RNNs?

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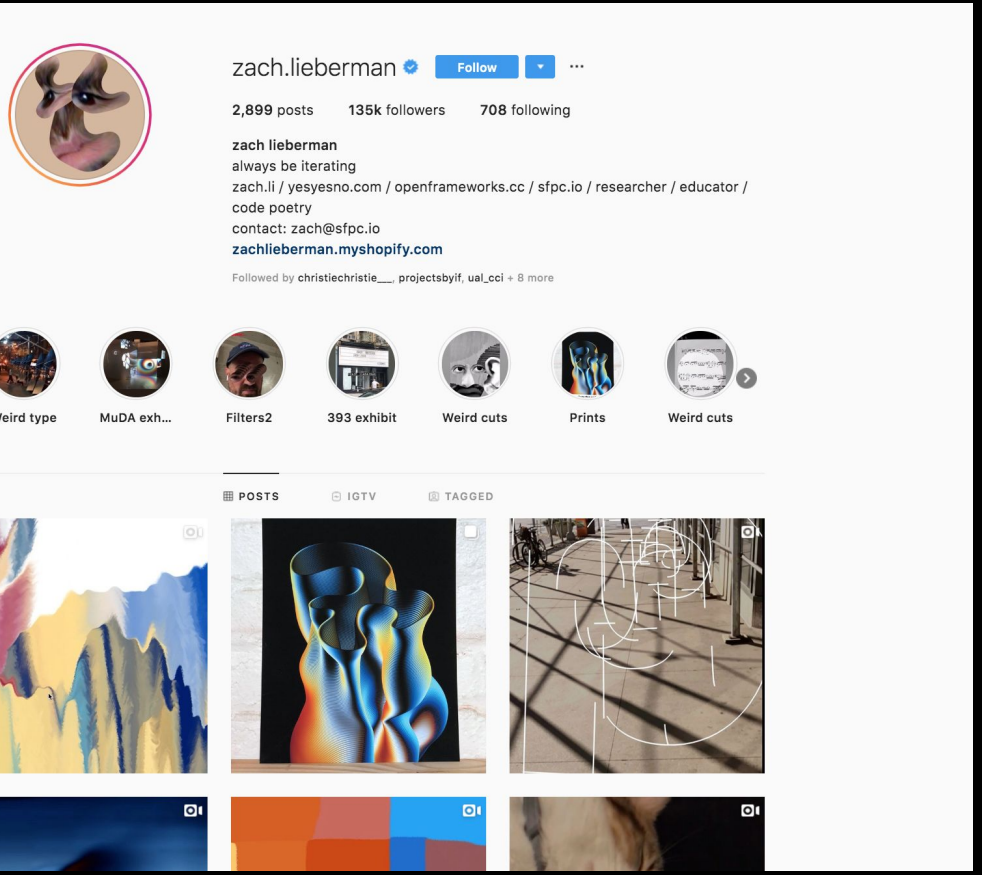
Anyone done the homework?

Rest over the holidays.

Maybe do a sketch a day.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So last week, we explored convolutional neural networks.

