Auto-encoders

Roberto Souza
Assistant Professor
Electrical and Computer Engineering
Schulich School of Engineering

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Outline

- Learning Goals
- Auto-encoders
- Summary

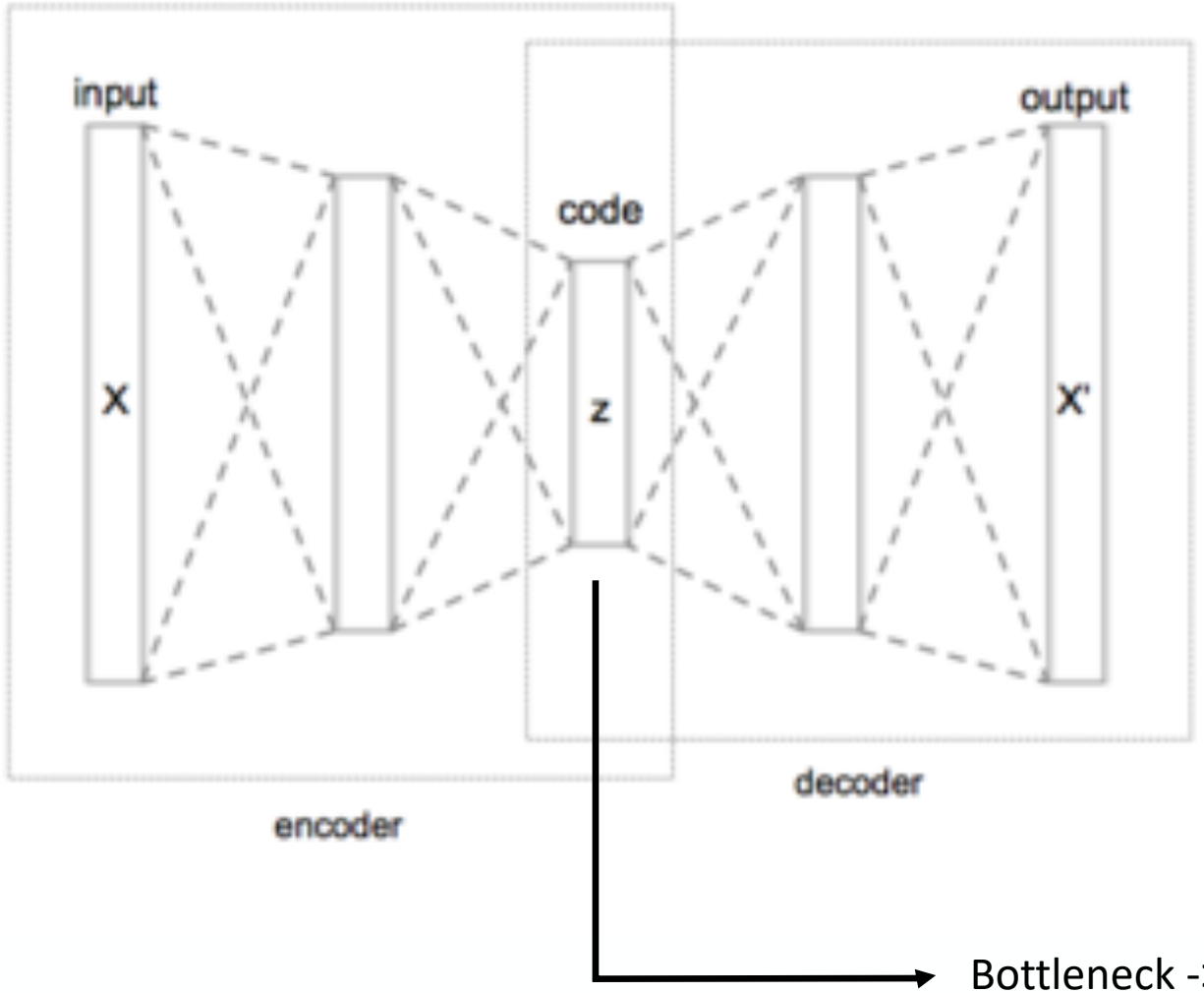
Learning Goals

- Understand the motivation behind auto-encoders
- Learn different ways to design an auto-encoder model
- Learn potential applications of auto-encoders

