Deep Convolutional Networks

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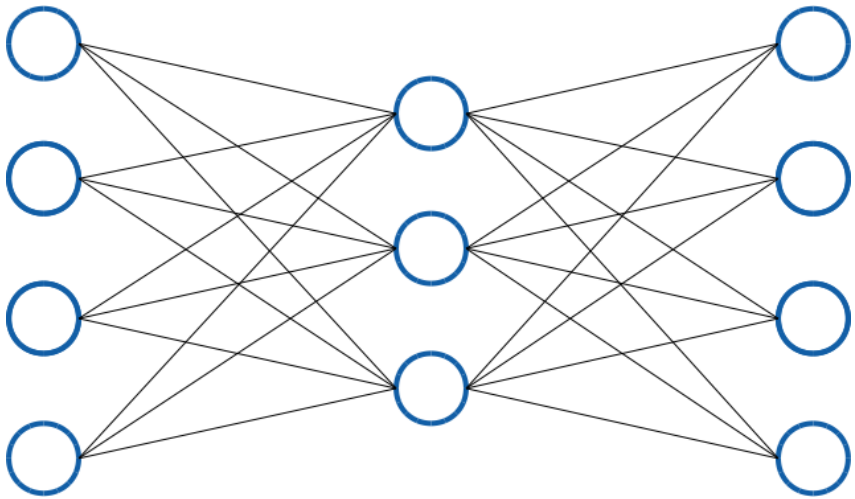
24th of February 2016

Convolutional Neural Networks

RUB

- Learns the weights of convolutional filters
- Exploits spatial structure in the input
- Convolving entire input with filter implies shared weights
- Reduced amount of weights allows lots of filters
- Filters specific to color channels



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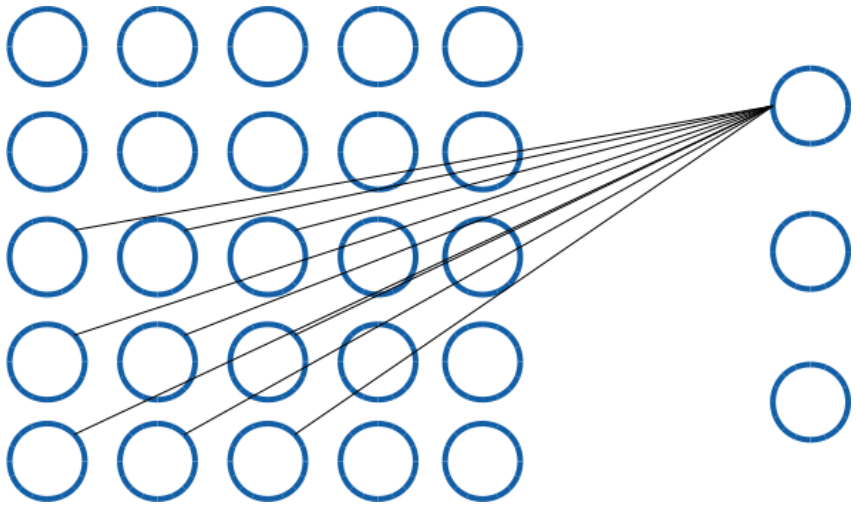

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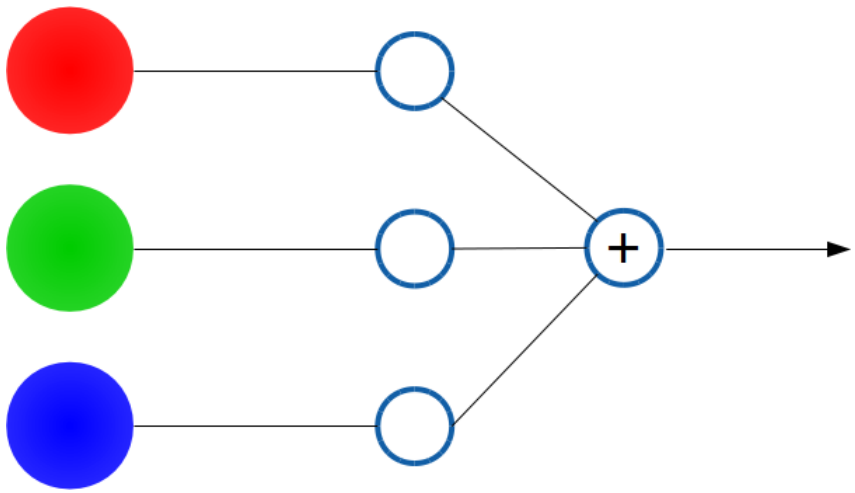

