



OCR

NEURAL NETWORKS MODELS

RNN , LSTM , BLSTM , BPTT

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Summary

01

Introduction

Neural networks, also known as artificial neural networks (ANNs) or simulated neural networks (SNNs), are a subset of

02

recurrent neural network

An RNN (Recurrent Neural Network) is a type of neural network designed for sequential data processing. It utilizes recurrent connections to retain information across time

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LSTM , BSTM , BPTT

LSTM stands for long short-term memory networks, used in the field of Deep Learning. It is a variety of recurrent neural networks (RNNs) that are capable of learning long-term dependencies,

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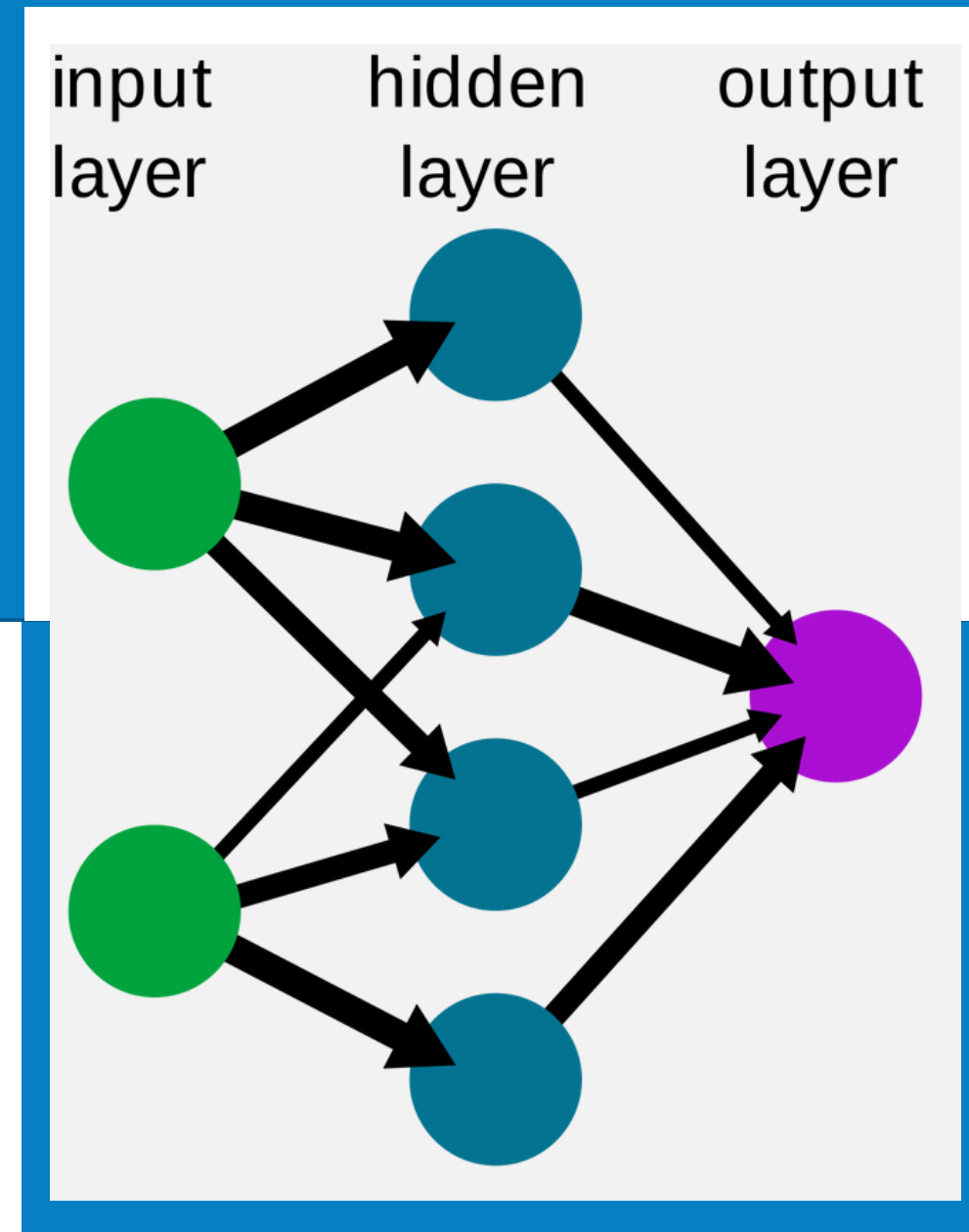
Conclusion

In this presentation, we presented one recurrent neural network called BiLSTM. After an introduction to neural networks and a discussion about RNN, we ept.

Table of Content

Introduction

Neural networks, also known as artificial neural networks (ANNs) or simulated neural networks (SNNs), are a subset of machine learning and are at the heart of deep learning algorithms. Their name and structure are inspired by the human brain, mimicking the way that biological neurons signal to one another.

