Deep Convolutional Networks

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24th of February 2016

Convolutional Neural Networks

RUB

- What is a Convolutional Neural Network?
- Short description
- Show an image

German Traffic Sign Recognition Benchmark

- German Traffic Sign Recognition Benchmark
- What is the task?
- Show some images

Network Structure

Layer	Type	Configuration	Activation function
0	Convolutional	100 filters of size 7×7 per channel	tanh
1	Max Pooling	Pool size 2×2	-
2	Convolutional	150 filters of size 4×4 per channel	tanh
3	Max Pooling	Pool size 2×2	-
4	Convolutional	250 filters of size 4×4 per channel	tanh
5	Max Pooling	Pool size 2×2	-
6	Dense	300 neurons	tanh
7	Dense	43 neurons	softmax

Simple Setup

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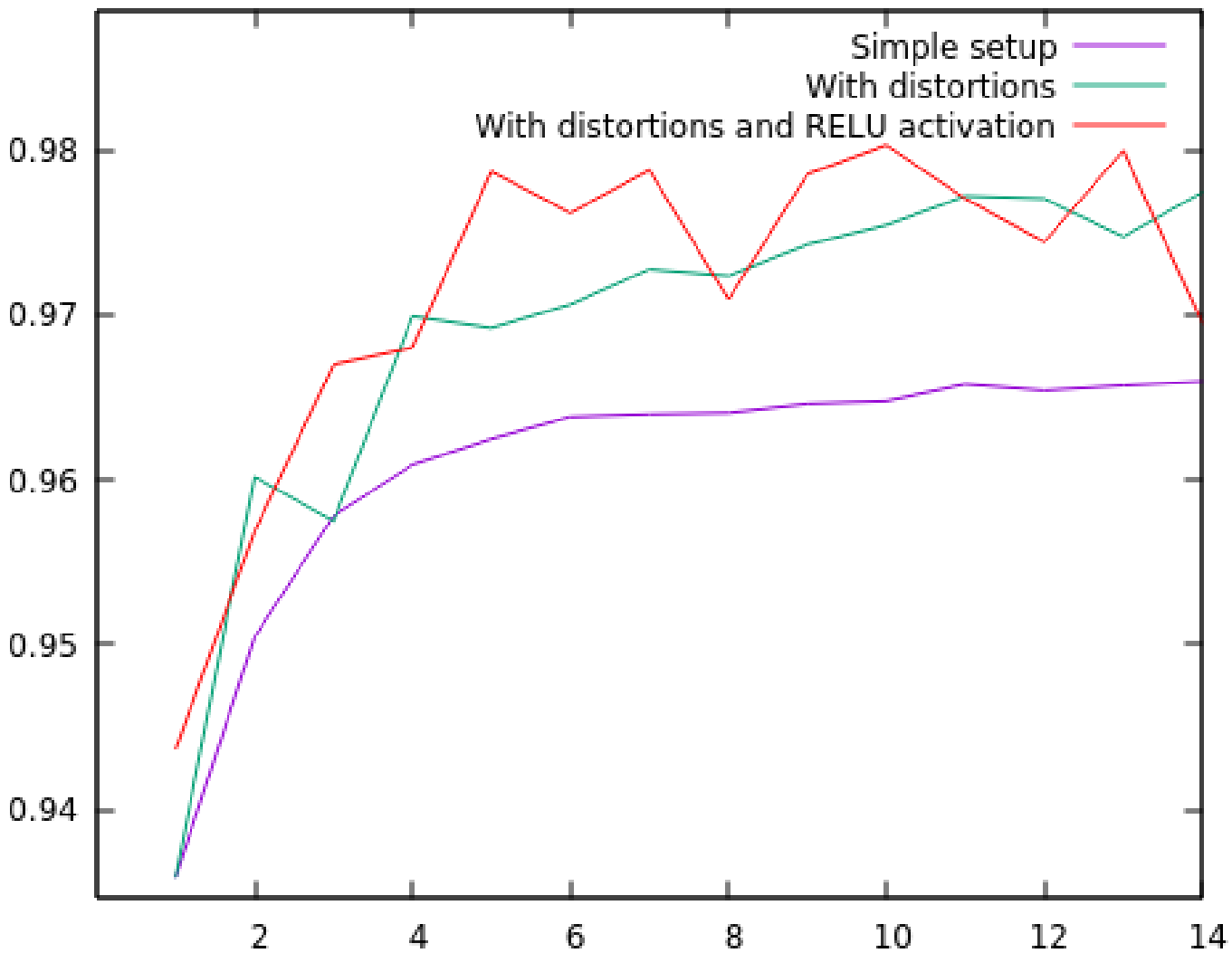
- Describe Simple Setup
- Present Results

