

# Deep Convolutional Networks

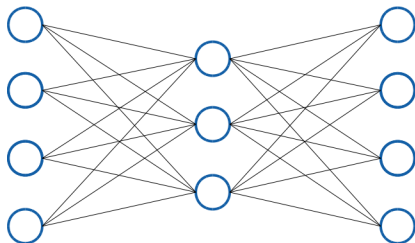
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Study Project

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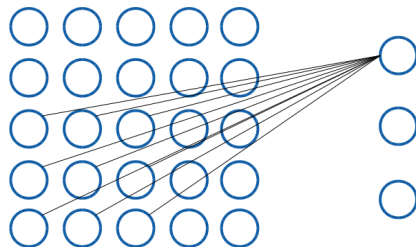
# Convolutional Neural Networks

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



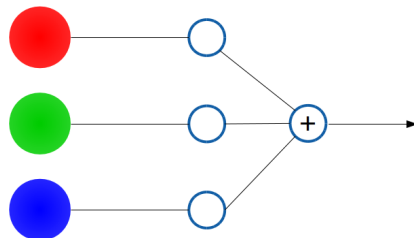
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# Network Structure

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

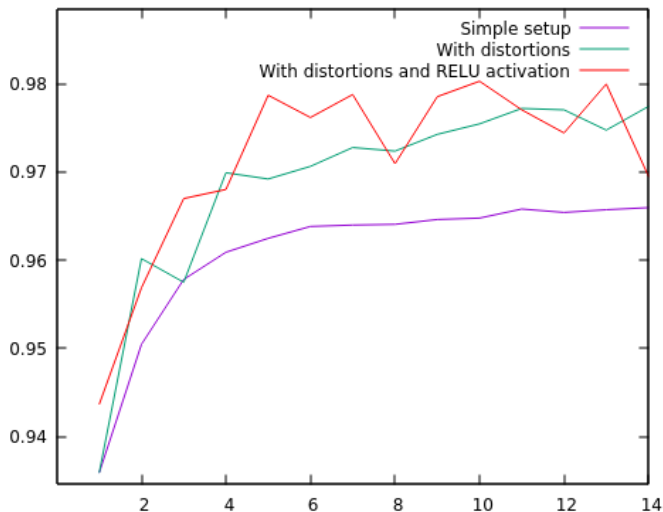
# German Traffic Sign Recognition Benchmark

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

# Simple Setup

- Describe Simple Setup
- Present Results

# Results on GTSRB





# Input Distortions

- 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



Input



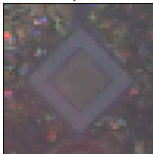
0.5814



0.2840



0.0401



Input



0.8513



0.0923



0.0493



Input



0.4296



0.2681

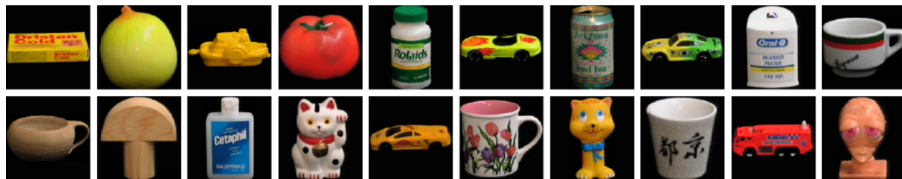


0.2390

# Filter Reuse

- 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  $5^\circ$
- 72 images per object, 7200 images in total
- Random separation into 58 training and 14 test images per object

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

# Conclusion

- Summarize results

# Questions?

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