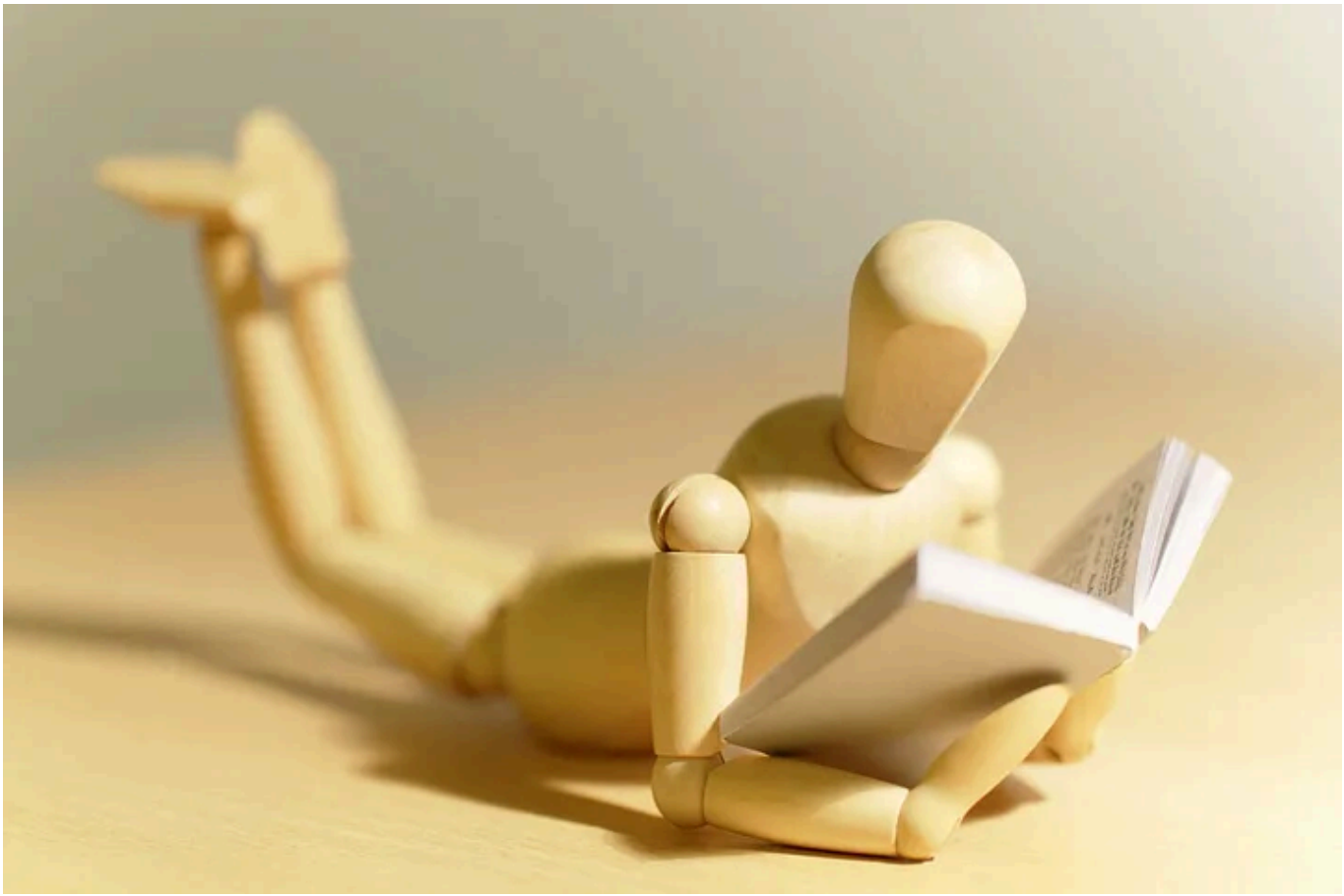
✨ Member-only story

Recurrent Neural Networks

Remembering what's important

Mahendran Venkatachalam · Follow

Published in Towards Data Science · 8 min read · Feb 28, 2019



Recurrent Neural Networks (RNNs) add an interesting twist to basic neural networks. A vanilla neural network takes in a fixed size vector as input which limits its usage in situations that involve a 'series' type input with no predetermined size.

