Cropping Input Image Can Lead to a Better Training of Convolutional Neural Networks

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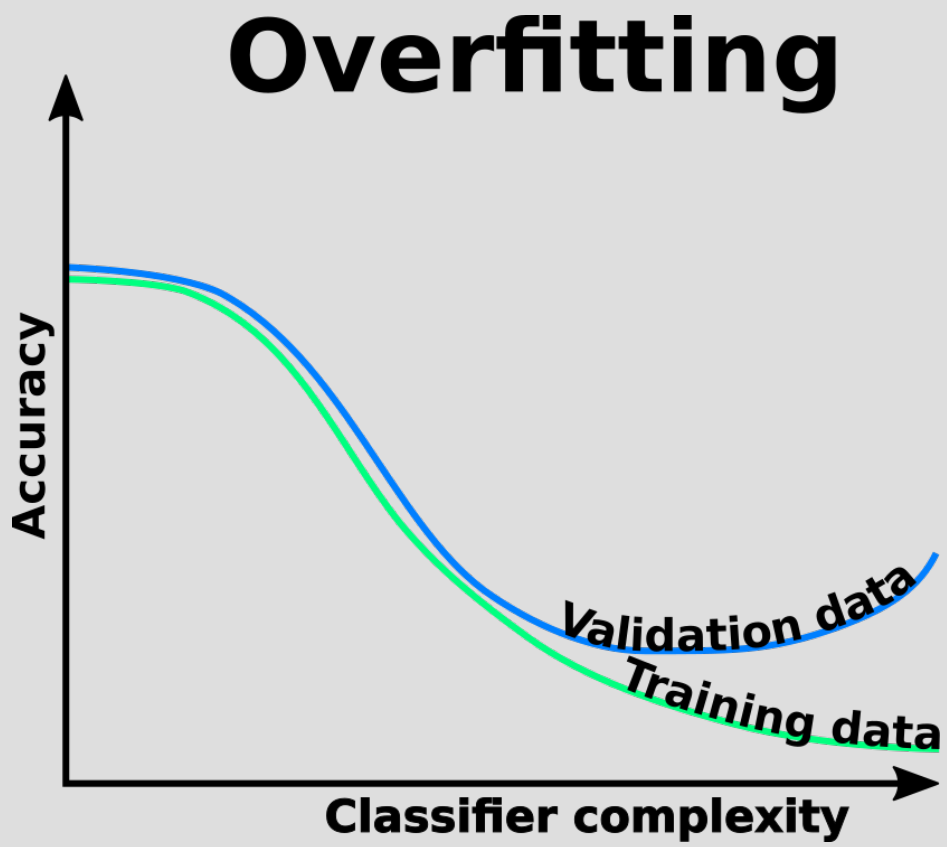
Cracow Grid Workshop 2017

