Autoencoders

Main idea:

Take data in some original (high-dimensional) space;

Project data into a new space **from which it can then be accurately restored**

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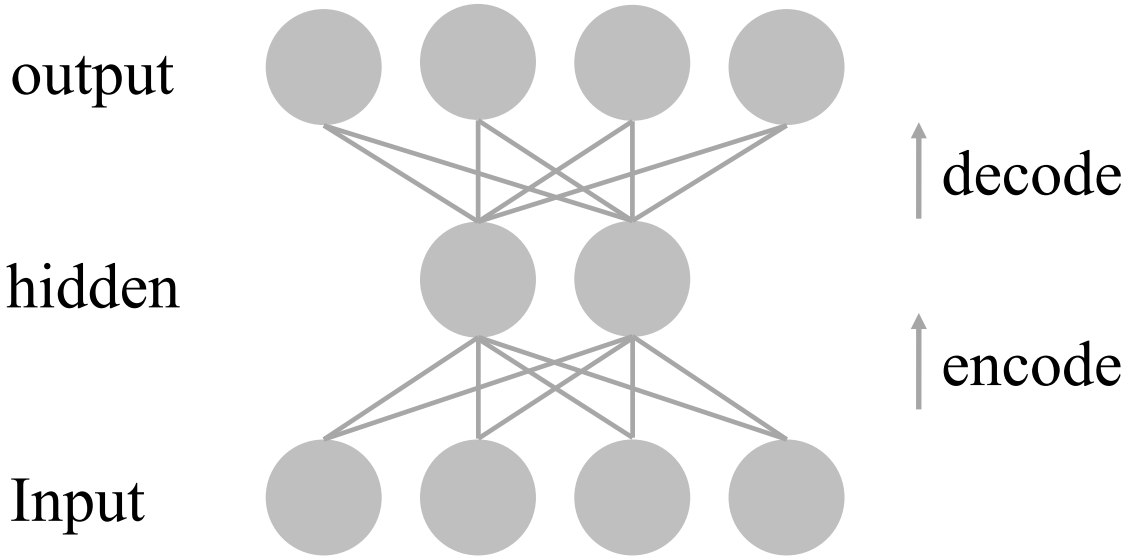
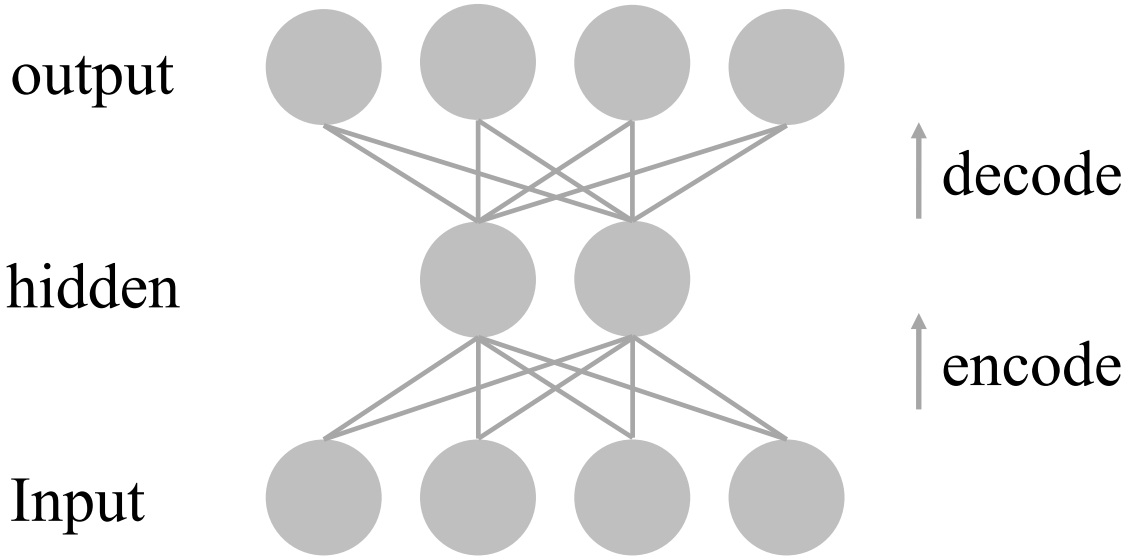