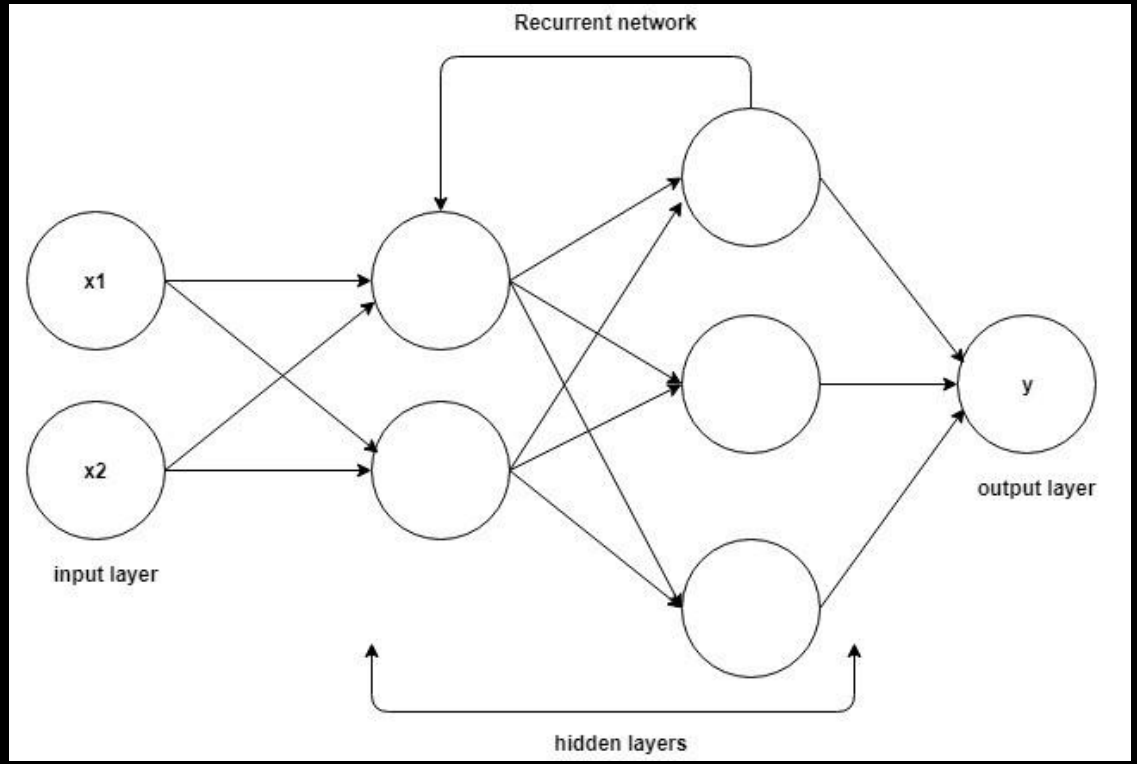
a soccer player is kicking a soccer ball

a street sign on a pole in front of a building

a couple of giraffe standing next to each other

https://github.com/karpathy/neuraltalk2

Today, our focus is on RNNs (recurrent neural networks)



They are a family of neural networks for processing sequential data.

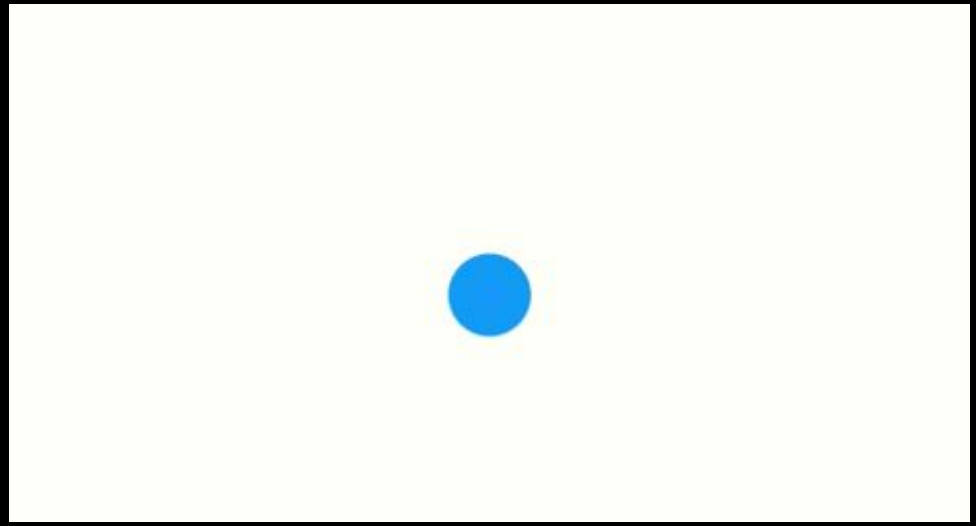
Sequence

A stream of data (finite or infinite) which are interdependent. Examples would be time series data, informative pieces of strings, conversations etc.

You take a still snapshot of a ball moving in time.