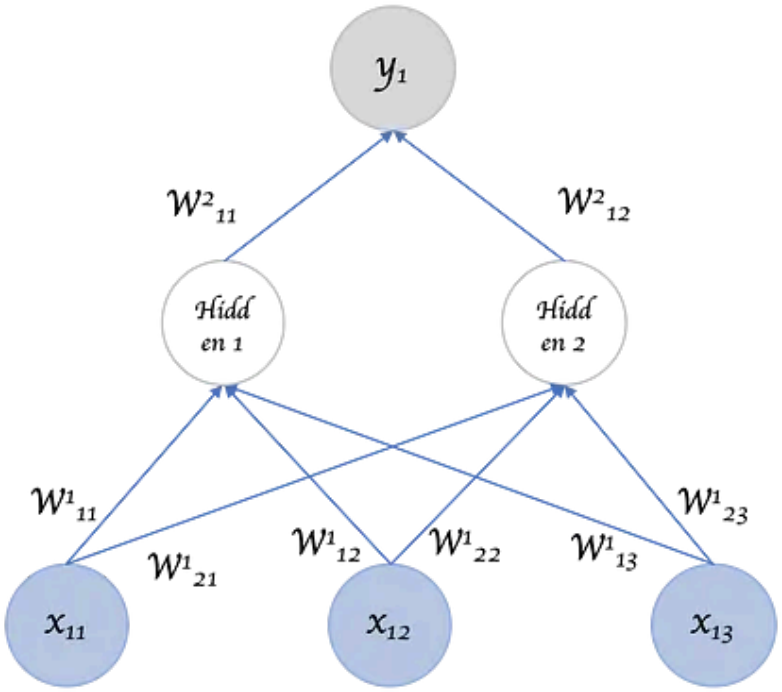


Figure 1: A vanilla network representation, with an input of size 3 and one hidden layer and one output layer of size 1.

RNNs are designed to take a series of input with no predetermined limit on size. One could ask what's the big deal, I can call a regular NN repeatedly too?

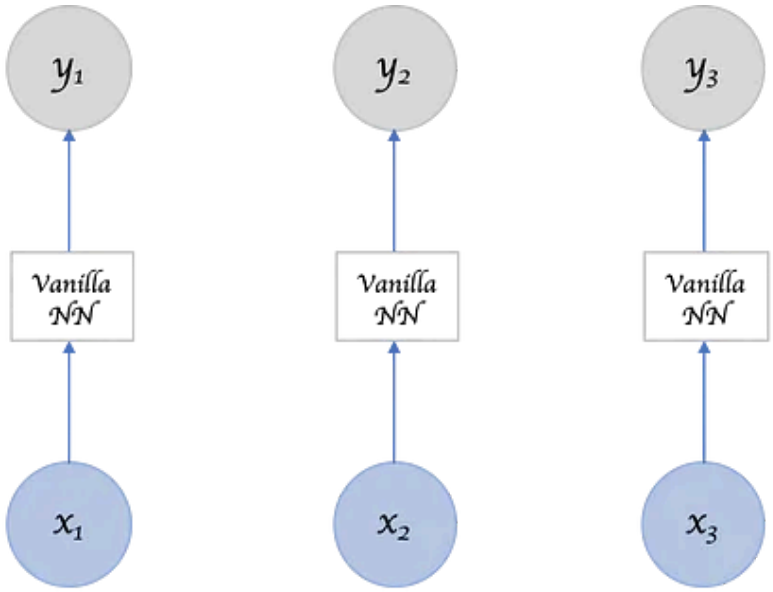


Figure 2: Can I simply not call a vanilla network repeatedly for a 'series' input?

Sure can, but the 'series' part of the input means something. A single input item from the series is related to others and likely has an influence on its neighbors. Otherwise it's just "many" inputs, not a "series" input (duh!).

So we need something that captures this relationship across inputs meaningfully.