Results on GTSRB



Input Distortions

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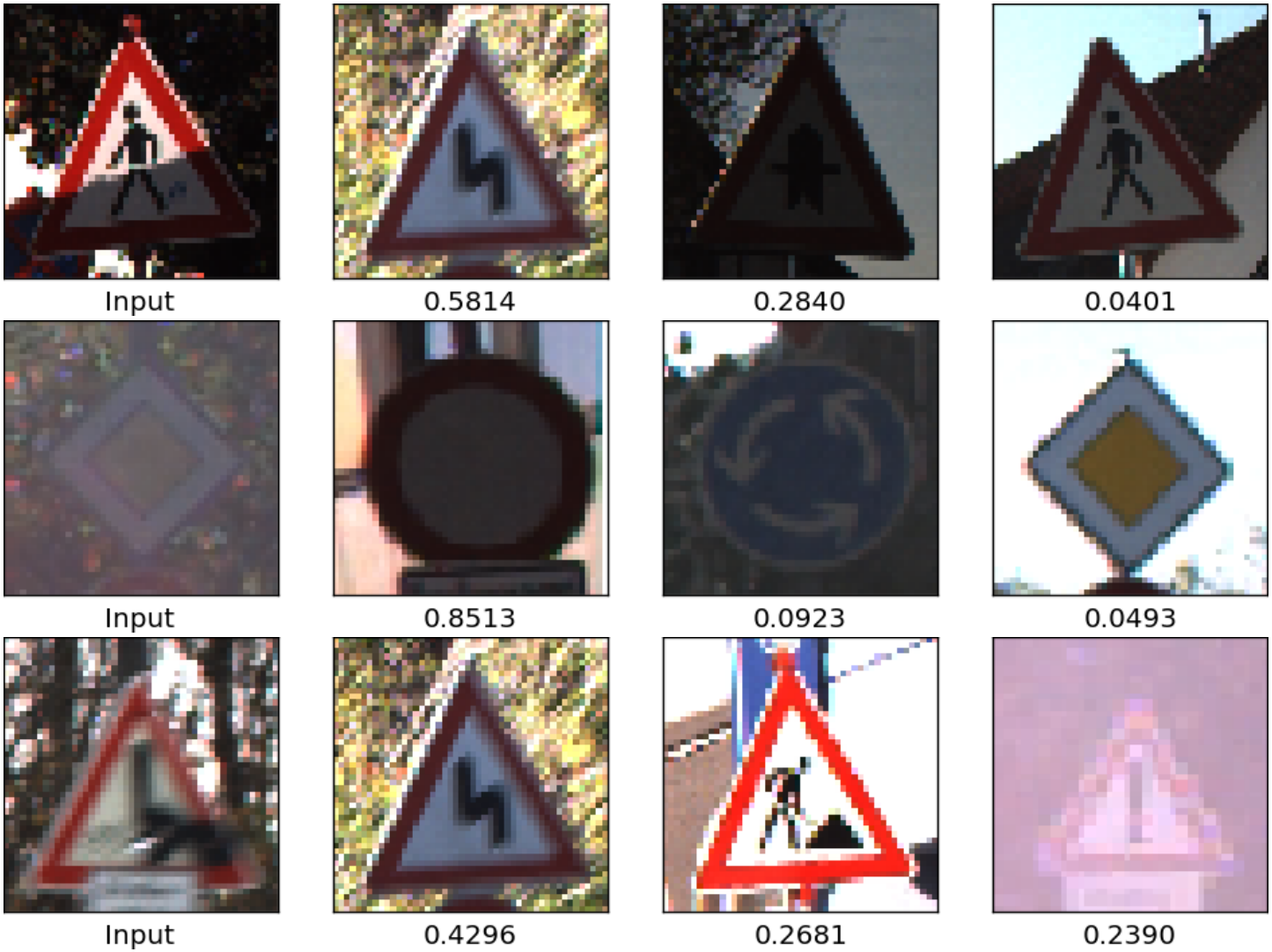
- Mention input distortions
- Explain them
- Present distortion parameters
- Maybe add one or two images before and after the transformations

