IE 678 Deep Learning

02 – Feedforward Neural Networks

Part 0: Overview

Prof. Dr. Rainer Gemulla

Universität Mannheim

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Outline

1. Embeddings
2. Feedforward Neural Networks
3. Basic ML Models as FNNs
4. Multi-Layer FNNs

Lessons learned

- Artificial neural networks
  - Useful for a variety of learning tasks, great results in some areas
  - Complex models, need data + compute + experience
- Feedforward neural networks
  - Discriminative models, directed flow from input to output
  - Hidden layers enable high representation power
  - Outputs of hidden layers can be seen as learned features (embeddings)
  - Train with backprop + tricks + tricks + tricks (see later lectures)
- Basic ML models can be represented as FNNs
  - Linear/logistic/softmax regression (no hidden layer)
  - SVD and k-Means clustering (one hidden layer)
- . . . and are a building block of more complex DL models
  - E.g., as prediction head
  - E.g., as artificial neuron

Suggested reading

- Drori, Ch. 1, 2.1–2.4
- Goodfellow et al., Ch. 6+7
- Murphy 1, Ch. 13.1+13.2