

CSE 575: Statistical Machine Learning (Spring 2021)

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Neural Networks & Deep Learning



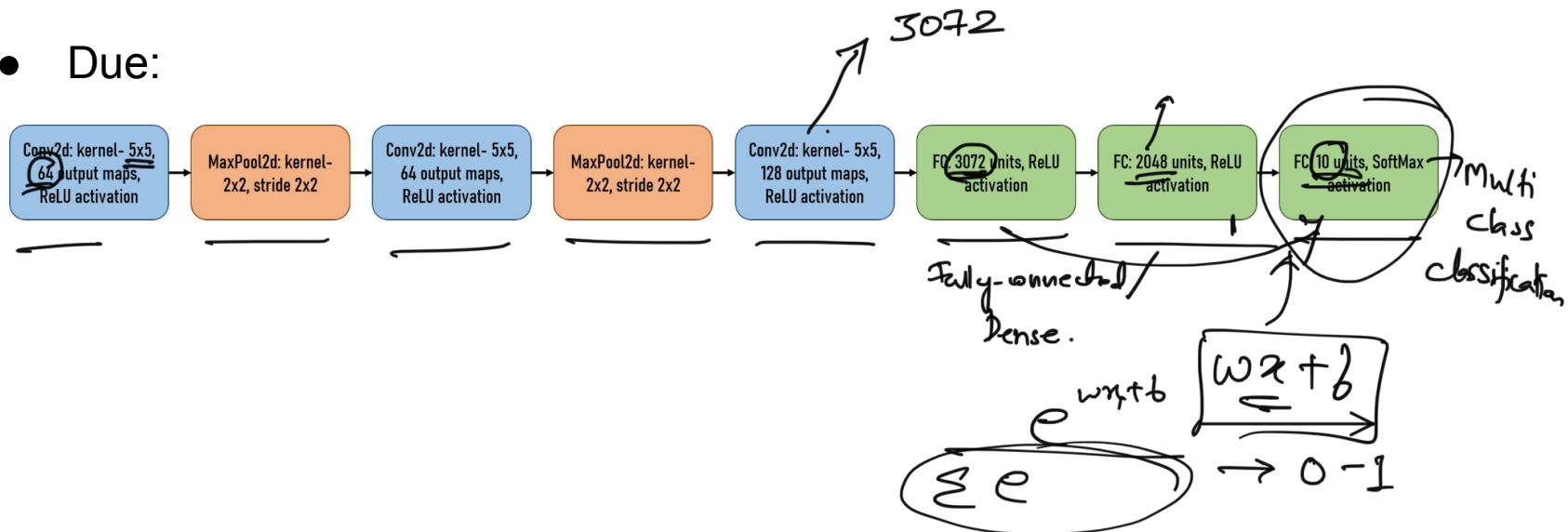
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Project Part 3



- Goal - train a small convolutional neural network for classification of SVHN dataset.
- Due:

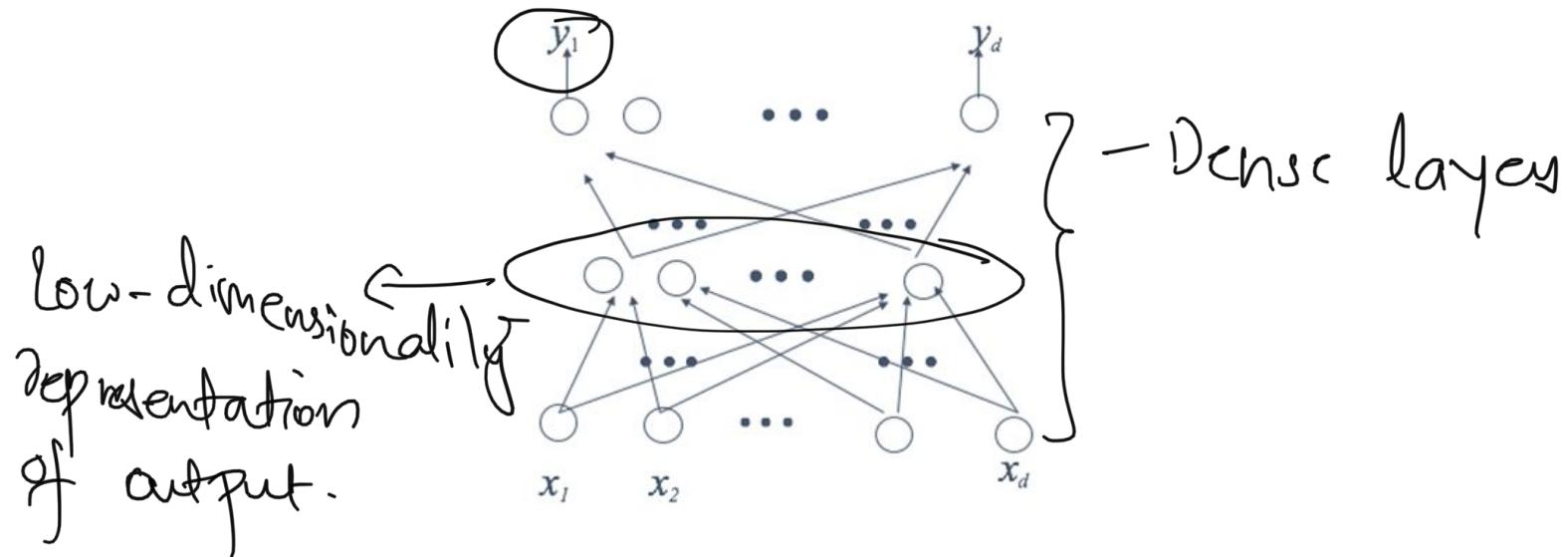


Project Part 3 - Software & Libraries

- Language - Python
- Deep learning libraries - Keras, Tensorflow, PyTorch
- Deliverables-
 - Code with proper comments.
 - A report including the plots for the learning/testing errors and the final classification accuracy.
 - Please submit the code and the report as separate files on Canvas. **Do not zip them.**