Autoencoders

- Encoder = data to hidden
- Decoder = hidden to data
- Decoder(Encoder(x)) ~ x



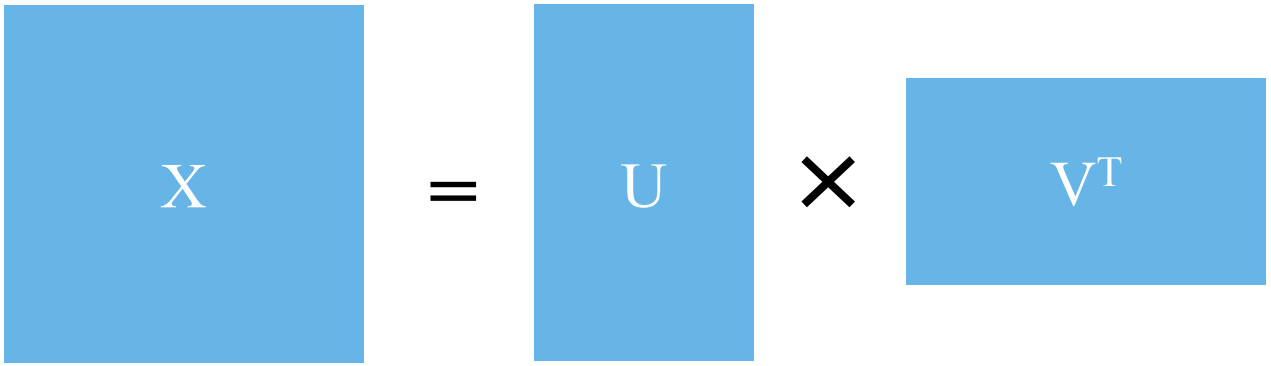
Why do we ever need that?

- Compress data
  - |code| << |data|
- Dimensionality reduction
  - Before feeding data to your XGBoost :)

