

# Correlated weights in infinite limits of deep CNNs

CMT ID: 752

With independent weights...

## Bayesian **convolutional** NN

+ Applies the same (random) function  
to each image patch



Spatially **correlated** activations

## Corresponding GP

- Applies a different random function  
to each image patch

(Locally connected network, LeCun, 1989.  
Noted by Novak et al. (2019))



Spatially **uncorrelated** activations

# Correlated weights in infinite limits of deep CNNs

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## Bayesian convolutional NN

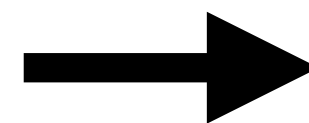
## Corresponding GP

Spatial correlation in weight prior



Spatial correlation  
between activations in the  
 $\infty$ -width limit

D-dimensional weight  
convolution



2D-dimensional covariance  
tensor convolution

**Independent  
weights**

Continuous interpolation



**Mean  
pooling**