Applied Machine Learning

Deep Neural Networks III - Encoding and Decoding

Deep Neural Networks III Encoding and Decoding

- Low-Dimensional Embeddings
- Encoders and Decoders

Low-Dimensional Embedding

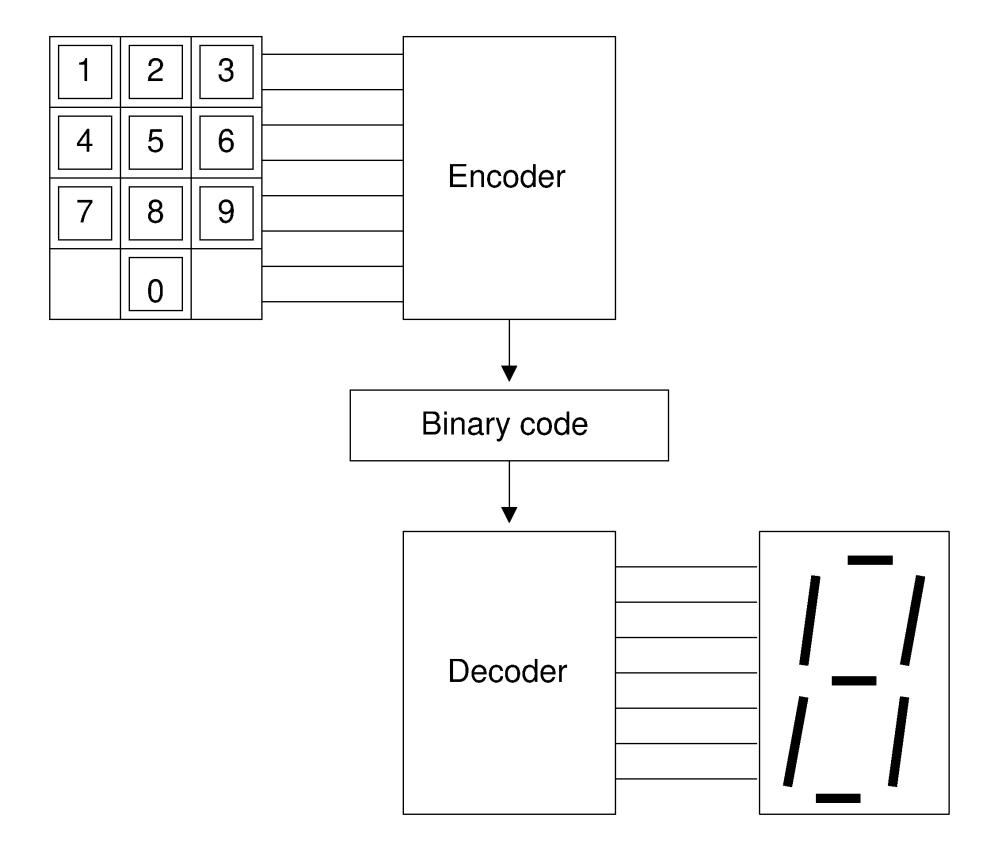
Source high-dimensional dataset ${\bf x}$ with N items, and d features ${\bf x}_i = \begin{bmatrix} {\bf x}_1 \\ \vdots \\ {\bf x}_d \end{bmatrix}$

Target low-dimensional dataset \mathbf{y} with N items and m features $\mathbf{y}_i = \begin{bmatrix} \mathbf{y}_1 \\ \vdots \\ \mathbf{y}_m \end{bmatrix}$

- usually $d \gg m$ and m is for visualization: $m \in \{2,3\}$
- Goal: $\mathbf{X}_i \mapsto \mathbf{y}_i$

Encoders and Decoders

- Mapping of dataset from high-dimensional to lowdimensional representation
 - low-dimensional embedding
- Encoder
 - Input: high-dimensional data item
 - Output: low-dimensional representation of data item that preserves relevant information
- Decoder
 - Input: code: low-dimensional representation of item
 - Output: high-dimensional data item
- Autoencoder
 - pair of encoder and decoder that are trained together



Deep Neural Networks III Encoding and Decoding

- Low-Dimensional Embeddings
- Encoders and Decoders

Applied Machine Learning

Deep Neural Networks III - Encoding and Decoding