Auto-encoders

- Unsupervised method (i.e., no labelled data)
- Used to learn a representation of your data
- Often the learned representation is in a lower-dimensional space than your input data

Auto-encoder



Encoder ⇒ f

Decoder ⇒ g

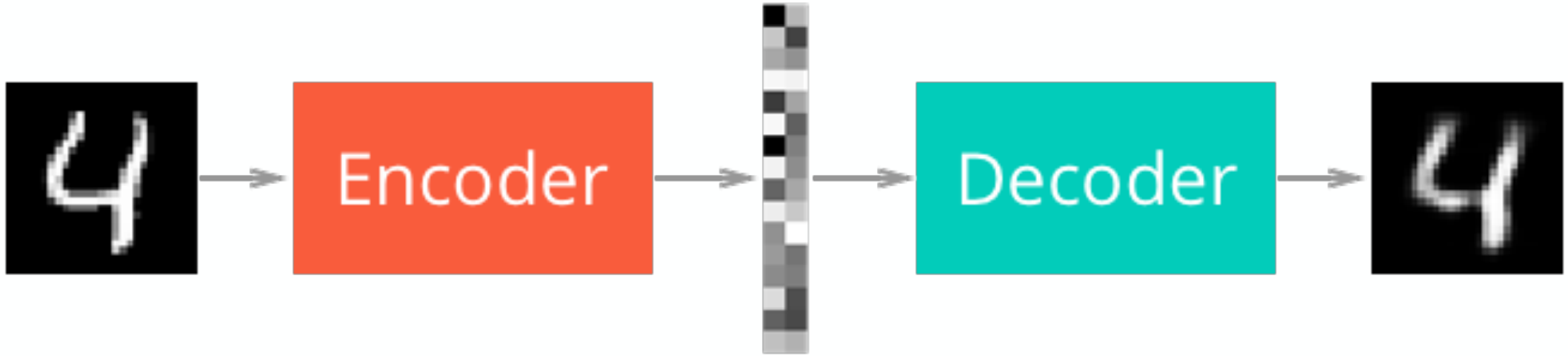
Z = f(X)

X’ = g(Z)

Objectives: X≈X’