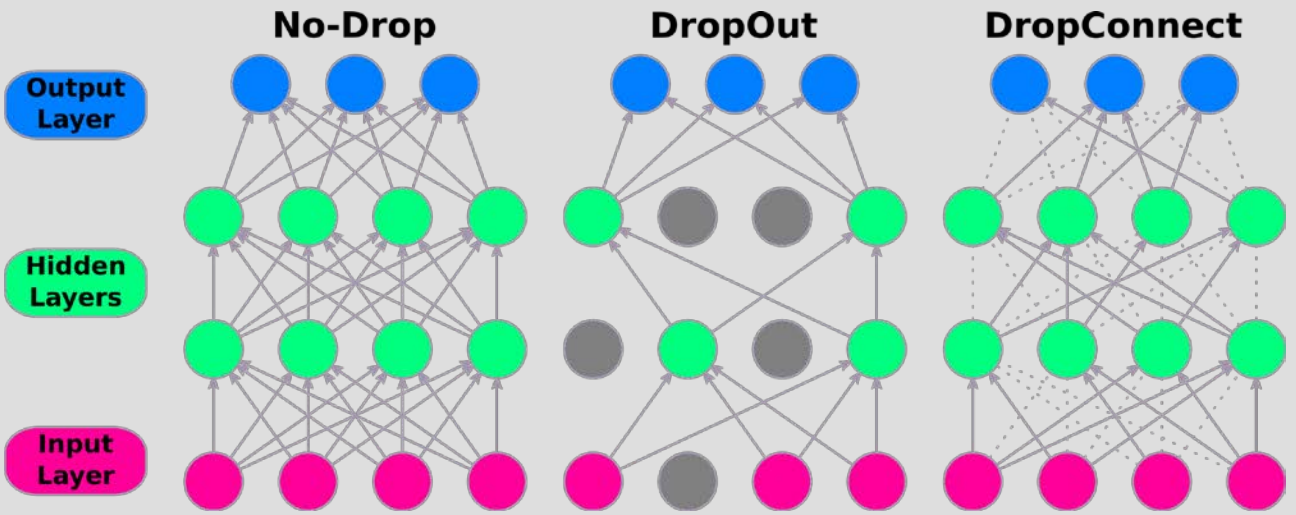
Overfitting

- Insufficient data set
- Perfect fit for training data
- Poor fit for data outside training set



Dropout

- Prevent overfitting
- Randomly shuts down neurons
- Many different signals for the same sample
- Data augmentation



Data augmentation

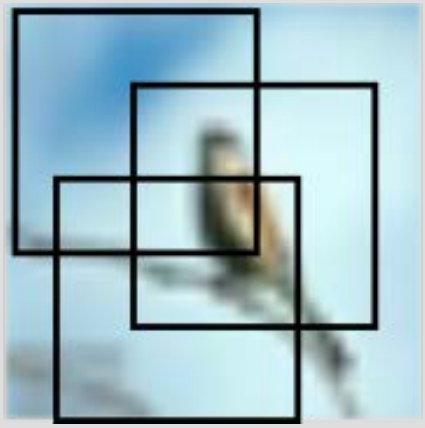
- Aritificially increase training set
- Can prevent overfitting