Recurrent Neural Networks

Recurrent Neural Network remembers the past and it's decisions are influenced by what it has learnt from the past. Note: Basic feed forward networks "remember" things too, but they remember things they learnt during training. For example, an image classifier learns what a "1" looks like during training and then uses that knowledge to classify things in production.

While RNNs learn similarly while training, in addition, they remember things learnt from prior input(s) while generating output(s). It's part of the network. RNNs can take one or more input vectors and produce one or more

output vectors and the output(s) are influenced not just by weights applied on inputs like a regular NN, but also by a "hidden" state vector representing the context based on prior input(s)/output(s). So, the same input could produce a different output depending on previous inputs in the series.

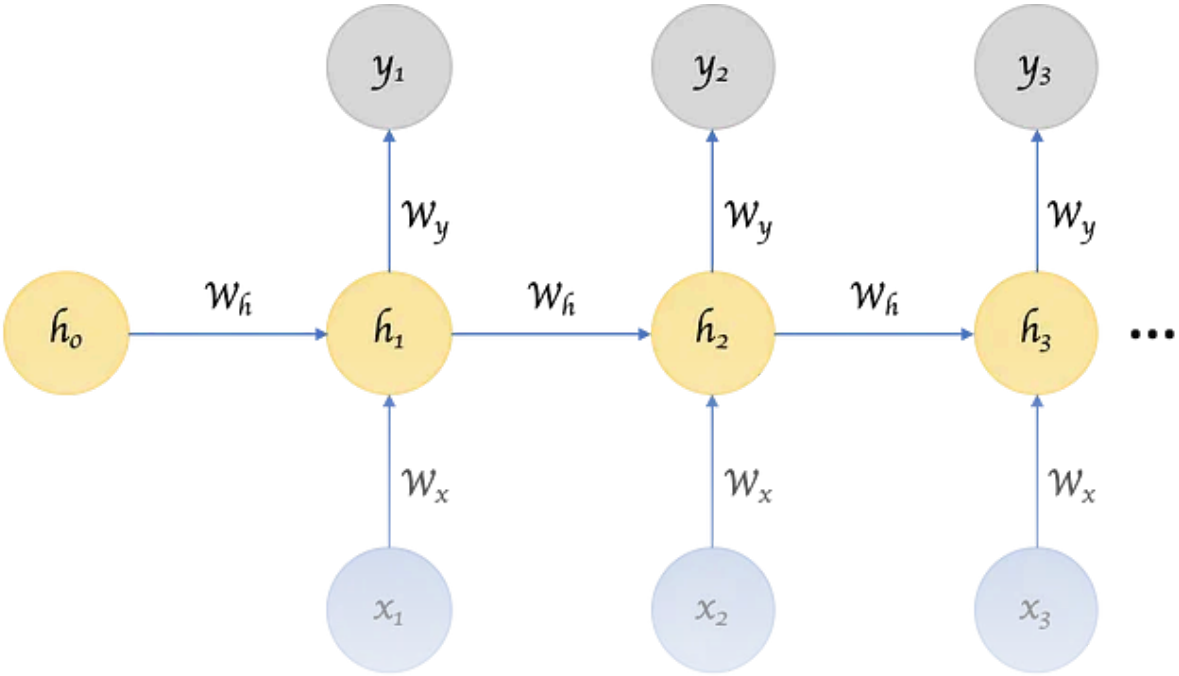


Figure 3: A Recurrent Neural Network, with a hidden state that is meant to carry pertinent information from one input item in the series to others.

