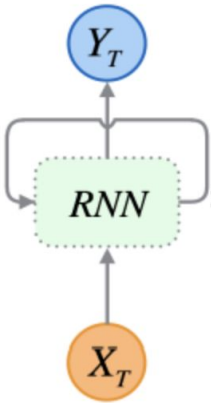
CIS 678 Machine Learning

Introduction to Neural Networks (cont.)

Recurrent Neural Networks

Examples:

- LSTMs
- GRU



ref

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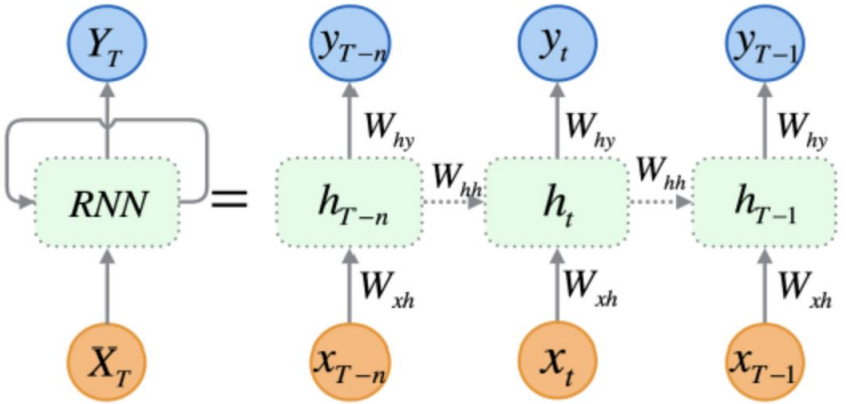
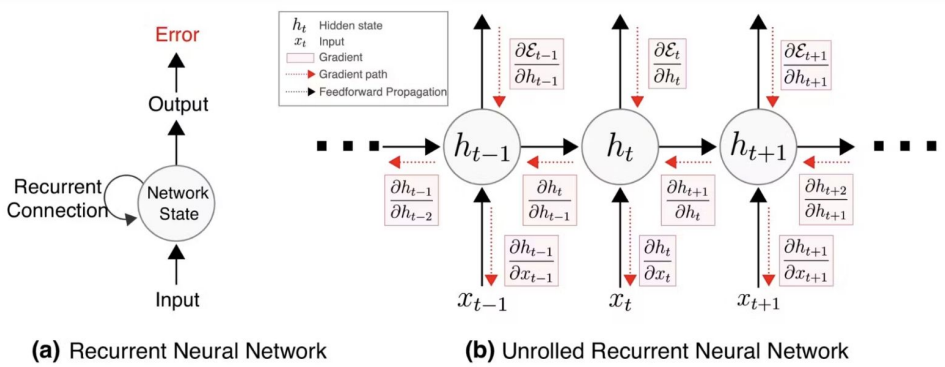


ref

Recurrent Neural Network (RNN)

Backpropagation

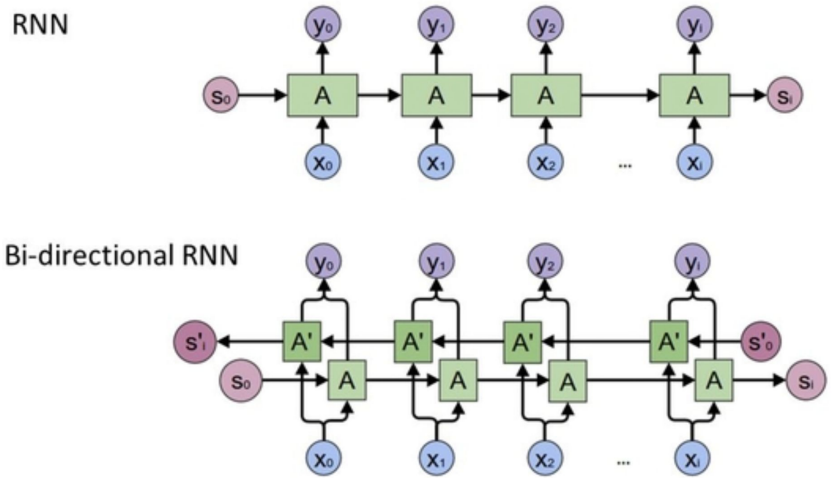


[Ref(code adaptation)]

RNN code

Notebook

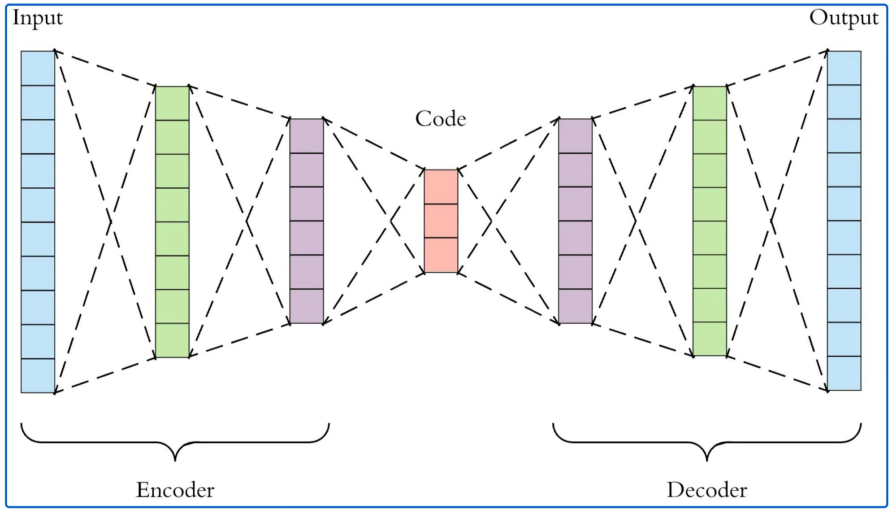
RNNs can be uni or Bi-directional



Src

Unsupervised learning (nonlinear)

- Auto Encoders
- Restricted Boltzmann Machines (RBMs)



Auto encoder

Notebook

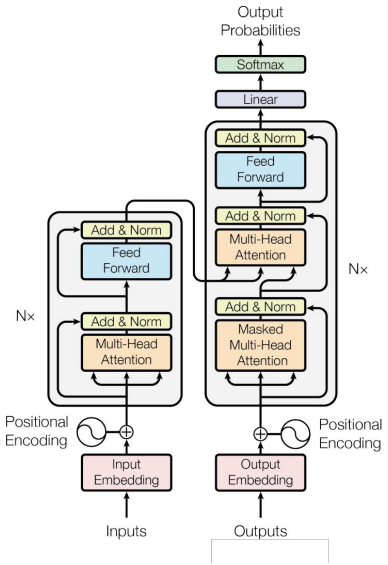
Transformers

Examples:

- Encoder decoder pair
- GPT
- BERT

BERT

Encoder



GPT

Decoder

ref

Training Neural Network Challenges

- Intractable gradients
  - Vanishing, and
  - Exploding gradients

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- Various normalizations
  - Input normalization (standard scalar)
  - Batch normalization
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- Intractable gradients
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- Various normalizations
  - Input normalization (standard scalar)
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  - Layer normalization
- Controlling overfitting
  - Regularization
  - Early stopping
  - Drop out

Whiteboarding

- Concepts discussed before

Whiteboarding

- Concepts discussed before
- CNN performance boosting

QA