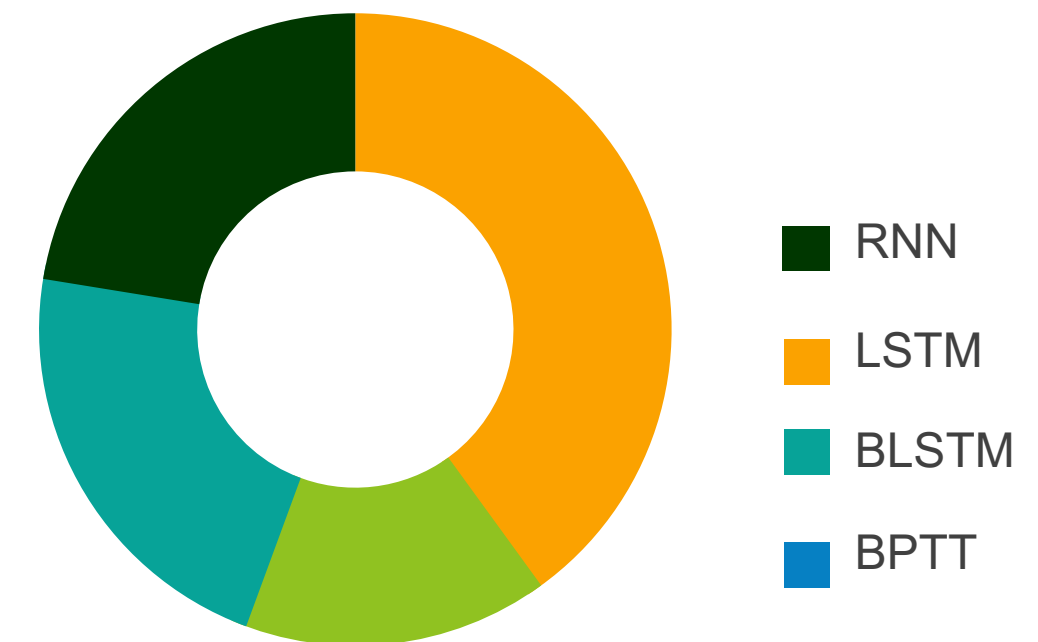


Neural Network

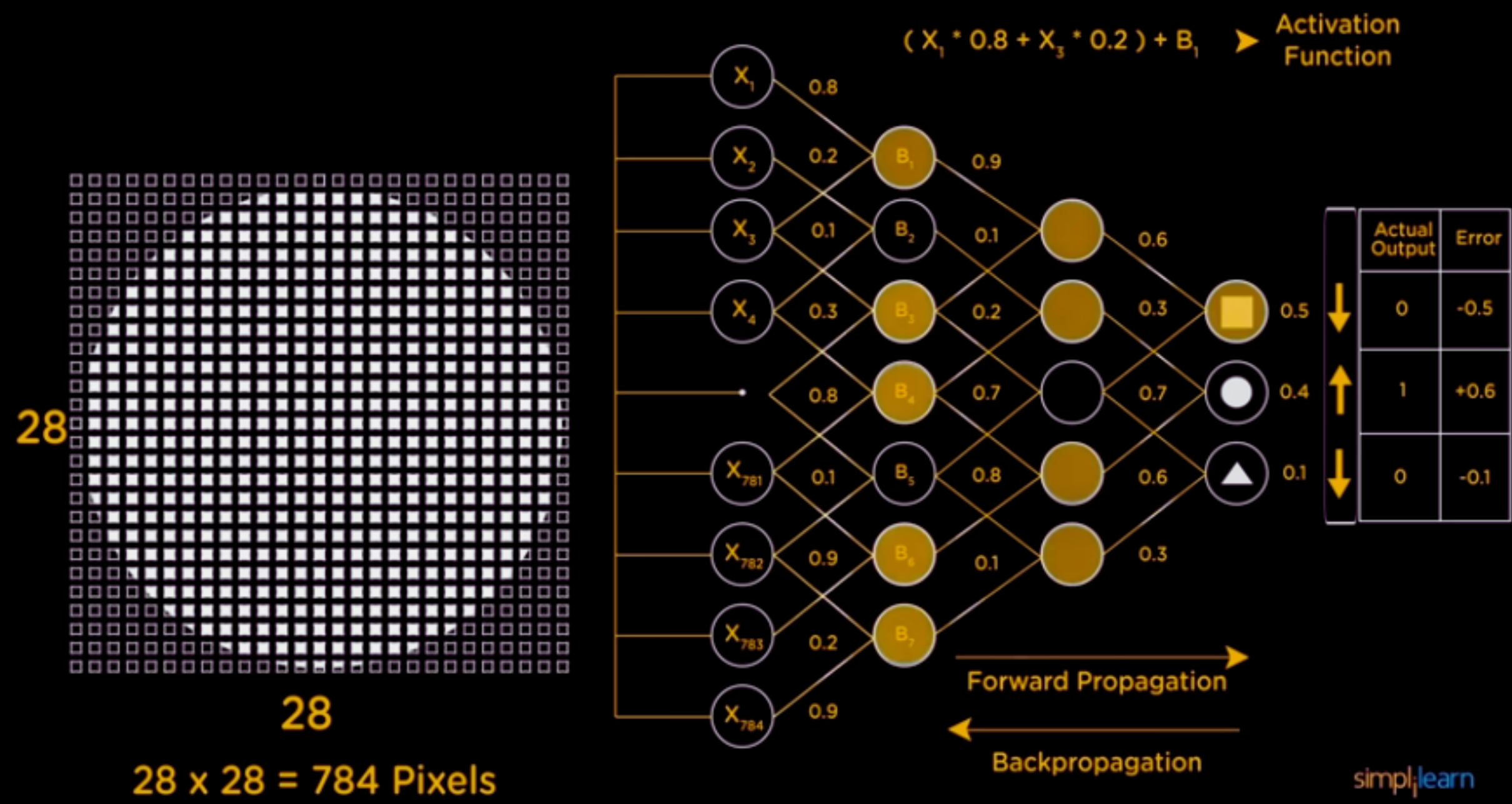
Logic Behind

Artificial neural networks (ANNs) are comprised of node layers, containing an input layer, one or more hidden layers, and an output layer