- Mean squared error
-Mean absolute error

MNIST Auto-encoder



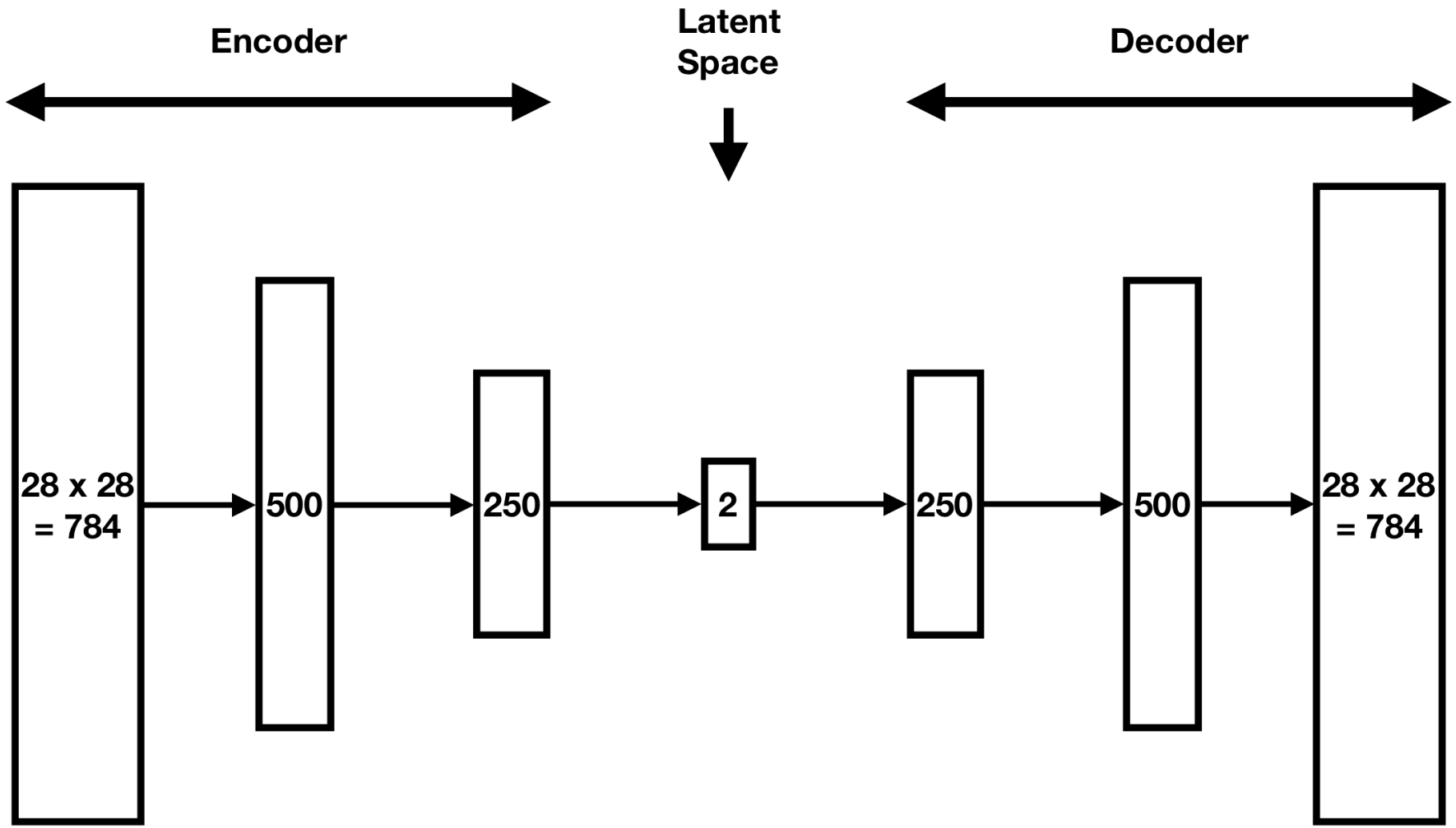
Original

Compressed

(latent space)