Negative result

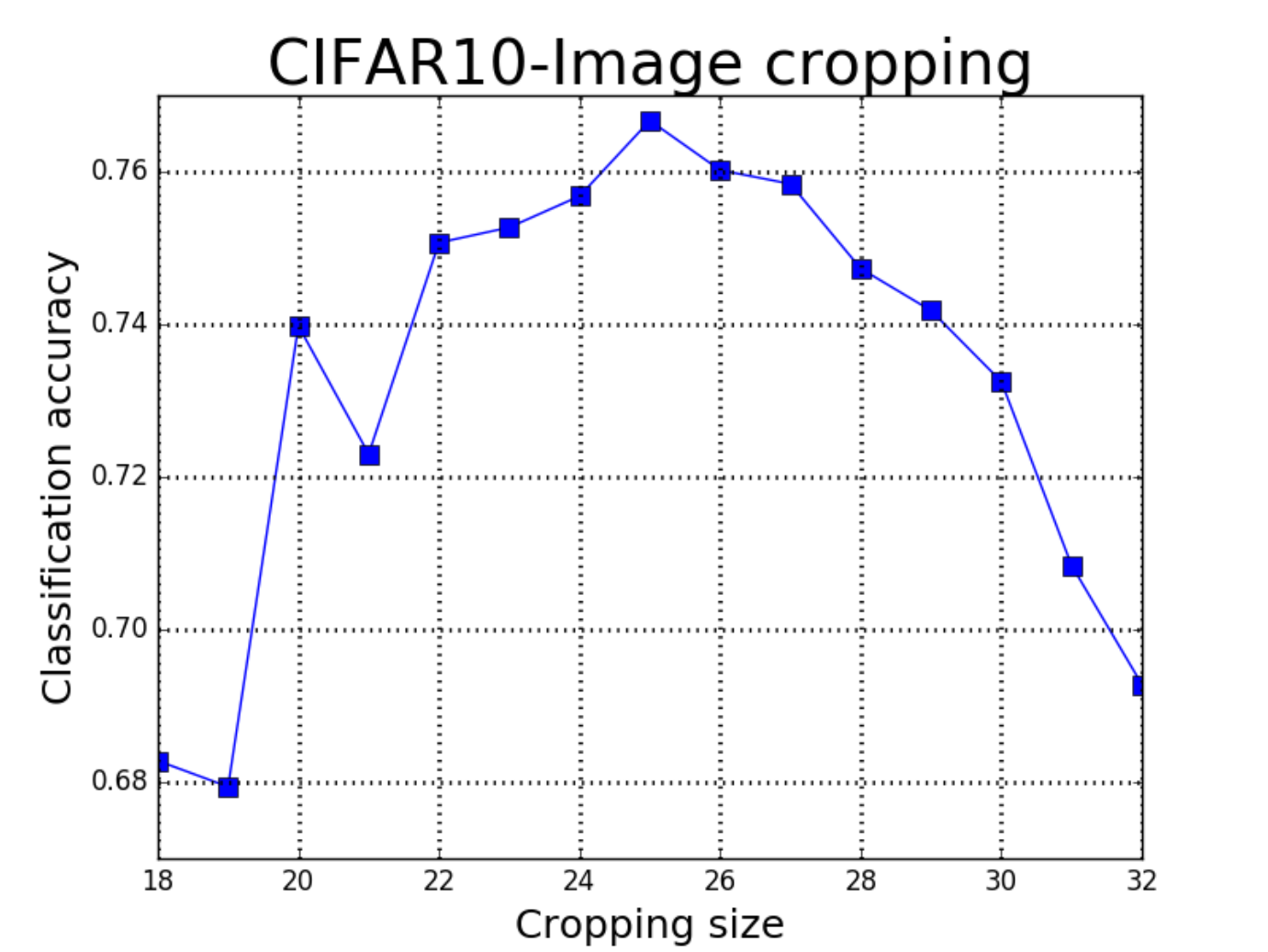
- Data augmentation can lead to a weaker performance
- It shouldn`t change fundamental object features

Cropping Input Image

- Don`t change fundamentally features
- Change features resulting from particular environment e.g: object is located in the lower left corner of the photo



