience: 100×1 Gb files twice faster than 10×10 Gb files
- Challenge: learn pytorch and develop the code for training
- Experience: development took almost 2 days
- A lot of new experience!

Outlook

- Invertible neural network $\Longrightarrow$ confidence interval for predicted parameters
- Use pretrained networks for faster convergence
- Vary optimizers
- Vary loss functions
- Vary data preprocessing
- Test with experimental data
- ...

This is just a start

Thank you
for your attention!