Autoencoder

- Train a network without supervision
- y_i being an approximation of x_i

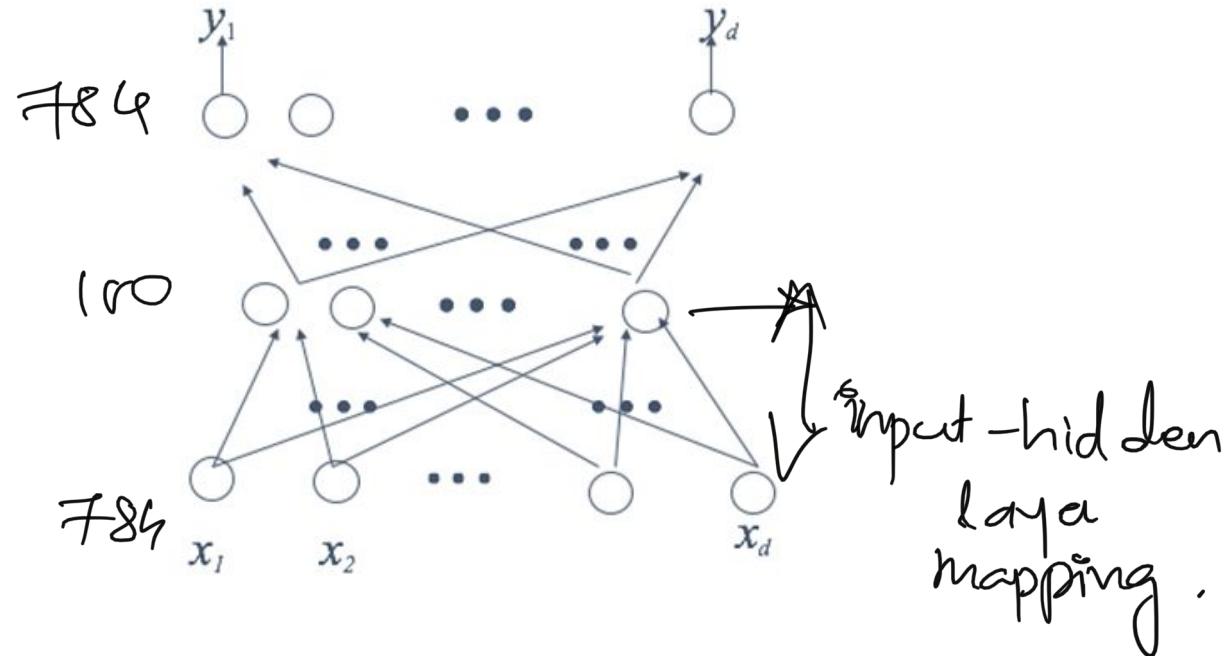


Autoencoder

- Perfect Autoencoder - Reconstructed output will be exactly same as input.
- Practical Scenario -
 - There is error in reconstruction.
 - Learning objective - Learn such that the reconstruction error is minimized.
 - MSE loss.