Results - CIFAR10



CIFAR10 Images

Conv 1
32 filters

Pooling

Conv 2
32 filters

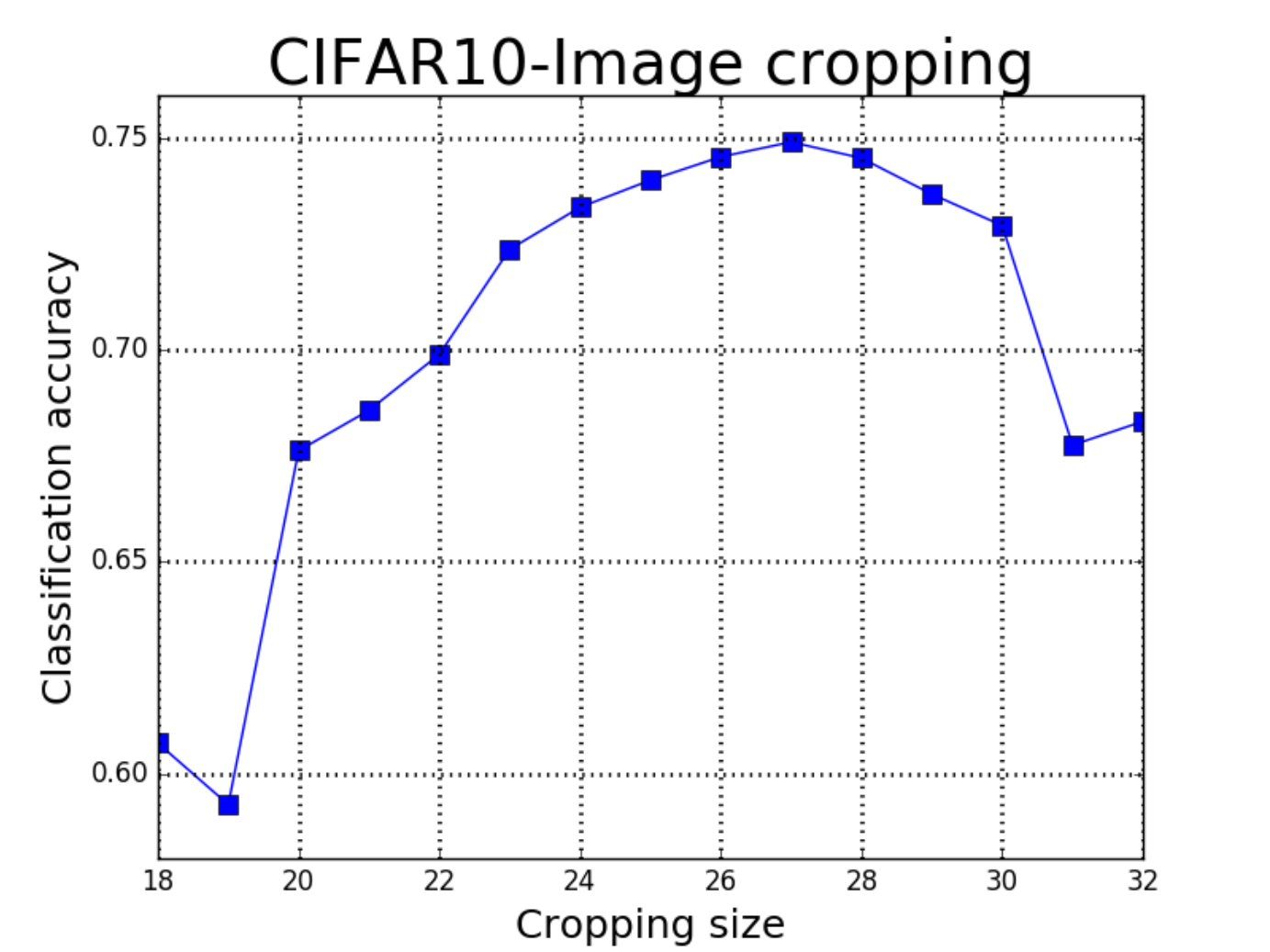
Pooling

Fully conected
192 neurons

Fully conected
96 neurons

Classification
to 10 class

Results - CIFAR10



CIFAR10 Images

Conv 1
32 filters

Conv 2
32 filters

Pooling

Conv 3
32 filters

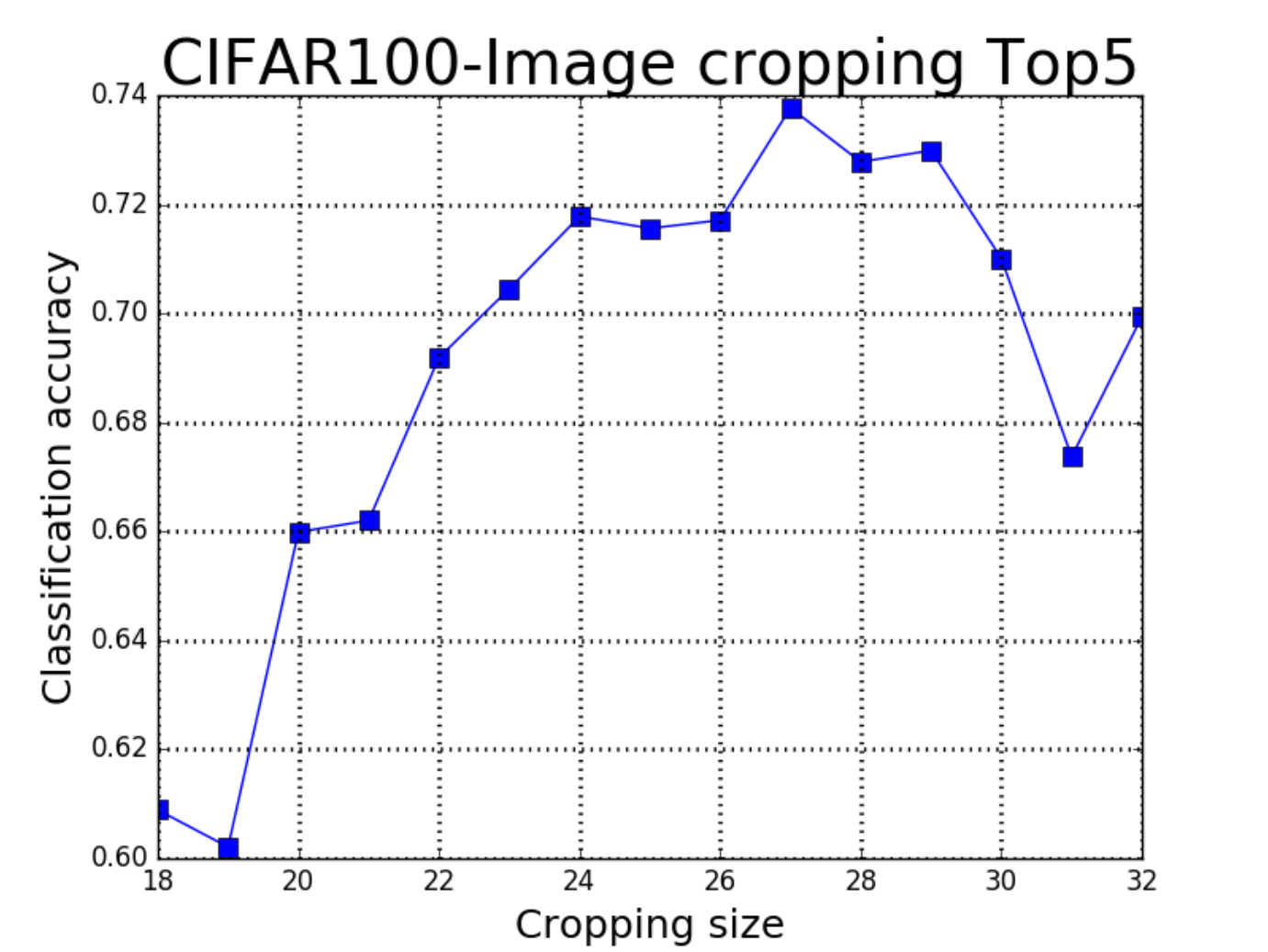
Pooling

Fully conected
192 neurons

Fully conected