- <to be continued>

Linear case

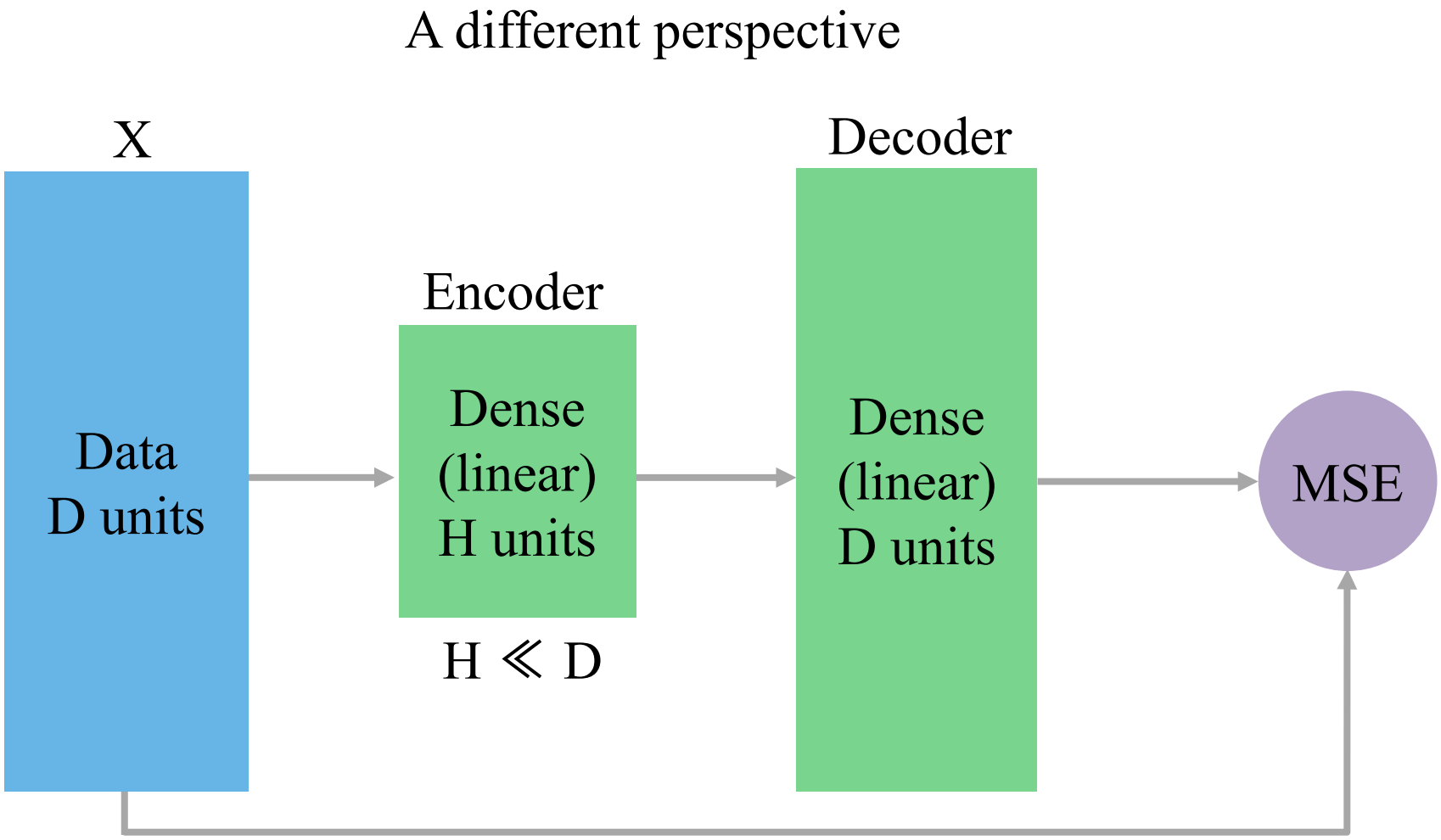
Example: matrix factorization



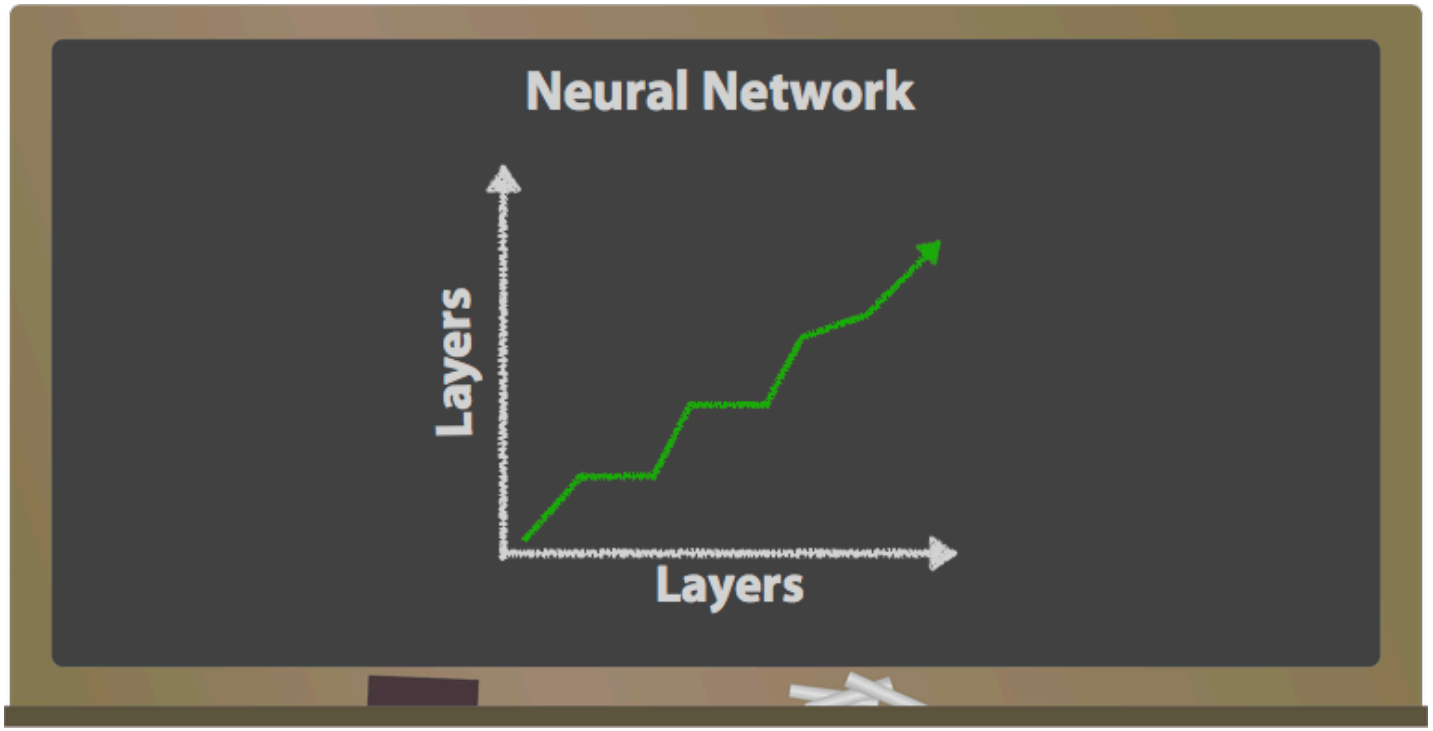
