### Neural networks Computer vision - data set expansion



**Topics:** generating additional examples

- Invariances built-in in convolutional network:
  - small translations: due to convolution and max pooling
  - small illumination changes: due to local contrast normalization
- It is not invariant to other important variations such as rotations and scale changes
- However, it's easy to artificially generate data with such transformations
  - could use such data as additional training data
  - neural network will learn to be invariant to such transformations

**Topics:** generating additional examples



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**Topics:** generating additional examples, distortion field

- Can add "elastic" deformations (useful in character recognition)
- We do this by applying a "distortion field" to
  - a distortion field specifies where to displace each pixel value



random distortion



See Simard et al. for more detail



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