Results with RELU

- Add RELU image
- Present results with RELU activation function

Missclassified images



Filter Reuse

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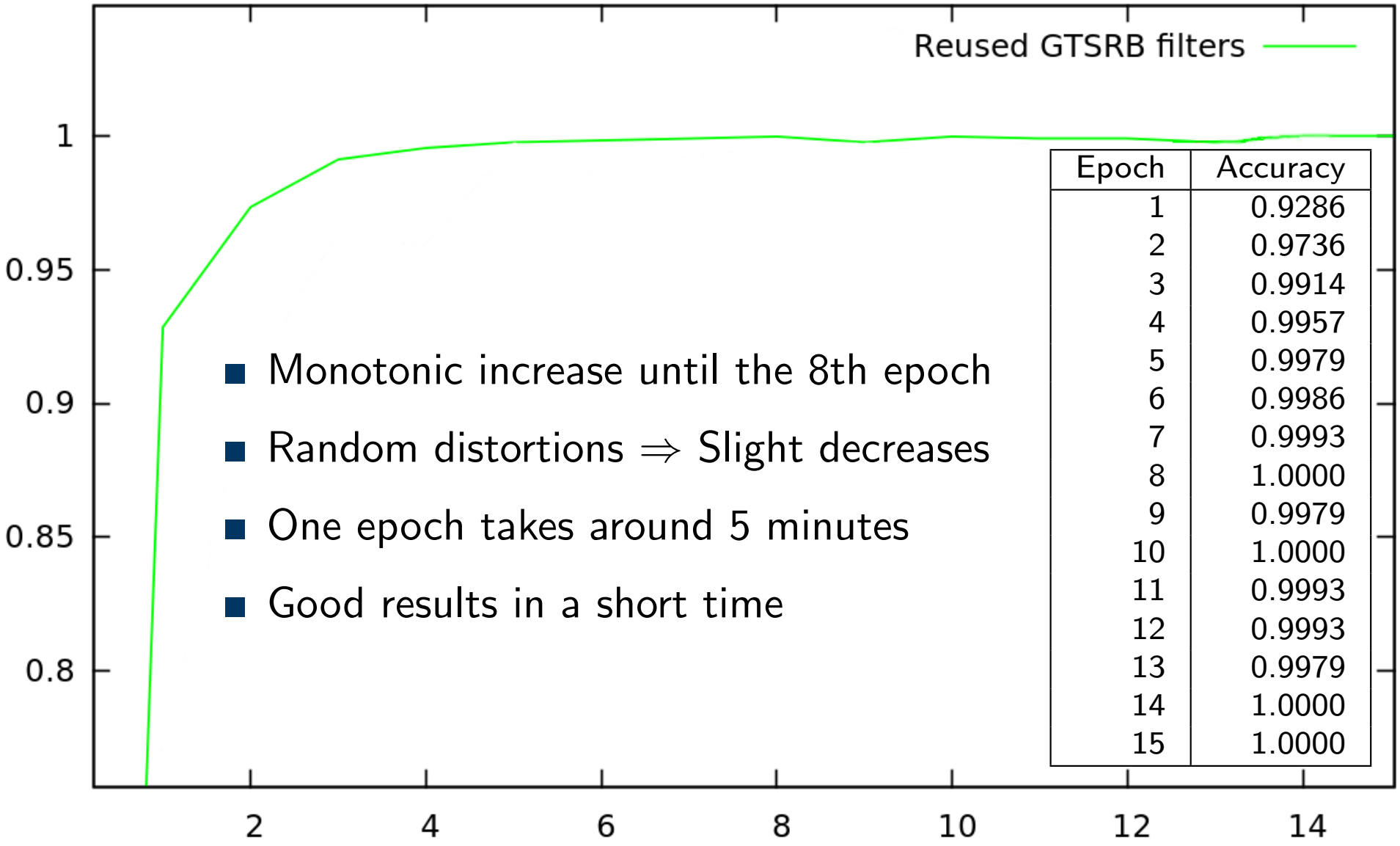
- How well do the GTSRB filters generalize?
- Initialize new network with same structure randomly
- Copy GTSRB filters to the new network
- Train only the fully connected layers!

COIL100

- Columbia Object Image Library 100 ⇒ COIL100
- 100 different objects
- Objects turning on a black turntable
- One photo each time the object has turned by 5°
- 72 images per object, 7200 images in total
- Random separation into 58 training and 14 test images per object

COIL100 — GTSRB Filters Results



- Monotonic increase until the 8th epoch
- Random distortions ⇒ Slight decreases
- One epoch takes around 5 minutes
- Good results in a short time

Epoch	Accuracy
1	0.9286
2	0.9736
3	0.9914
4	0.9957
5	0.9979
6	0.9986
7	0.9993
8	1.0000
9	0.9979
10	1.0000
11	0.9993
12	0.9993
13	0.9979
14	1.0000
15	1.0000

INRIA

- Describe INRIA dataset
- Show image
- Show results with reused filters
- Show results with original filters

Conclusion

- Summarize results

Questions?

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Questions?