Minimizing reconstruction error

$$\| X - U \cdot V^T \| \rightarrow \min_{U,V}$$

Matrix decompositions

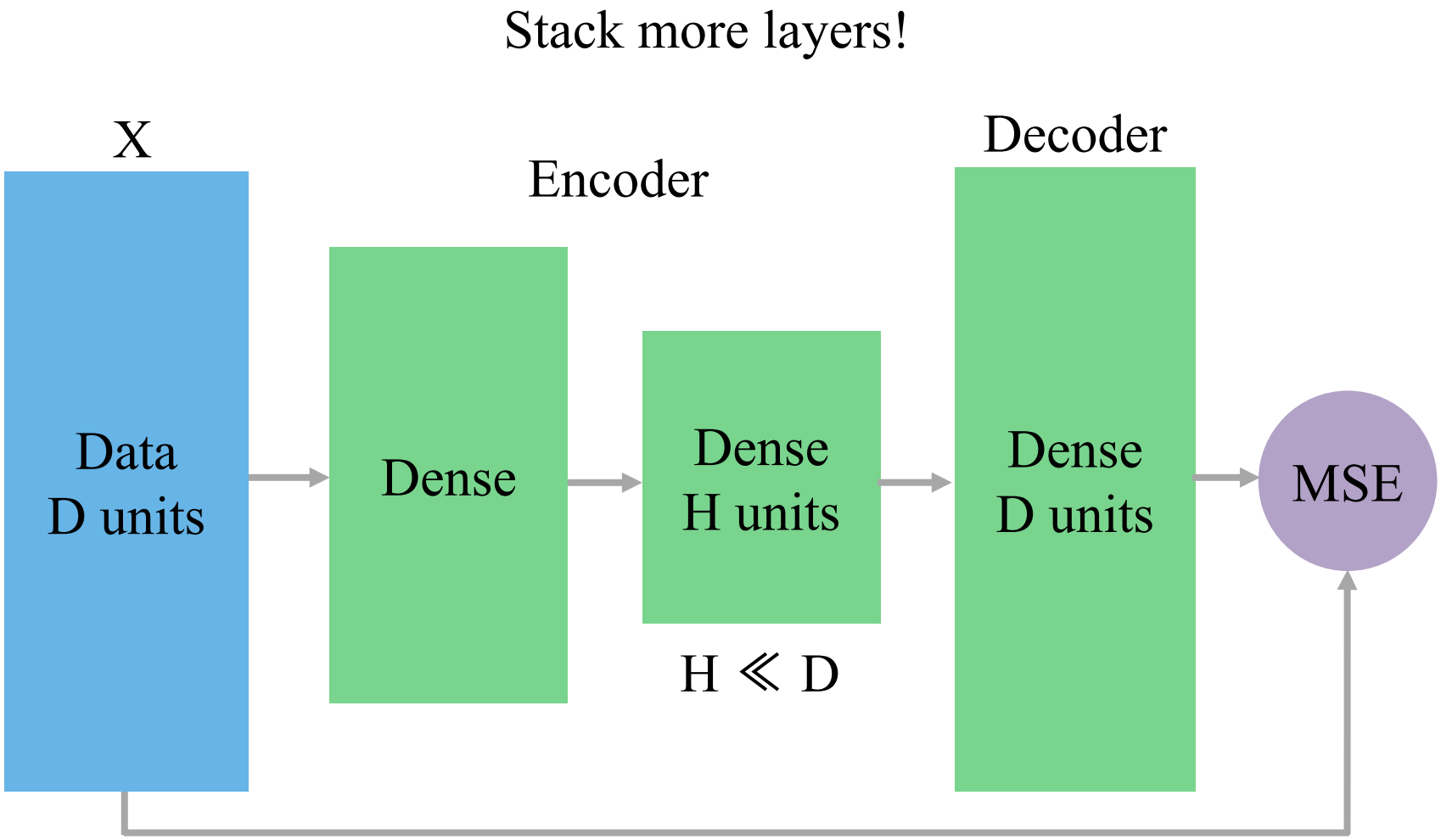