96 neurons

Classification
to 10 class

Results - CIFAR100



CIFAR100 Images

Conv 1
32 filters

Pooling

Conv 2
32 filters

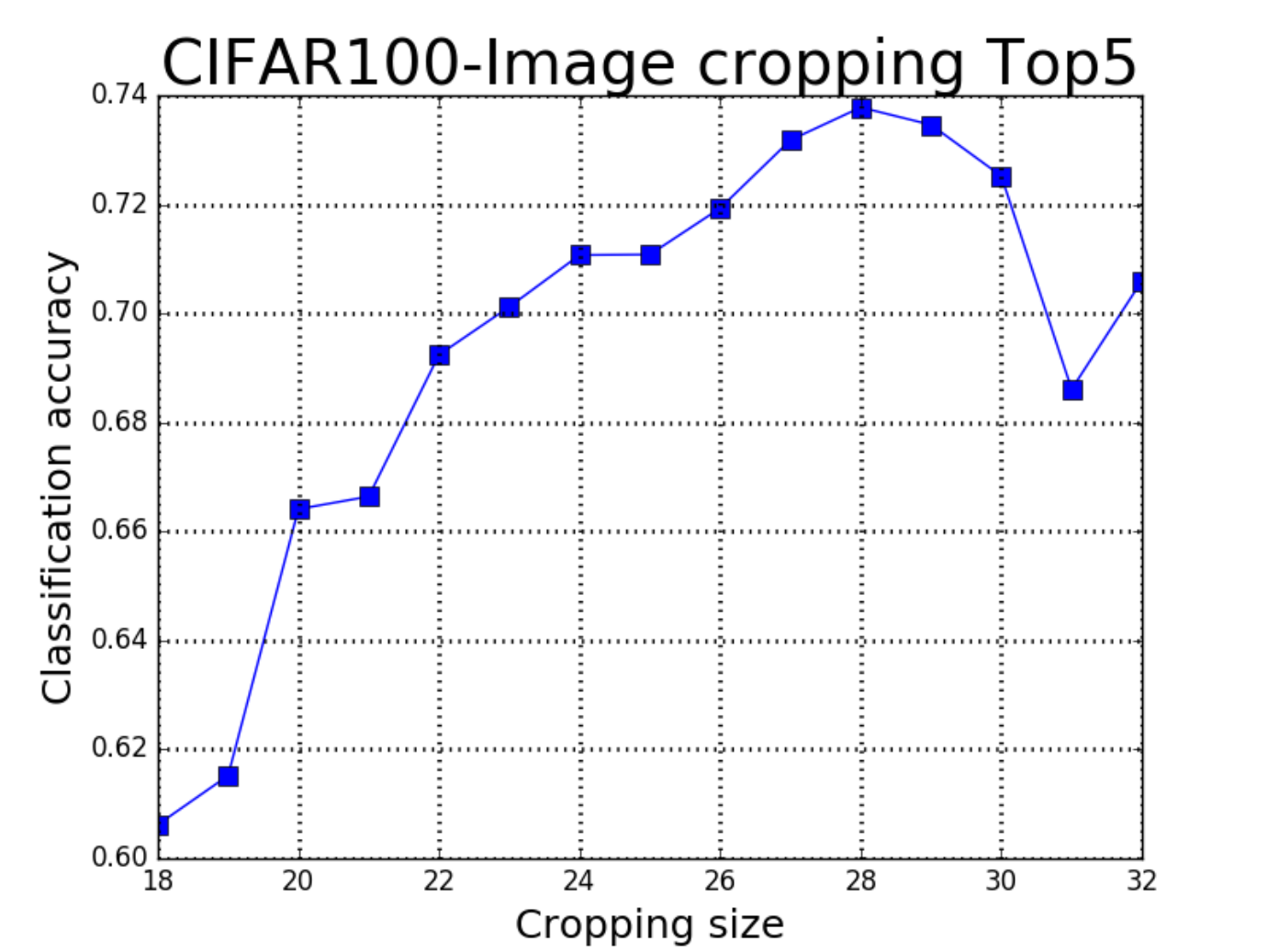
Pooling

Fully conected
192 neurons

Fully conected
96 neurons

Classification
to 100 class

Results – CIFAR100



CIFAR100 Images

Conv 1
32 filters

Conv 2
32 filters

Pooling

Conv 3
32 filters

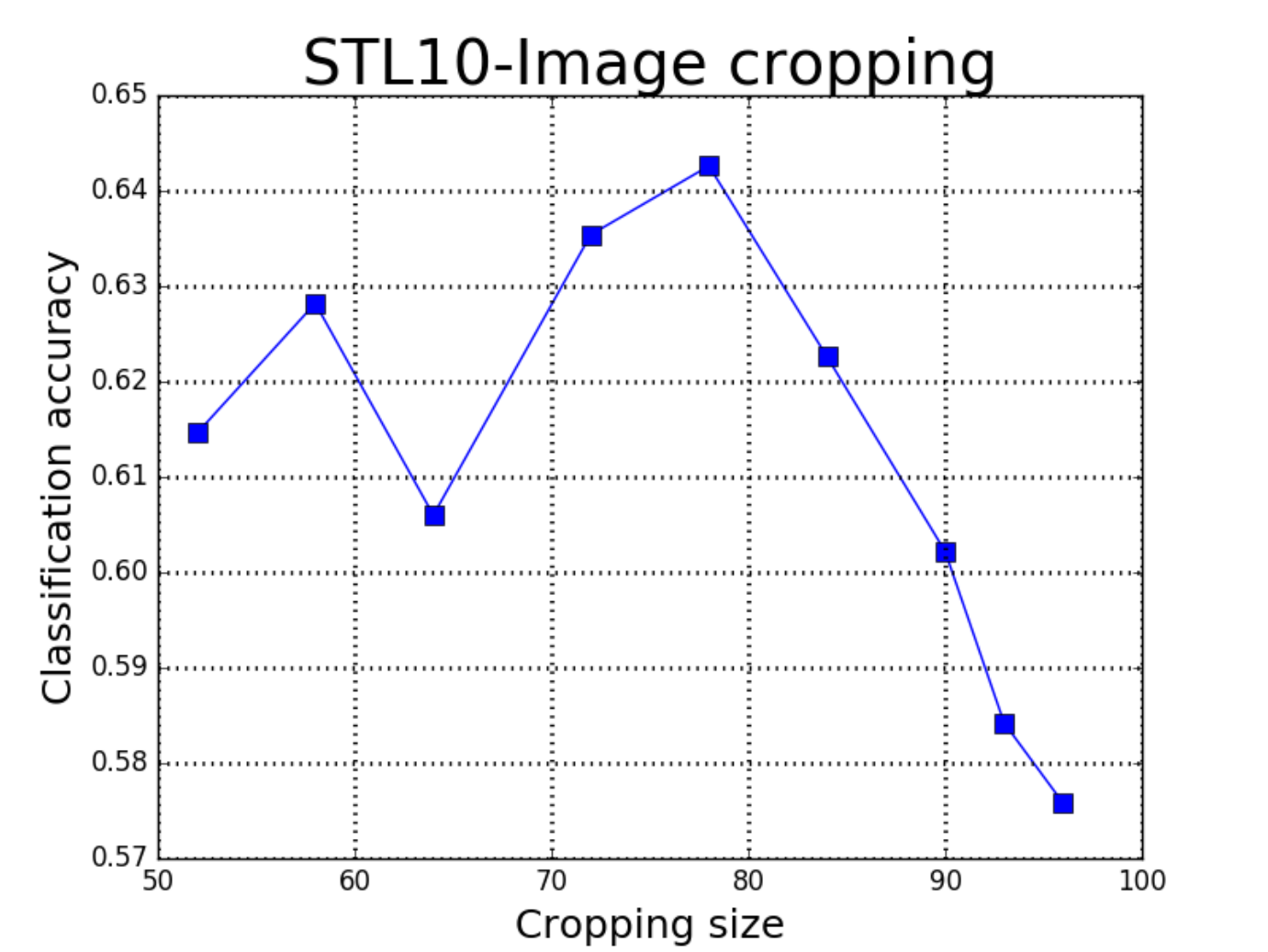
Pooling

Fully conected
192 neurons

Fully conected
96 neurons

Classification
to 100 class

Results - STL10



STL10 Images

Conv 1
32 filters

Pooling

Conv 2
32 filters

Pooling

Conv 3
32 filters

Conv 3
32 filters

Fully conected
192 neurons

Fully conected
96 neurons

Classification
to 10 class

Conclusions and future work

- Cropping Input Image Can Lead to a Better Training of Convolutional Neural Networks
- How to find optimal cropping size

Acknowledgments

This research is supported by the Polish National Center of Science (NCN) DEC-2013/09/B/ST6/01549
grant and, partly, by PL-Grid Infrastructure project.

References

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- CIFAR-10 and CIFAR-100 dataset: https://www.cs.toronto.edu/~kriz/cifar.html
- TensorFlow library:https://www.tensorflow.org/