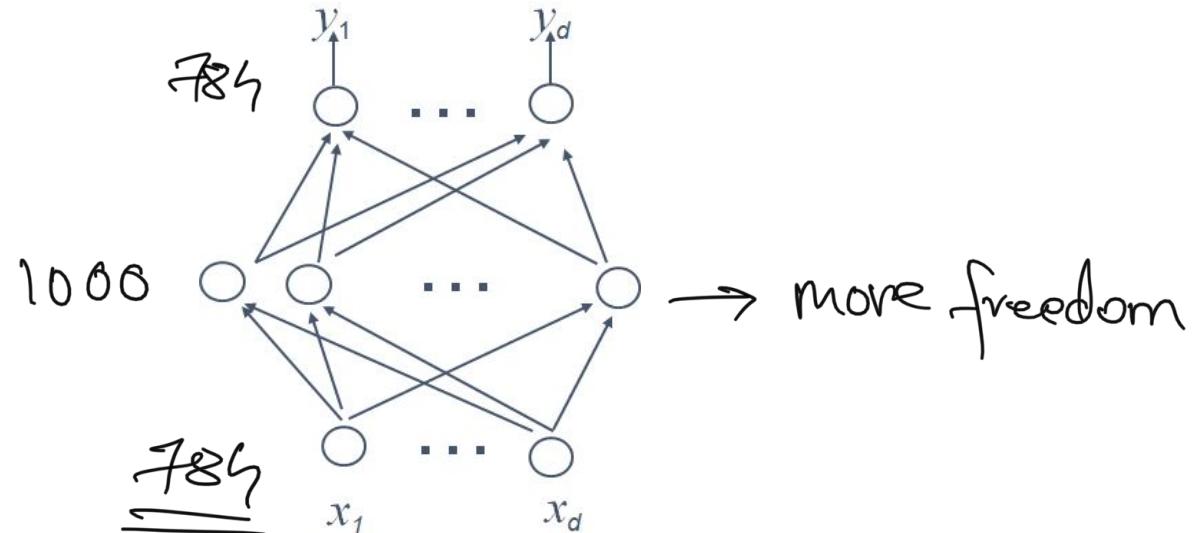
Autoencoder - 2 cases

- Case 1- Much fewer hidden nodes than input nodes



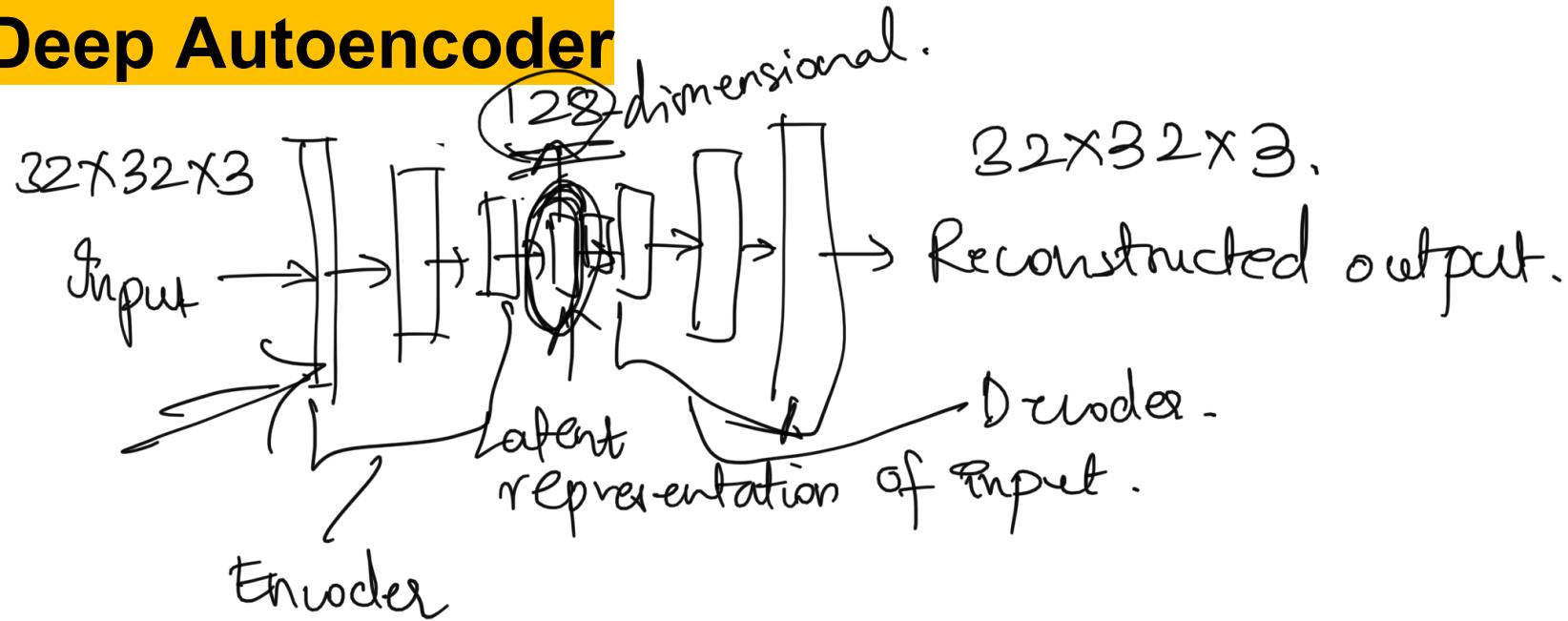
Autoencoder - 2 cases

- Case 1- Allow more hidden nodes than input



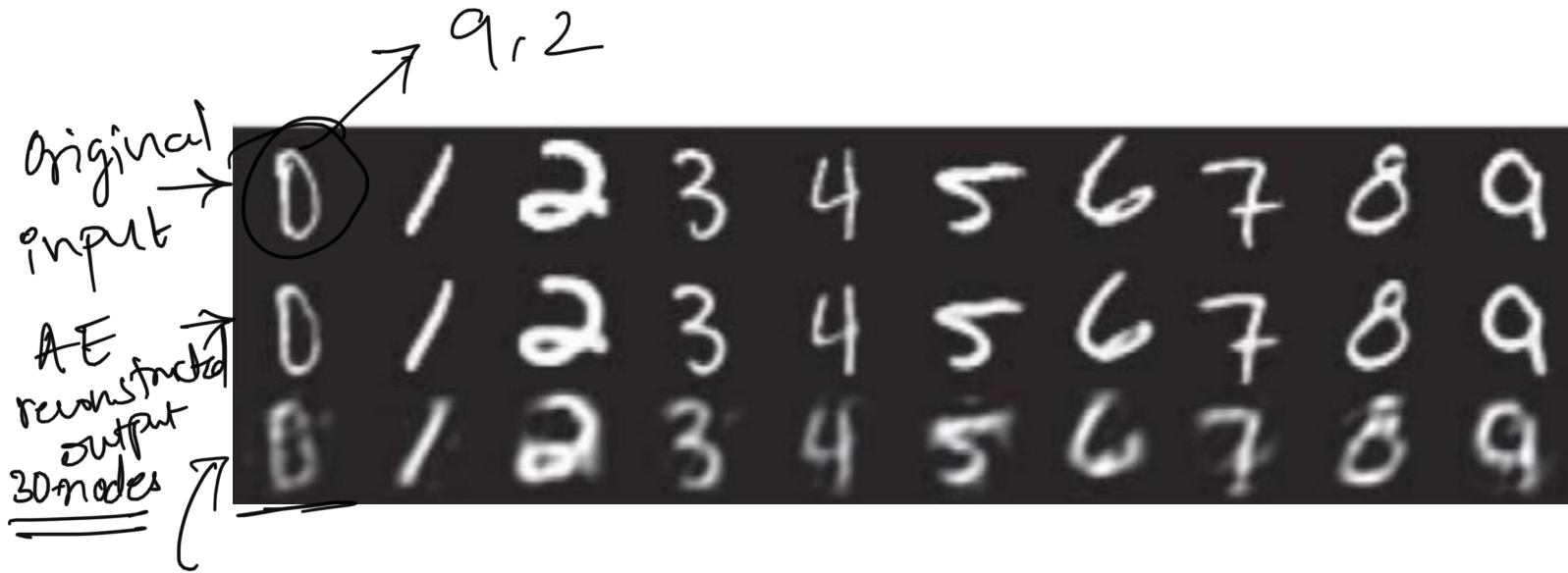
— Regularization .

Deep Autoencoder



- Encoder \Rightarrow Convolution
- Decoder \Rightarrow Deconvolution