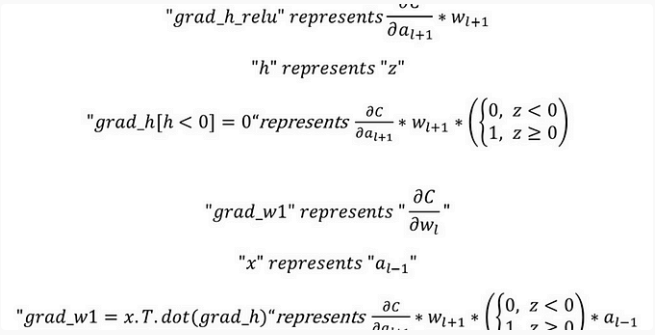
Written by Mahendran Venkatachalam

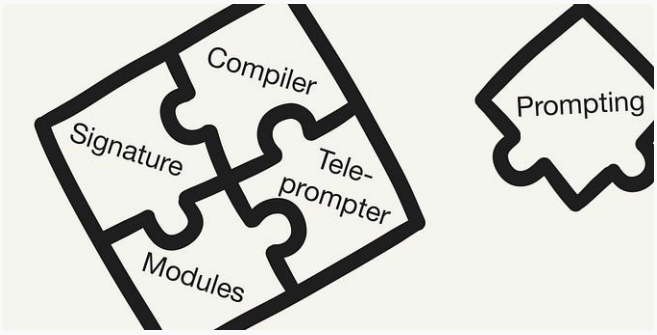
Follow

299 Followers · Writer for Towards Data Science

https://gotensor.com/

More from Mahendran Venkatachalam and Towards Data Science





Mahendran Venkatachal... in Towards Data Scien...

Leonie Monigatti in Towards Data Science

Reverse Engineering Backpropagation

Sometimes starting with examples might be a faster way to learn something rather than...

✦ · 8 min read · Nov 12, 2018

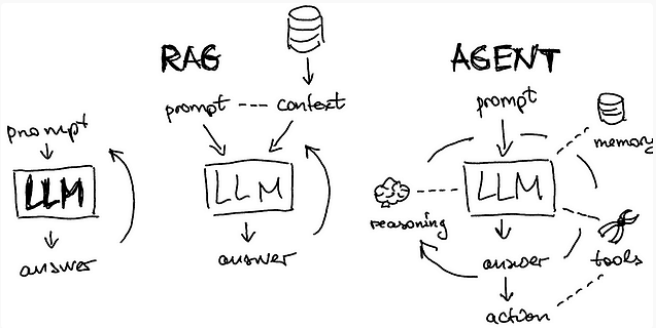
293 2

Intro to DSPy: Goodbye Prompting, Hello Programming!

How the DSPy framework solves the fragility problem in LLM-based applications by...

✦ · 13 min read · Feb 27, 2024

4K 9



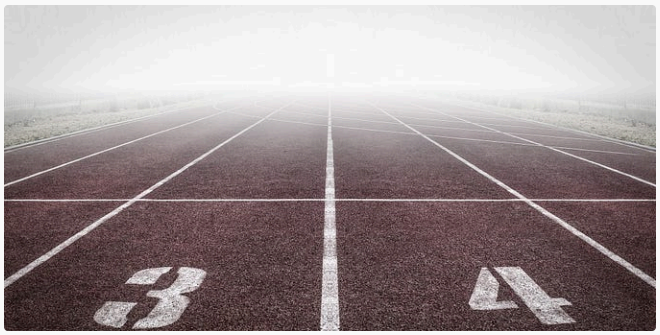
Alex Honchar in Towards Data Science

Intro to LLM Agents with Langchain: When RAG is Not...

First-order principles of brain structure for AI assistants

7 min read · Mar 15, 2024

1.6K 8



Mahendran Venkatachal... in Towards Data Scien...

Getting started with a Neural Network

A simple CNN example with Pytorch

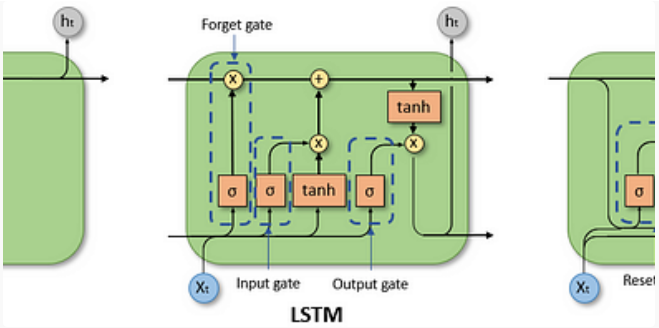
✦ · 11 min read · Oct 18, 2021

2

See all from Mahendran Venkatachalam

See all from Towards Data Science

Recommended from Medium



Jonte Dancker in Towards Data Science

A Brief Introduction to Recurrent Neural Networks

An introduction to RNN, LSTM, and GRU and their implementation

12 min read · Dec 26, 2022

586 7

Eugene Shevchenko

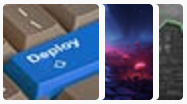
Attention mechanism for LSTM used in a sequence-to-sequence...