Network Structure

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

German Traffic Sign Recognition Benchmark

- Dataset of traffic signs taken while on the road
- 39209 training and 12630 test images in 43 classes
- Images contain a 10% border around the sign
- Annotations provide precise sign locations
  - We cropped out just the sign
- Show some images

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Simple Setup

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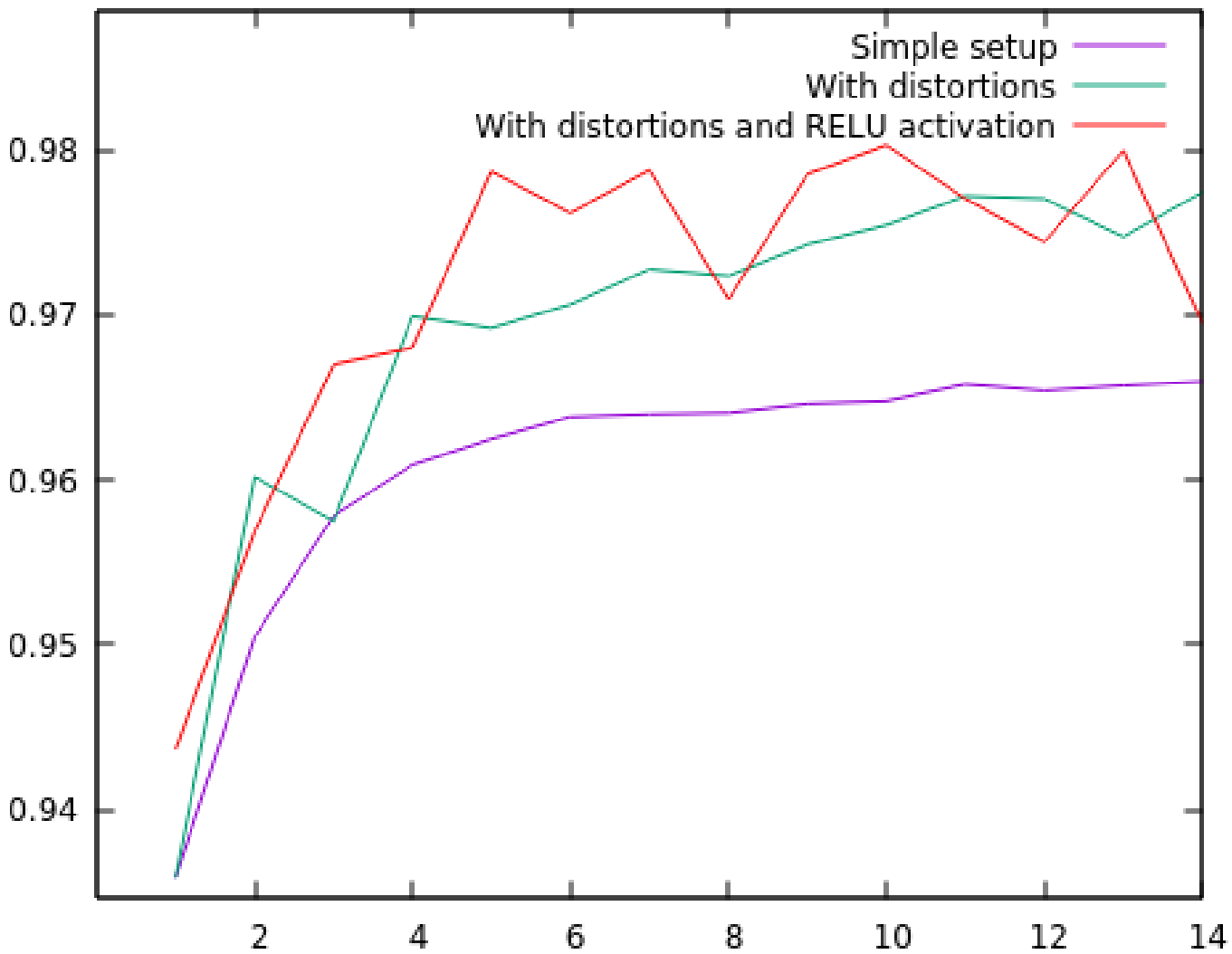
- Input size 48×48
- Contrast normalization
- Describe Simple Setup
- Present Results

