Applied Machine Learning

Deep Neural Networks III - Encoding and Decoding

Deep Neural Networks III
Encoding and Decoding

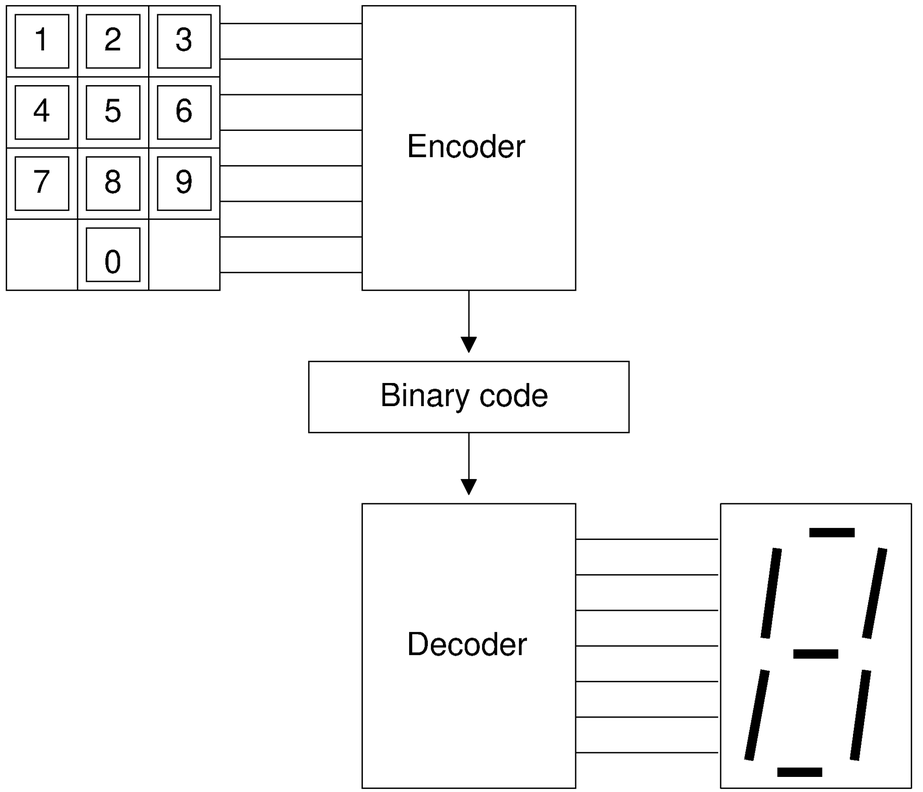
- Low-Dimensional Embeddings
- Encoders and Decoders

Low-Dimensional Embedding

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



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