The attention mechanism is a technique introduced in deep learning, particularly for...

5 min read · Oct 24, 2023

79

Lists



Predictive Modeling w/ Python

20 stories · 1054 saves

Practical Guides to Machine Learning

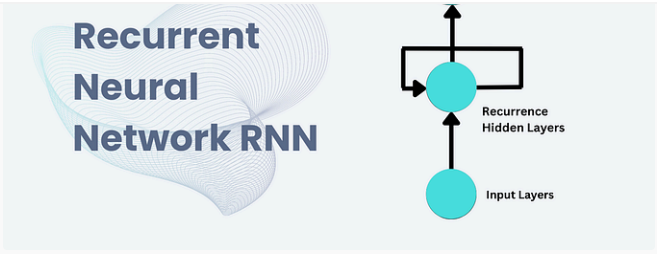
10 stories · 1263 saves

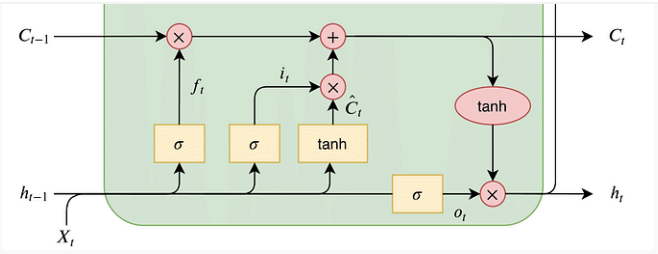
Natural Language Processing

1342 stories · 822 saves

The New Chatbots: ChatGPT, Bard, and Beyond

12 stories · 350 saves





Praveen Raj

Understanding Recurrent Neural Networks (RNN)—NLP

What is RNN ?

12 min read · Dec 7, 2023

6

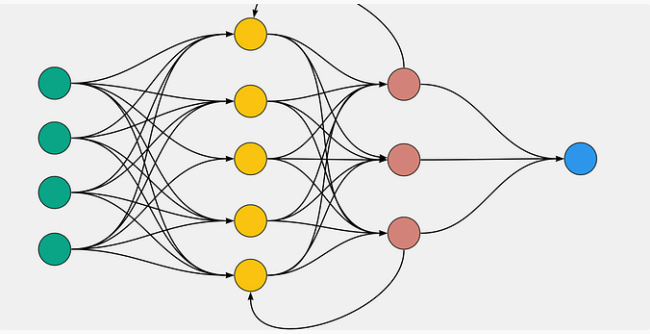
Saba Hesaraki

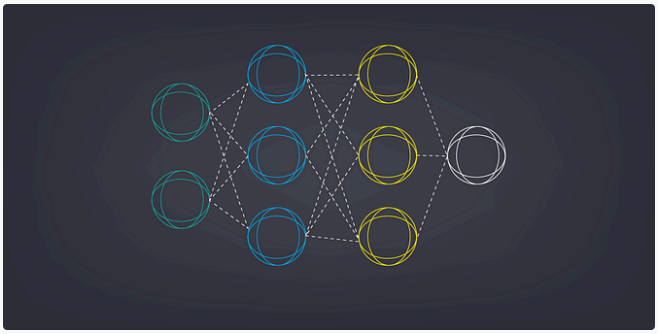
Long Short-Term Memory (LSTM)

Long Short-Term Memory (LSTM) is a type of recurrent neural network (RNN) architecture...

3 min read · Oct 27, 2023

47 1





Muhammad Fouzan

Understanding LSTM, GRU, and RNN Architectures

In the ever-evolving landscape of artificial intelligence and machine learning, the...

4 min read · Oct 22, 2023

59

Roshmita Dey

Understanding Language Modeling: From N-grams to...

Language modeling is a foundational concept in the field of Natural Language Processing...

11 min read · Oct 2, 2023

3

See more recommendations