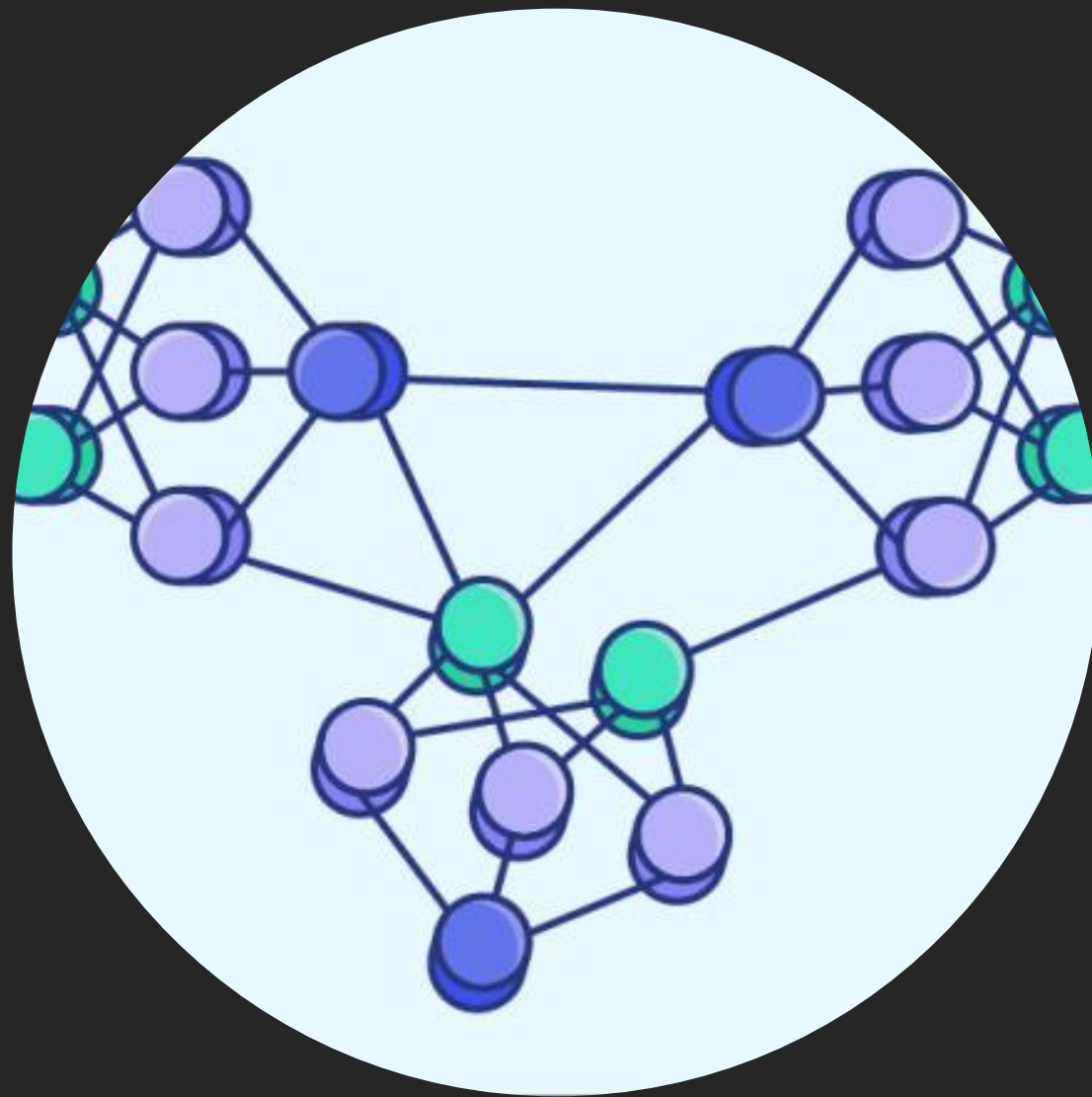
NN Models



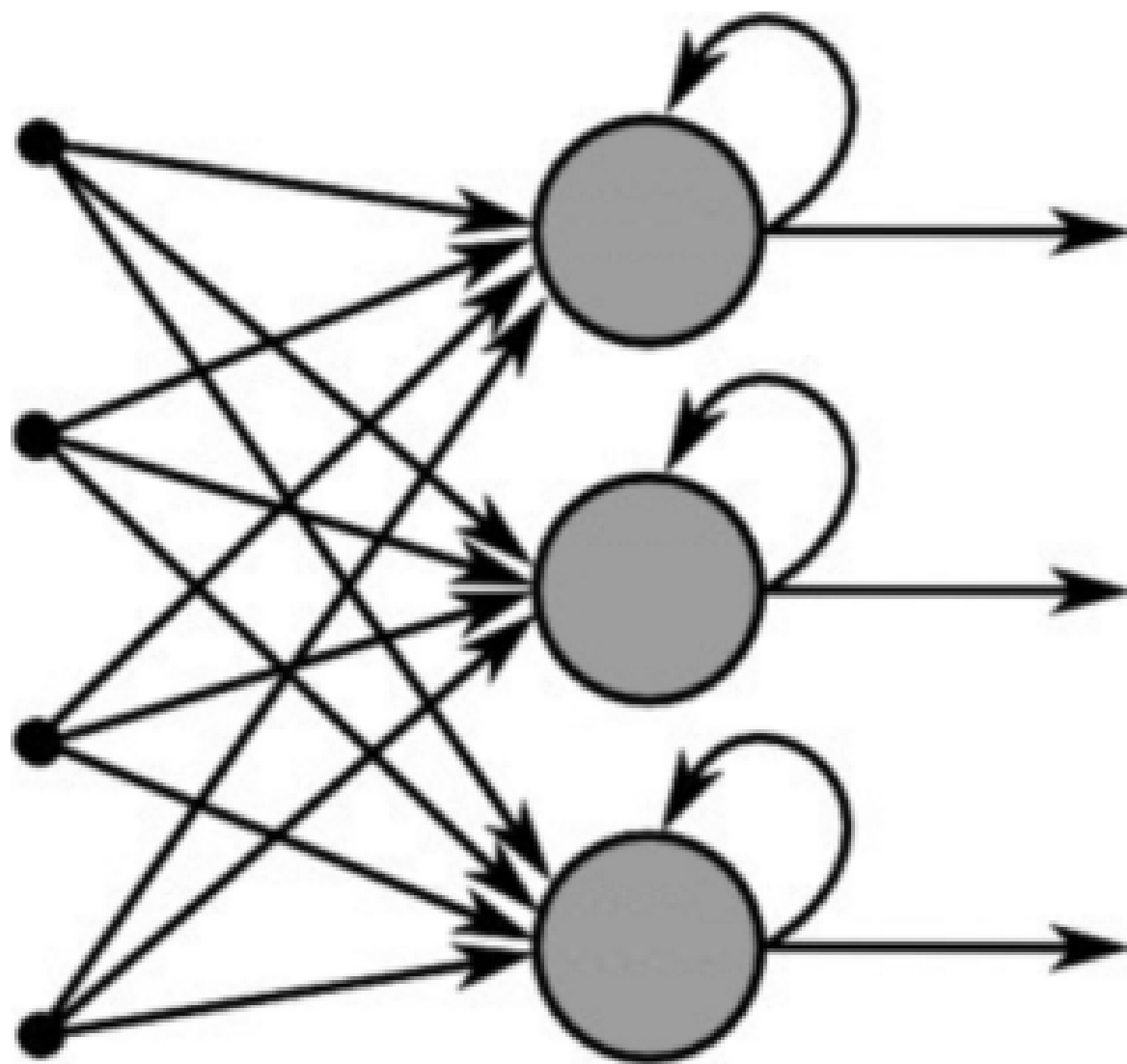
A series of algorithms that essentially aims to recognize underlying relationships in a set of data through a process that inherits the human being reflection



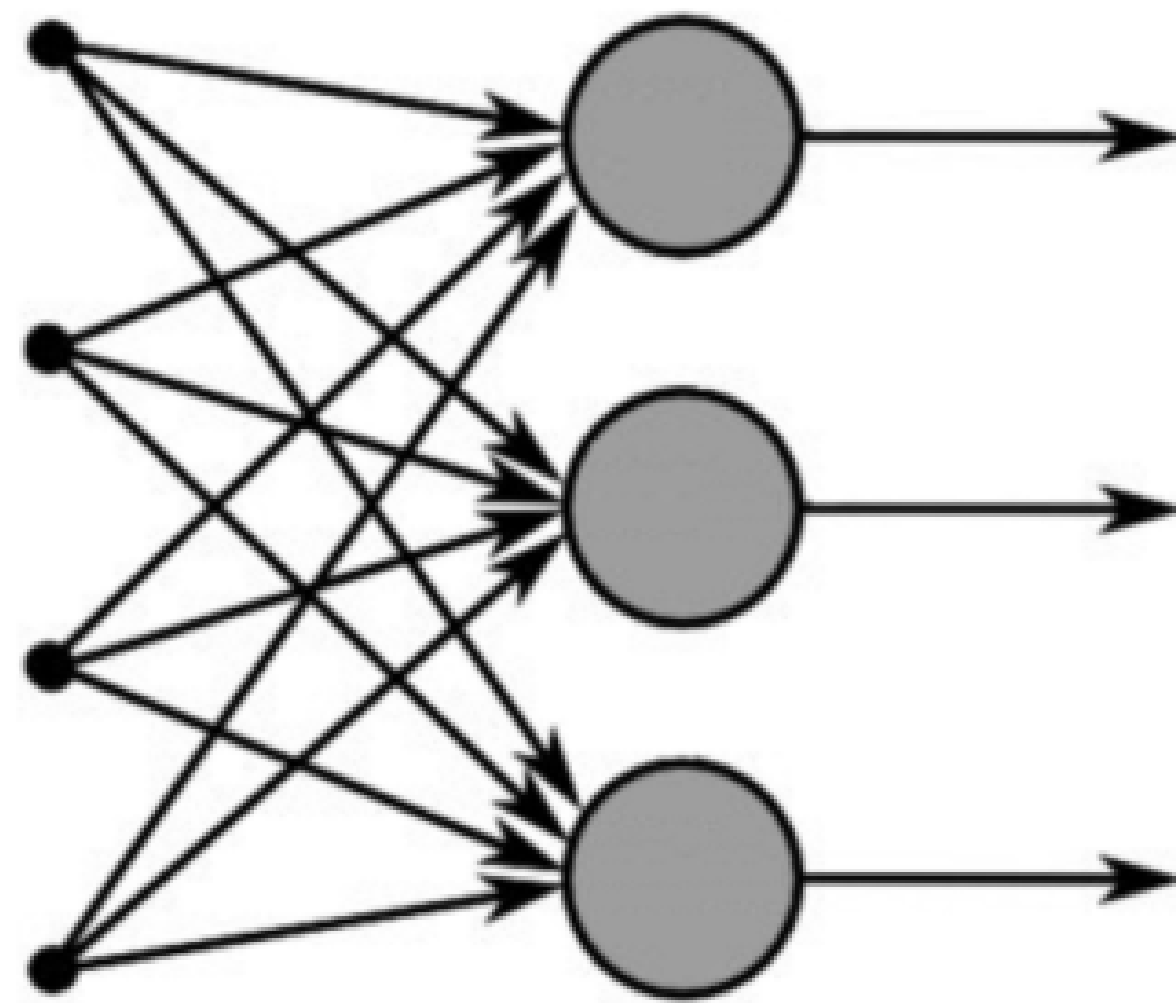
Reccurent Neural Networks (RNNs)