Matrix decompositions

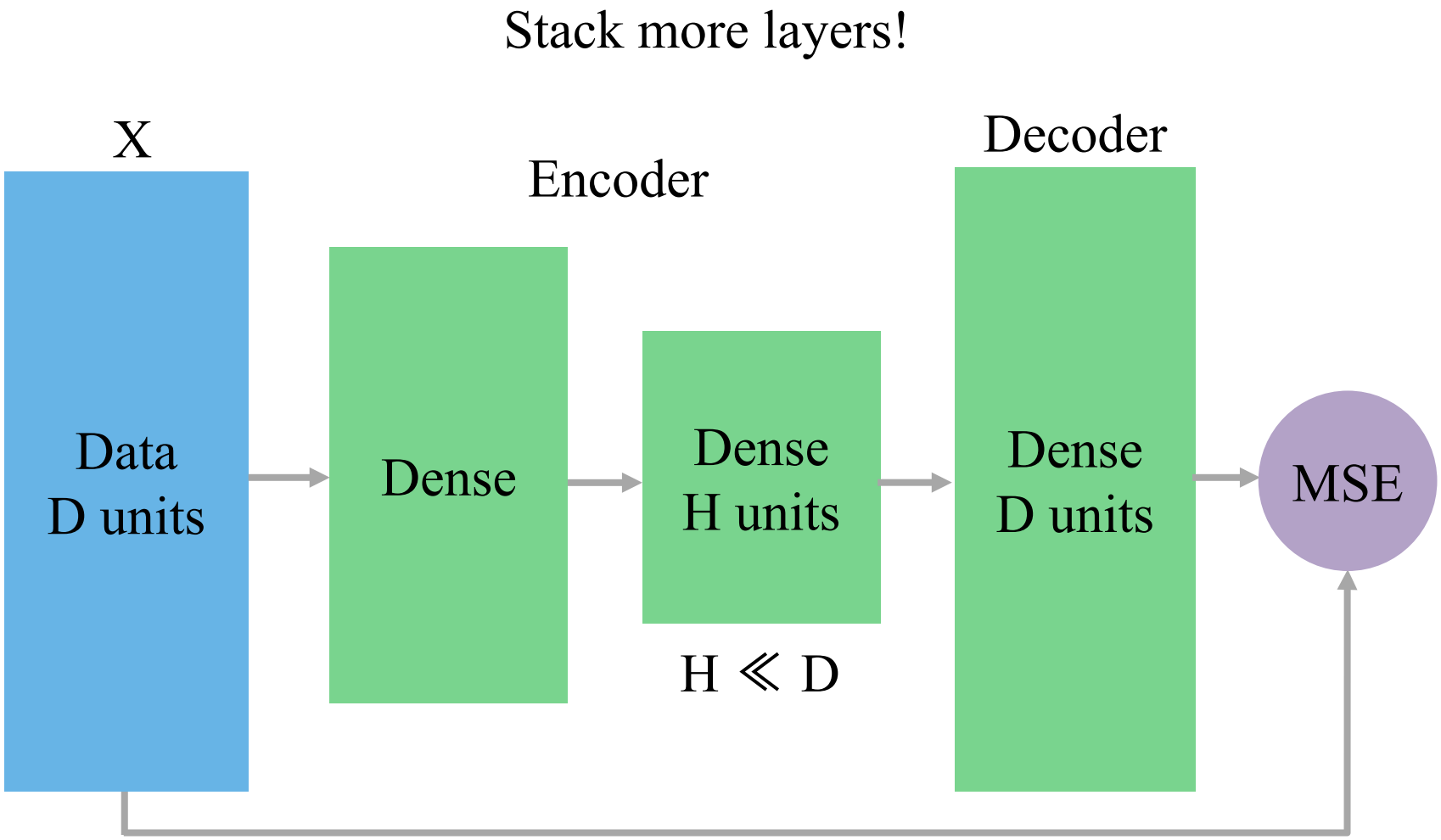


«STACK MORE LAYERS»

Deep autoencoder



Deep autoencoder