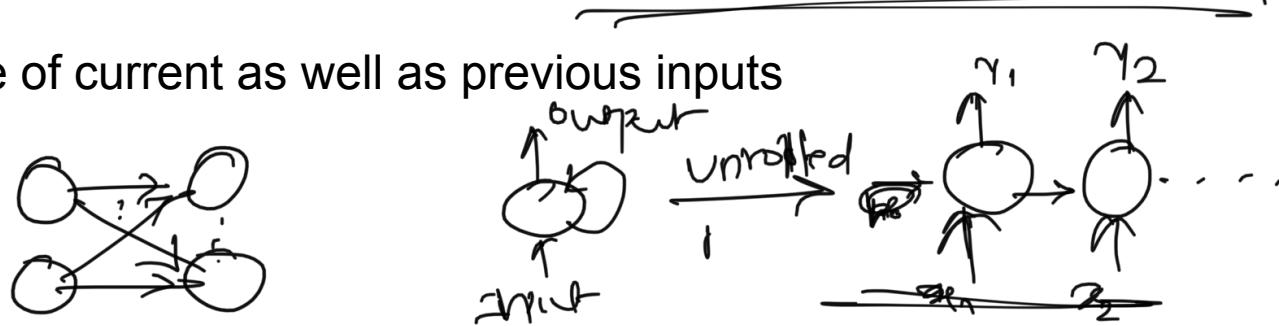
Deep Autoencoder



PCA output -
30-dim.

Recurrent Neural Networks

- Allow directed cycles in connections between neurons
- Such networks could naturally model variable-length sequential data
- Influence of current as well as previous inputs



- Very popular in NLP (Natural Language Processing)
- Vision — to process videos.

LSTM, GRU

Questions?