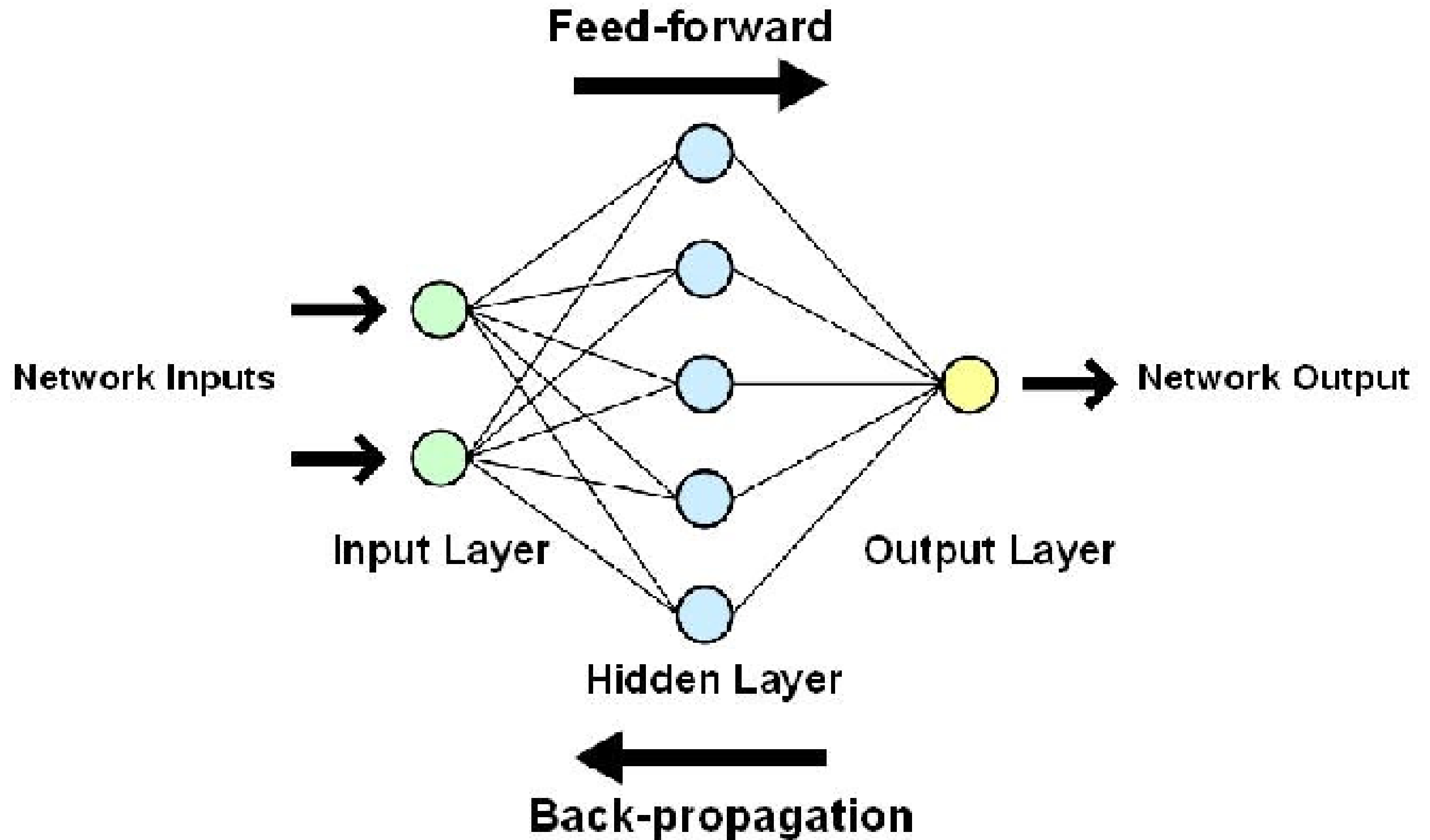
An RNN (Recurrent Neural Network) is a type of neural network designed for sequential data processing. It utilizes recurrent connections to retain information across time steps, enabling it to capture temporal dependencies. RNNs are widely used in natural language processing, speech recognition, and time series analysis.



Recurrent Neural Network



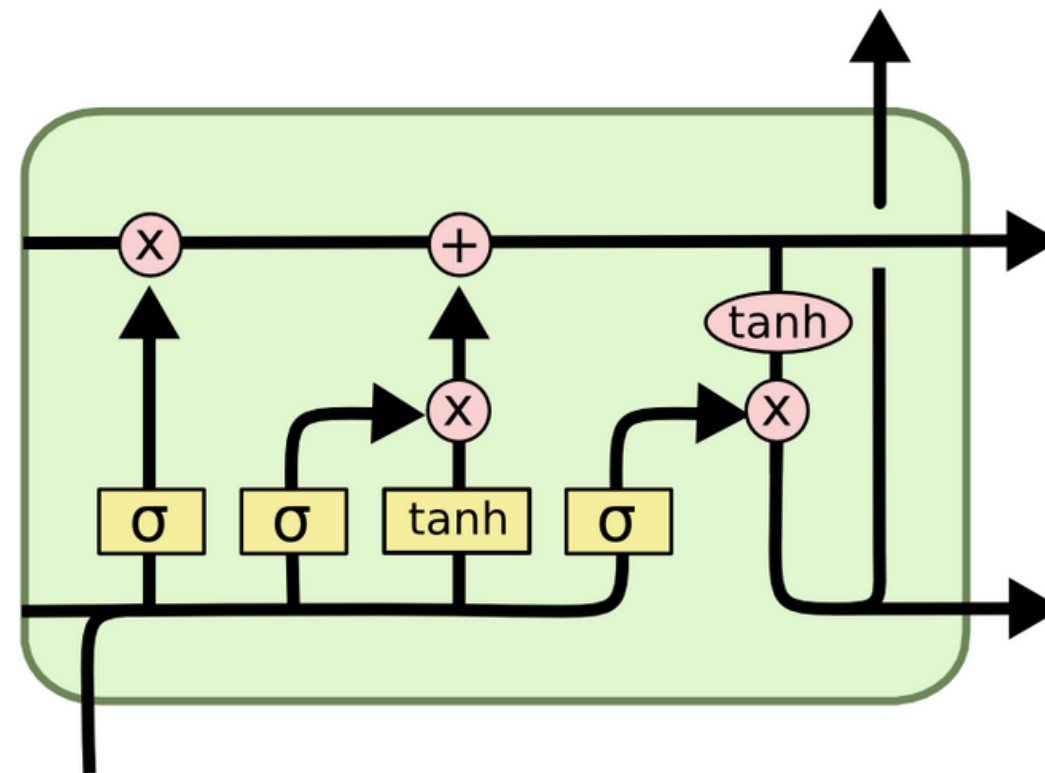
Feed-Forward Neural Network



Long Short time Memory (LSTM)

LSTM stands for long short-term memory networks, used in the field of Deep Learning. It is a variety of recurrent neural networks (RNNs) that are capable of learning long-term dependencies, especially in sequence prediction problems