Quiz: What if data is an image?

Image2image: convolutional

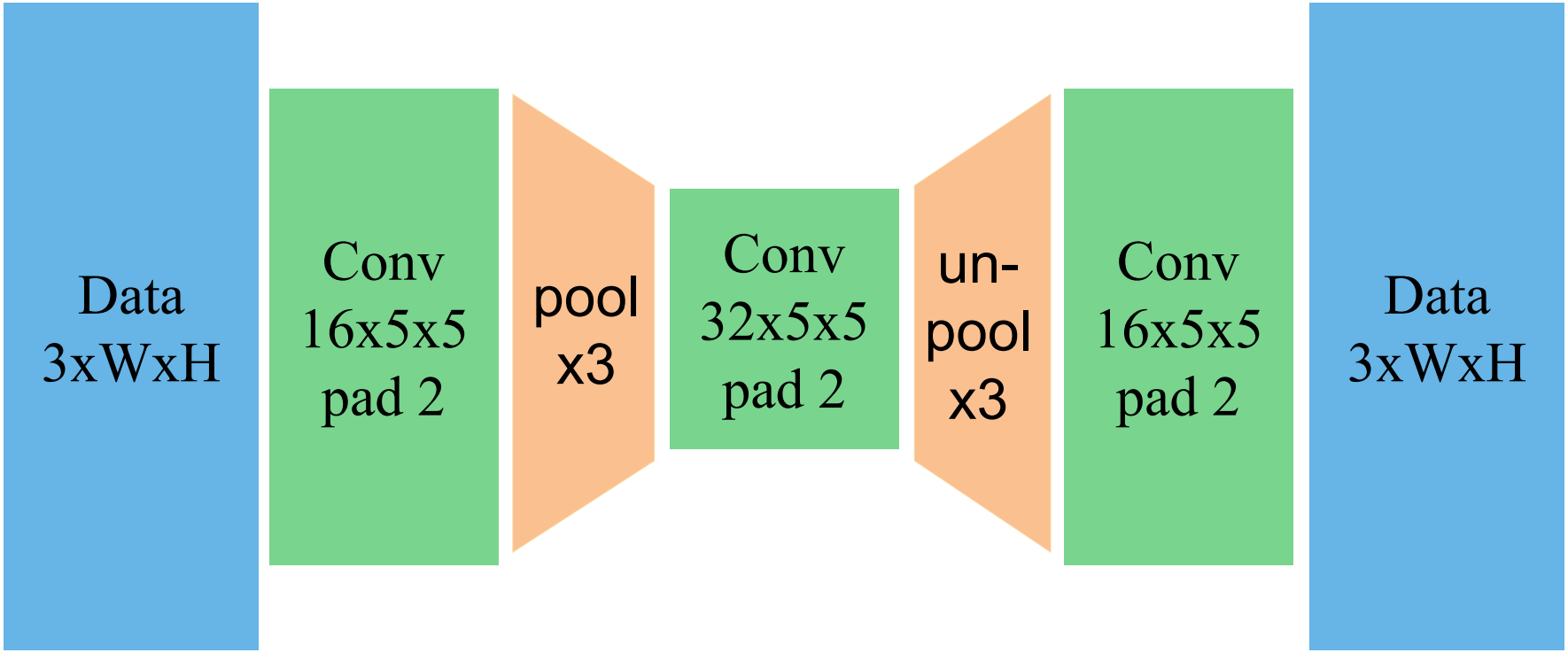


Image2image: fully-convolutional