Reconstruction

Fully Connected Auto-Encoder



All layers fully connected

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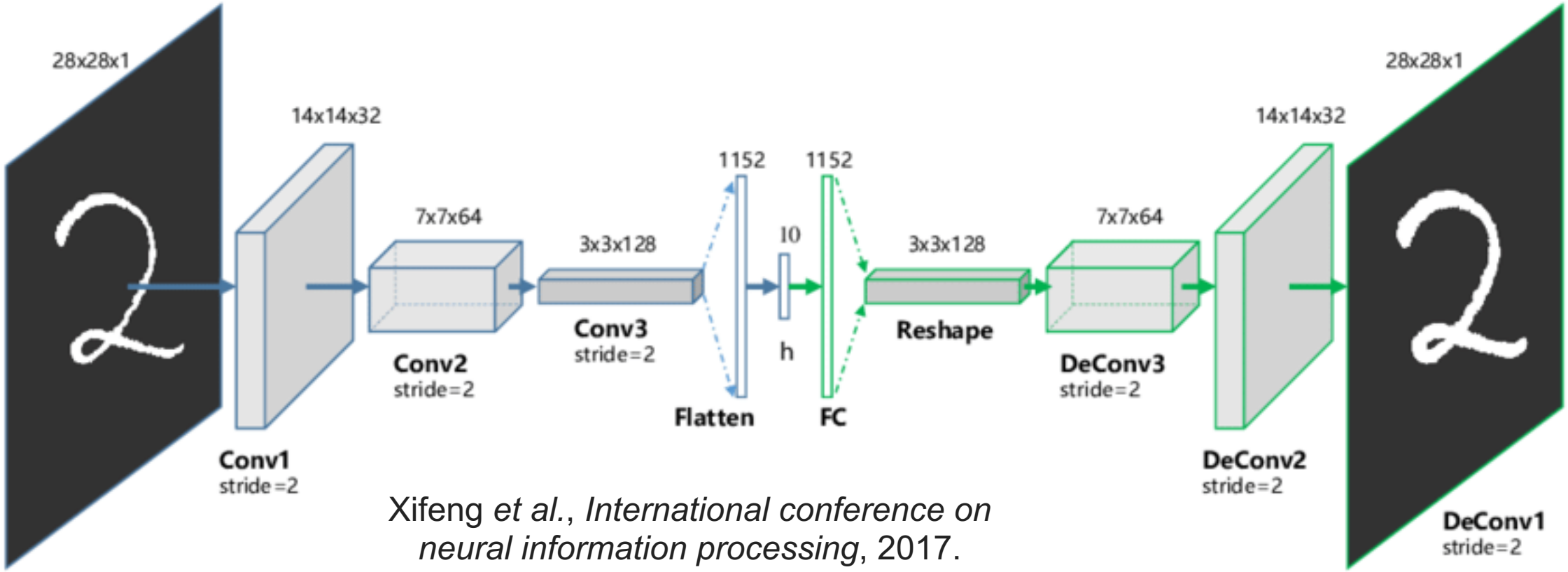
Convolutional Auto-encoder



Xifeng *et al.*, *International conference on neural information processing*, 2017.

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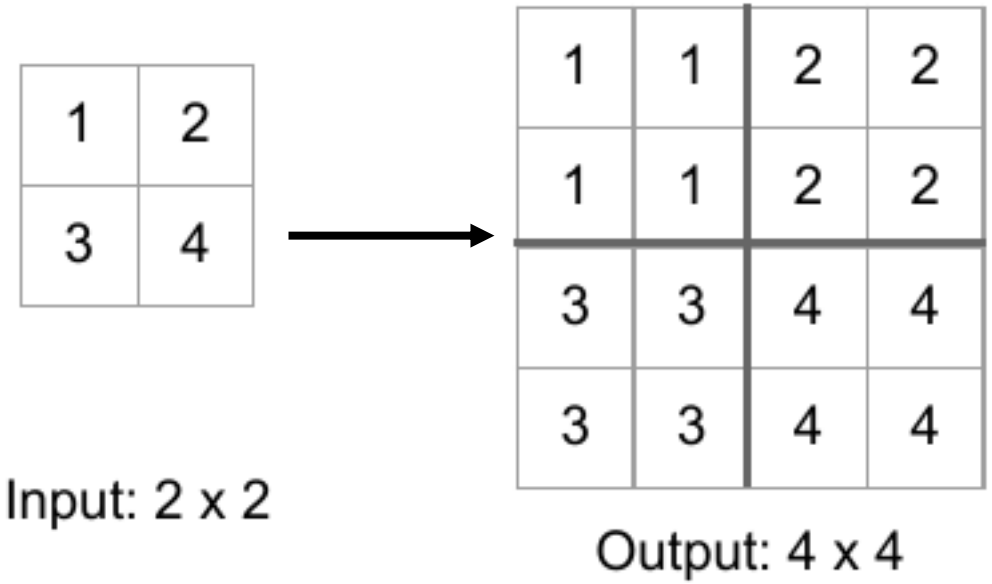
Up Sampling

- Opposite effect of max-pooling
- Many ways to do it
- Simplest way is nearest neighbor interpolation
- UpSampling2D -> Keras layer



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Auto-encoder Applications

- Learning representations
- Data compression
- Denoising
- Learning manifolds

Summary

- Auto-encoders are unsupervised methods that can be used to learn data representation
- They can be either fully connected models or convolutional models
- They have large applicability for compression, denoising among others

Thank you!

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