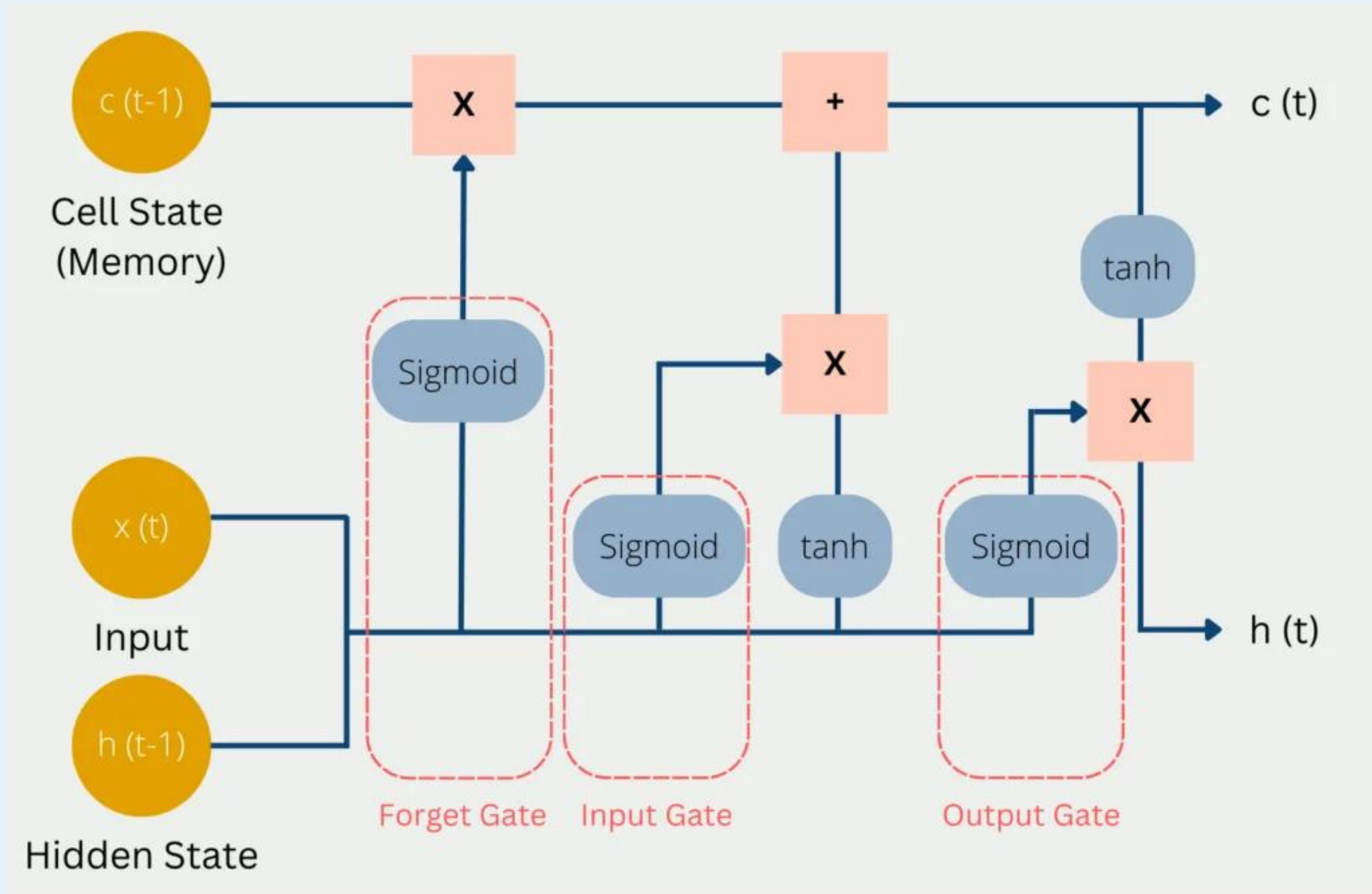
an RNN completely changes the existing data by applying a function. Whereas, LSTM makes small modifications on the data by simple addition or multiplication that flow through cell states

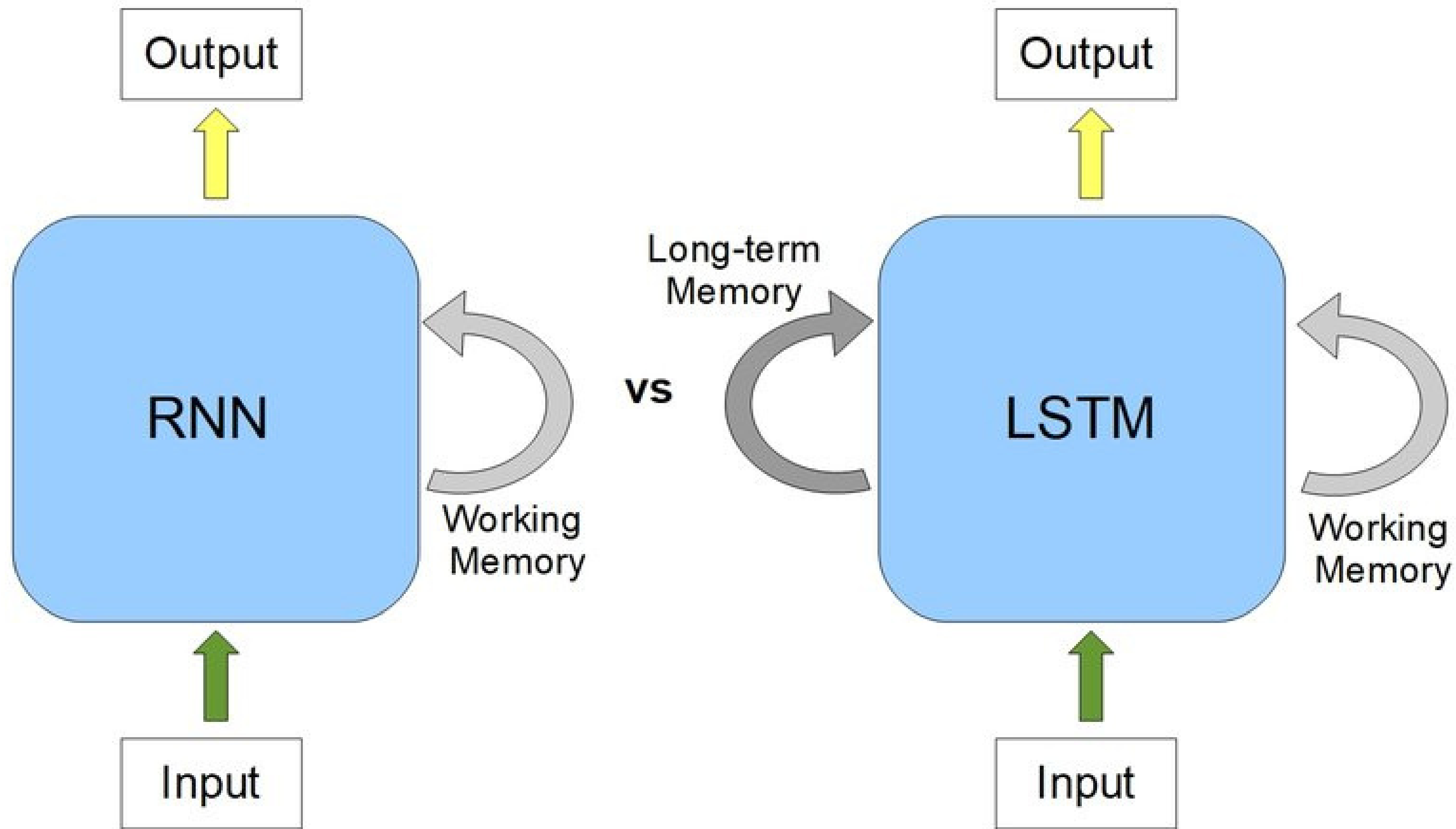


The central role of an LSTM model is held by a memory cell known as a 'cell state' that maintains its state over time. The cell state is the horizontal line that runs through the top of the below diagram

LSTM neural networks are capable of solving numerous tasks that are not solvable by previous learning algorithms like RNNs. Long-term temporal dependencies can be captured effectively by LSTM, without suffering much optimization hurdles