Results on GTSRB



Input Distortions

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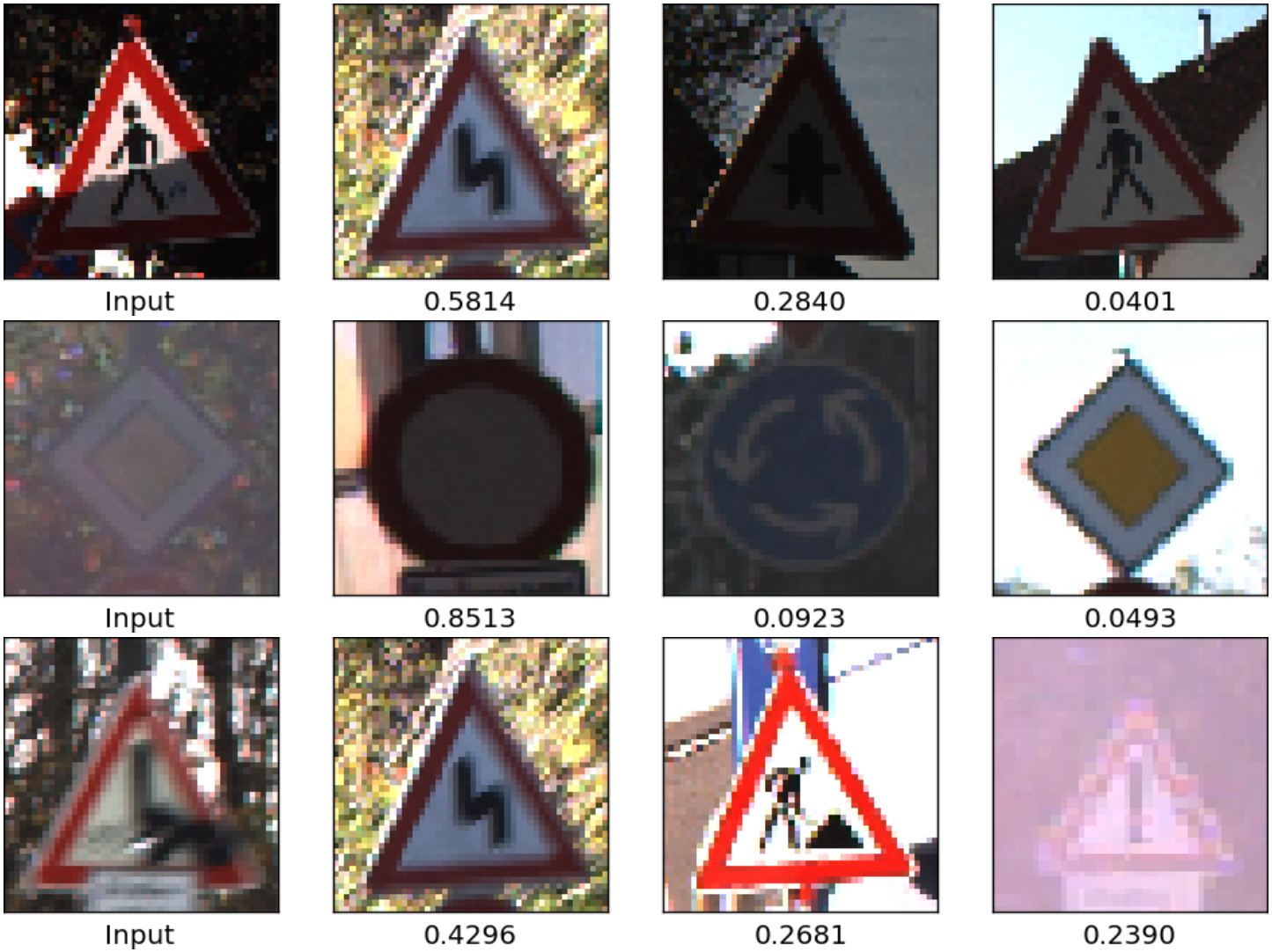
- Mention input distortions
- Explain them
- Present distortion parameters
- Maybe add one or two images before and after the transformations

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 $\Rightarrow$ COIL100
- 100 different objects
- Objects turning on a black turntable
- One foto 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

INRIA

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

Conclusion

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- Summarize results

Questions?

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Questions?