Architecture



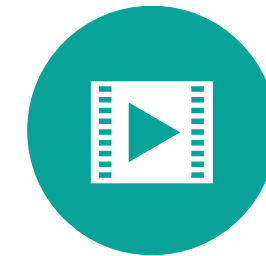


Advantages and drawbacks

able to store multiple layers of data or information



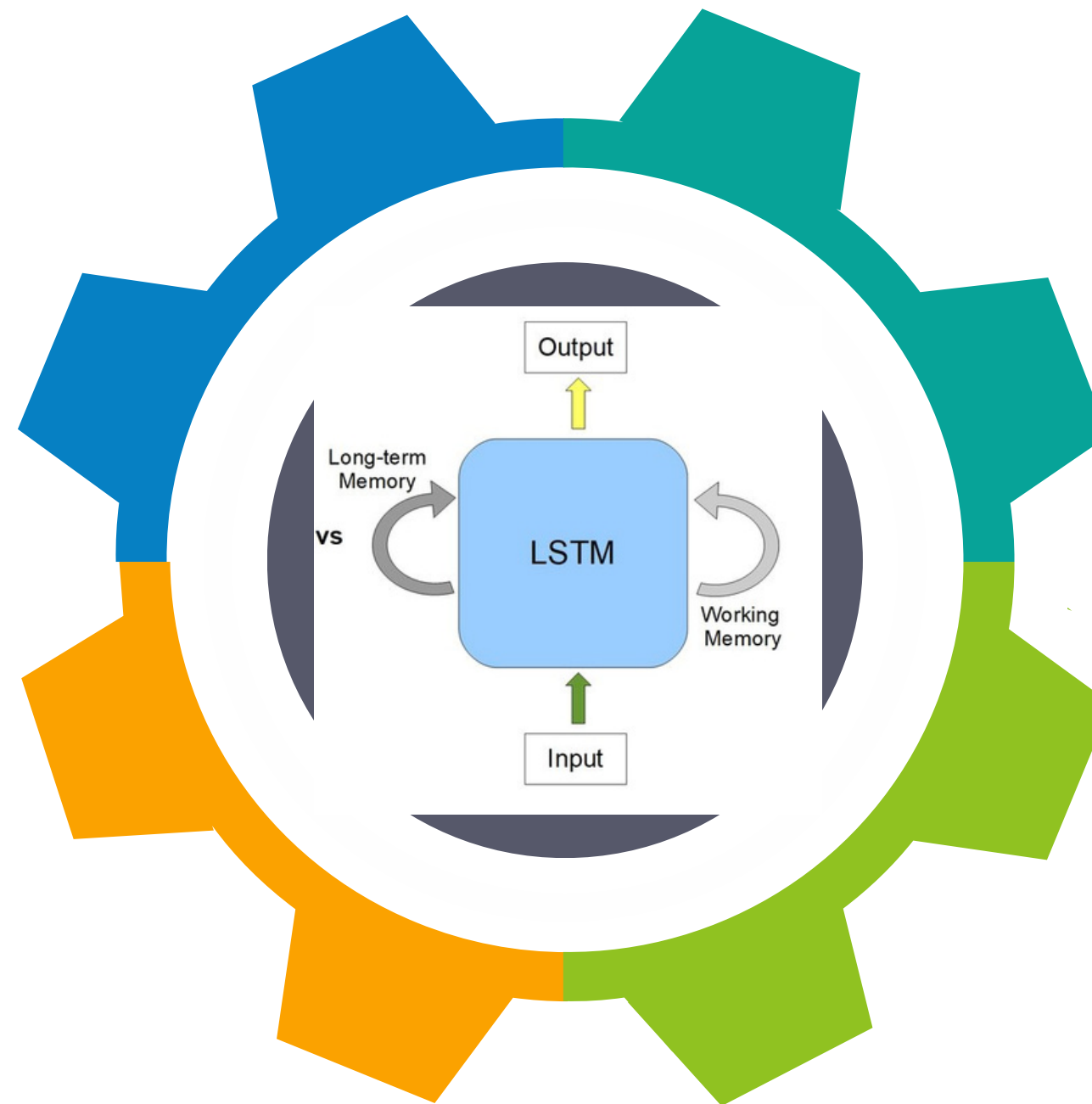
Finding and exploiting long range context



Does not support sequence transcription task



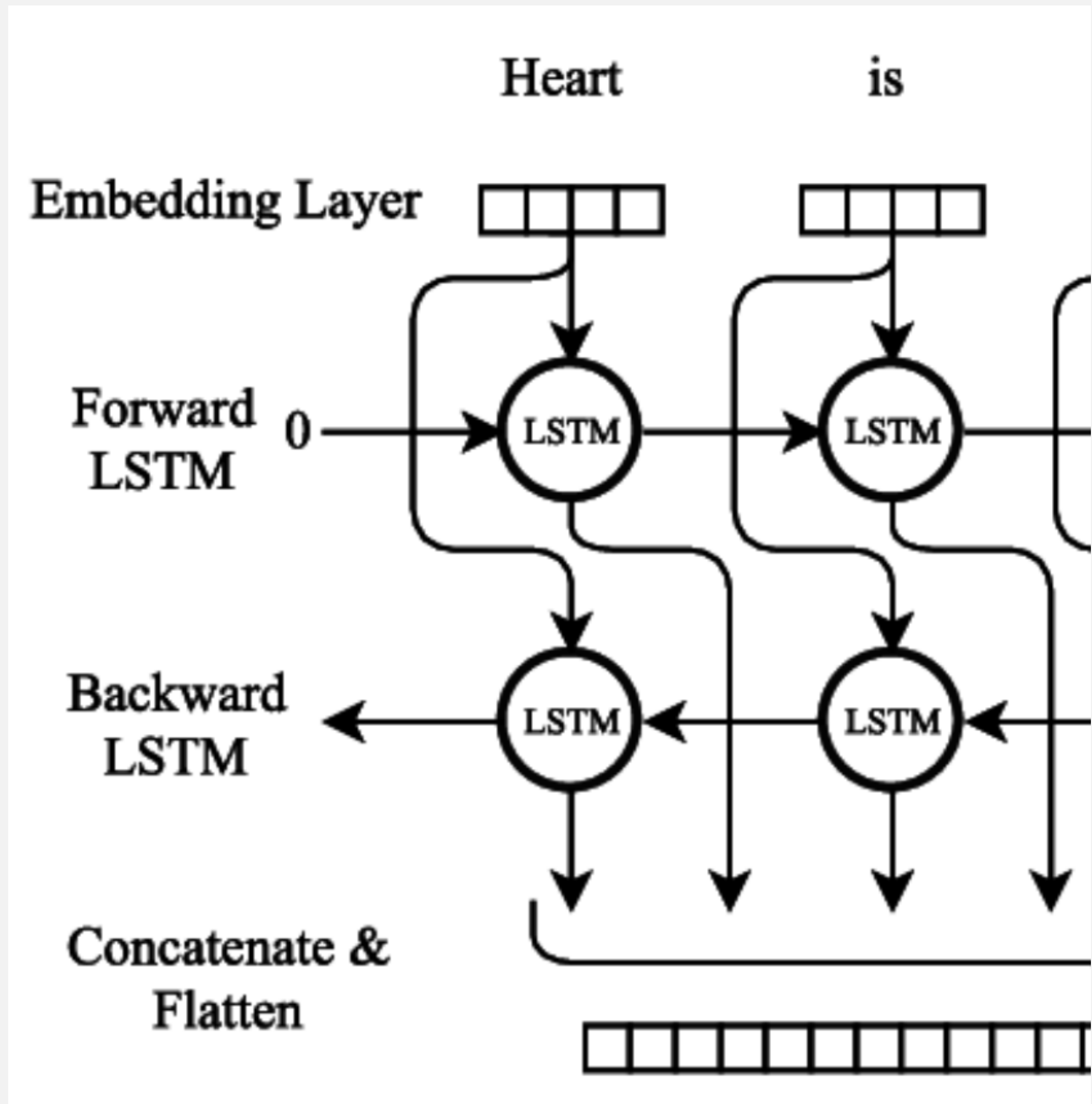
Need to align the input to the target sequences



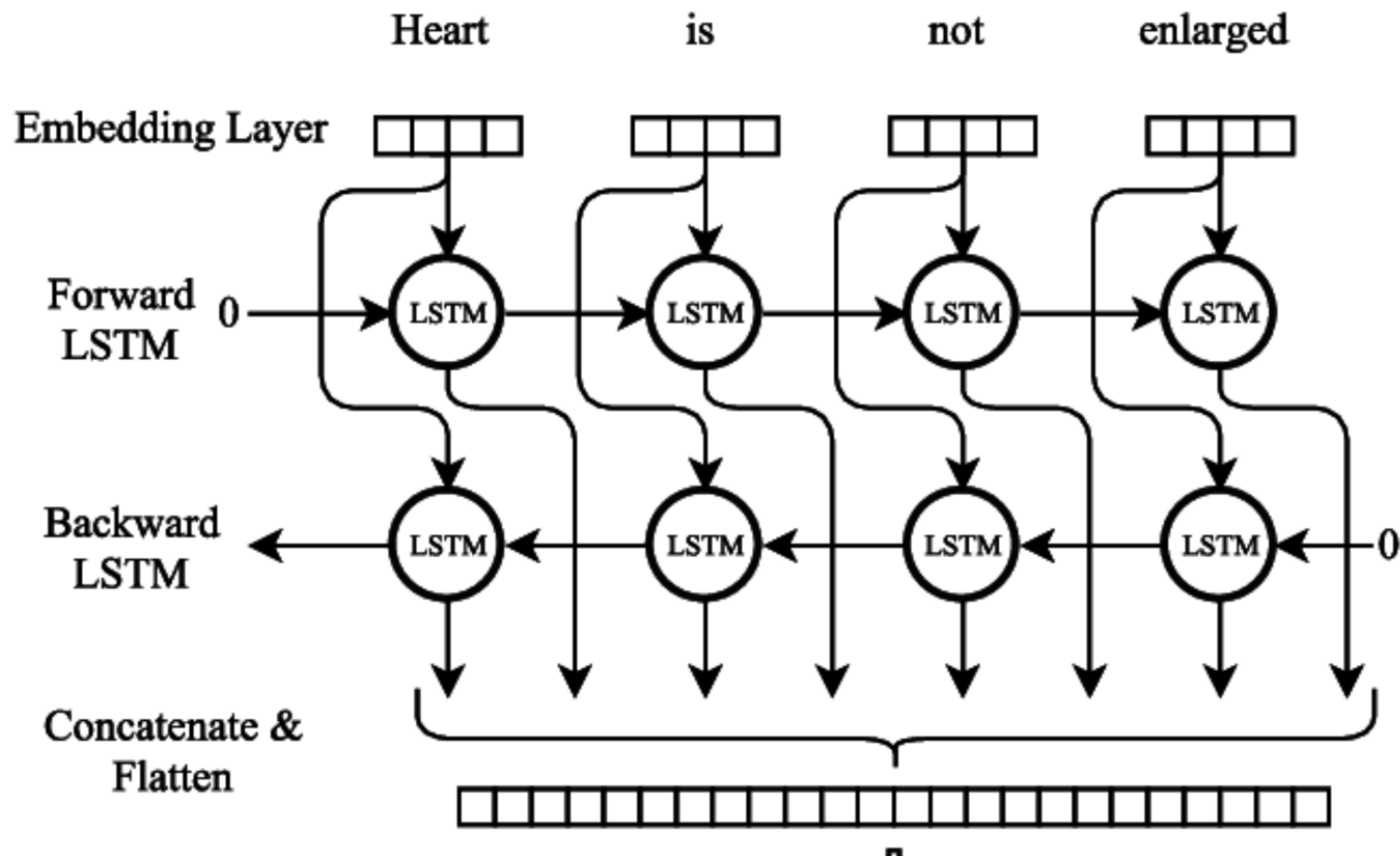
Bidirectional Long Short-Term Memory (BLSTM)

Bidirectional LSTM (BiLSTM) is a recurrent neural network used primarily on natural language processing. Unlike standard LSTM, the input flows in both directions, and it's capable of utilizing information from both sides. It's also a powerful tool for modeling the sequential dependencies between words and phrases in both directions of the sequence

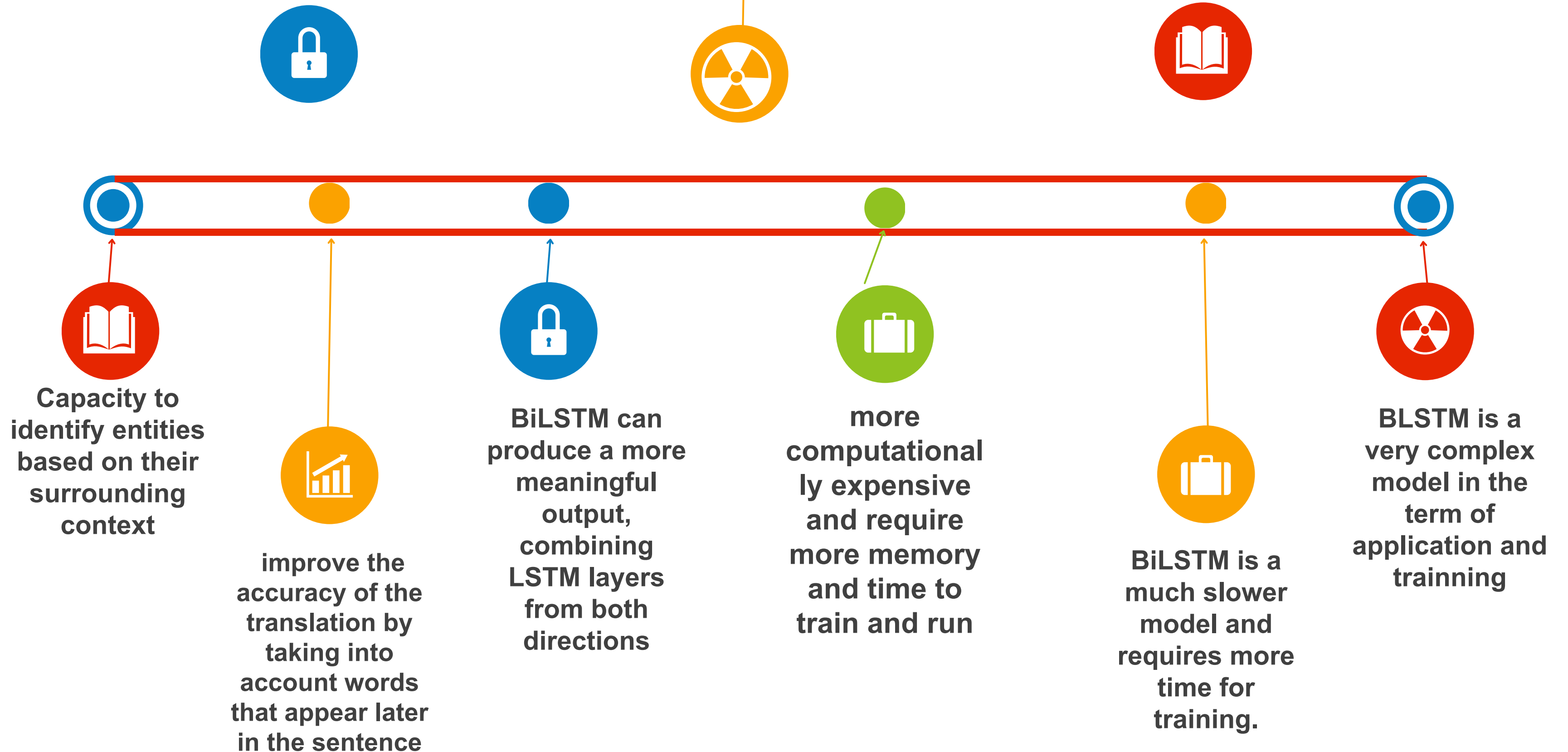
In summary, BiLSTM adds one more LSTM layer, which reverses the direction of information flow. Briefly, it means that the input sequence flows backward in the additional LSTM layer. Then we combine the outputs from both LSTM layers in several ways, such as average, sum, multiplication, or concatenation



Architecture

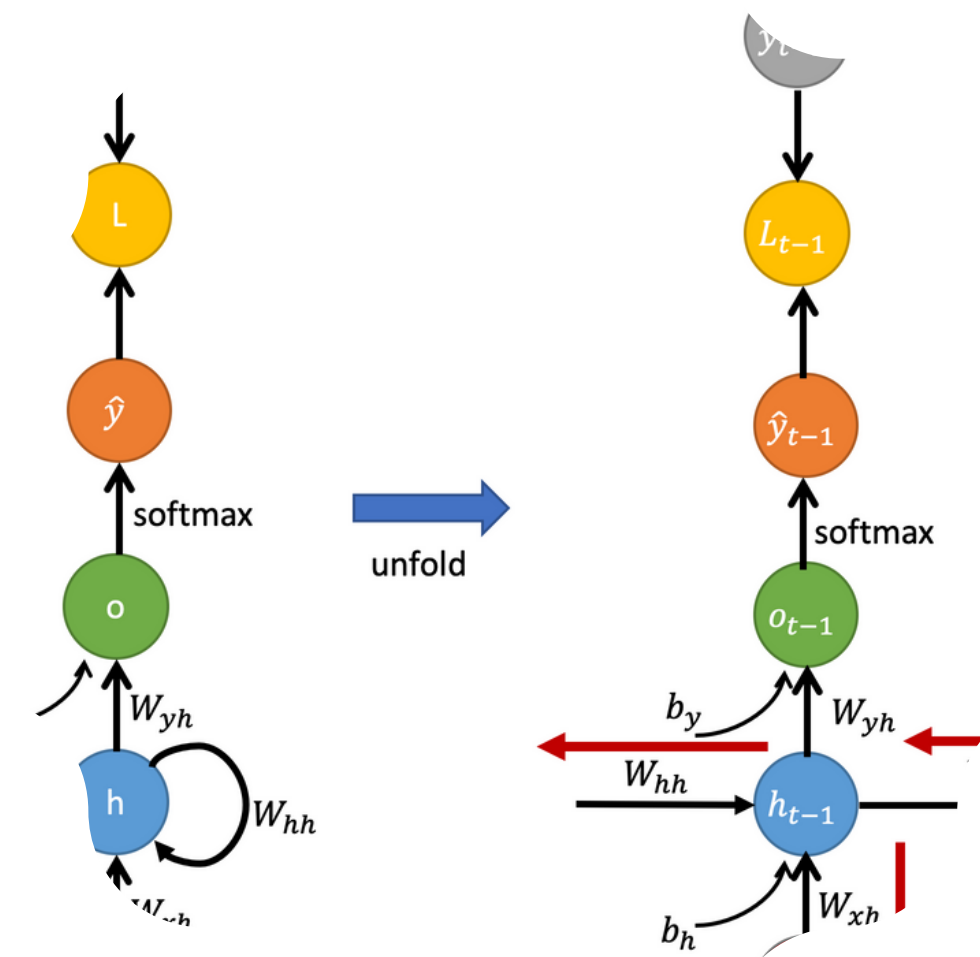


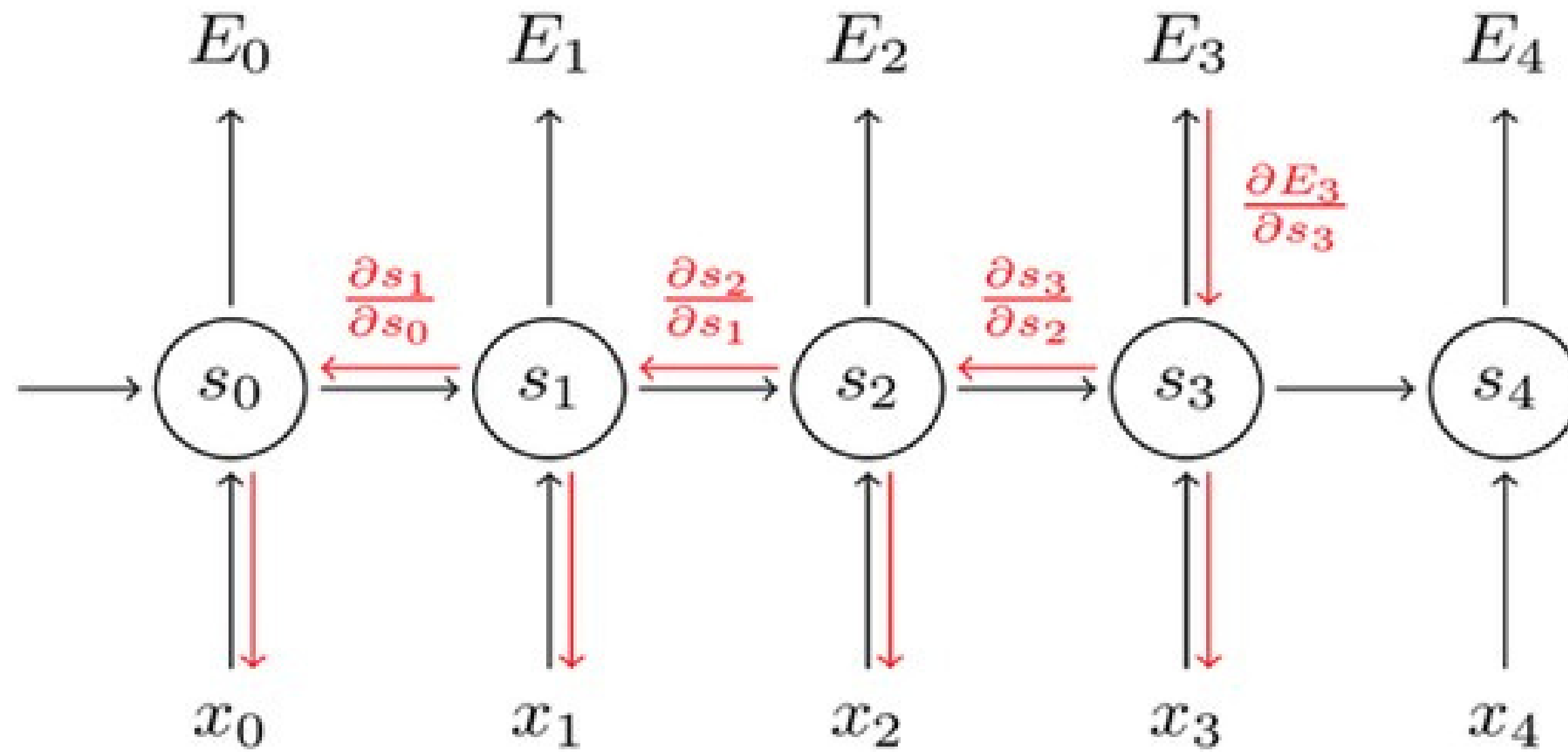
Advantages and drawbacks



Backpropagation Through Time

Backpropagation Through Time, or BPTT, is the training algorithm used to update weights in recurrent neural networks like LSTMs) is a gradient-based technique for training certain types of recurrent neural networks. It can be used to train Elman networks. The algorithm was independently derived by numerous researchers





Backpropagation Through Time

Discussion

BPTT tends to be significantly faster for training recurrent neural networks than general-purpose optimization techniques such as evolutionary optimization

BPTT has difficulty with local optima. With recurrent neural networks, local optima are a much more significant problem than with feed-forward neural networks

Conclusion

In this presentation, we presented one recurrent neural network called BiLSTM. After an introduction to neural networks and a discussion about RNN, we explained both the unidirectional and bidirectional LSTM algorithms in depth. In addition to the algorithmic differences between these methods. Finally, we talked about the BPTT concept. To sum up, every approach of NN has shown some exciting benefits and also some challenges that still consist of the big subject of research

thank
you