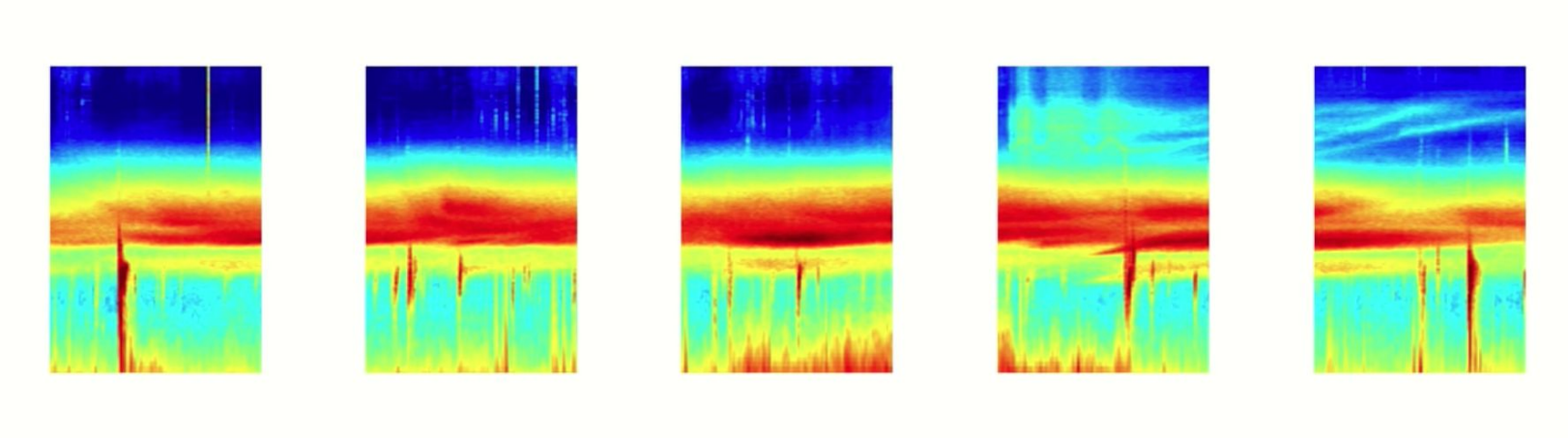
Let’s also say you want to predict the direction that the ball was moving.

So with only the information that you see on the screen, how would you do this?

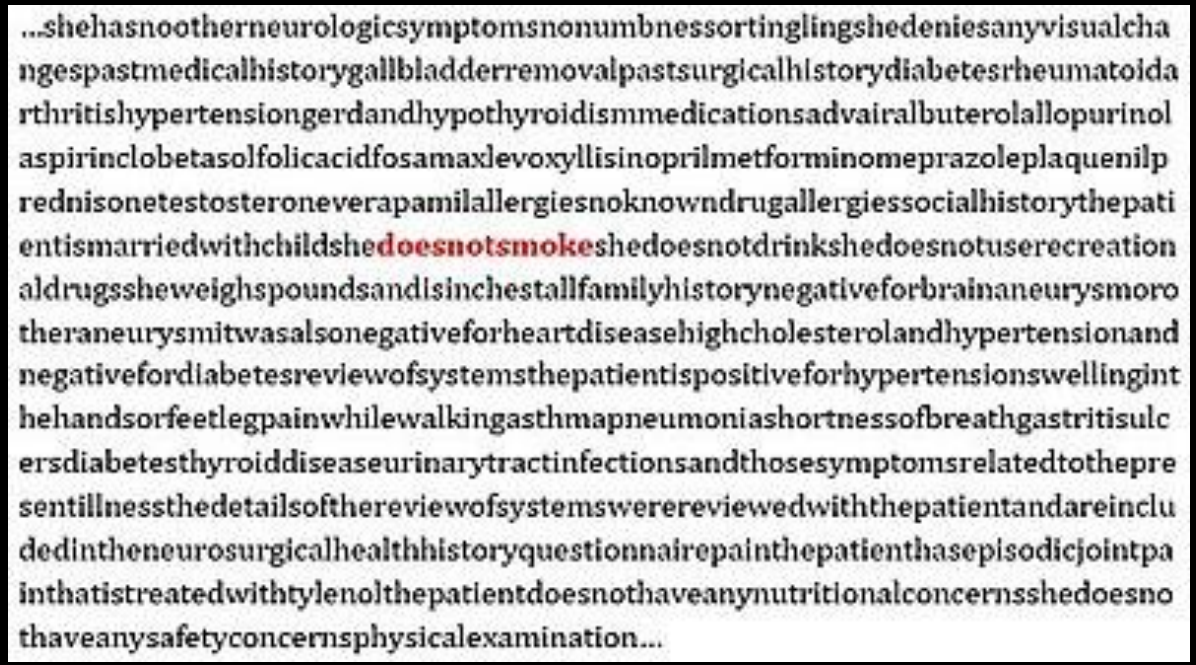


Without knowledge of where the ball has been, you wouldn’t have enough data to predict where it’s going.

If you record many snapshots of the ball’s position in succession, you will have enough information to make a better prediction



Audio is a natural sequence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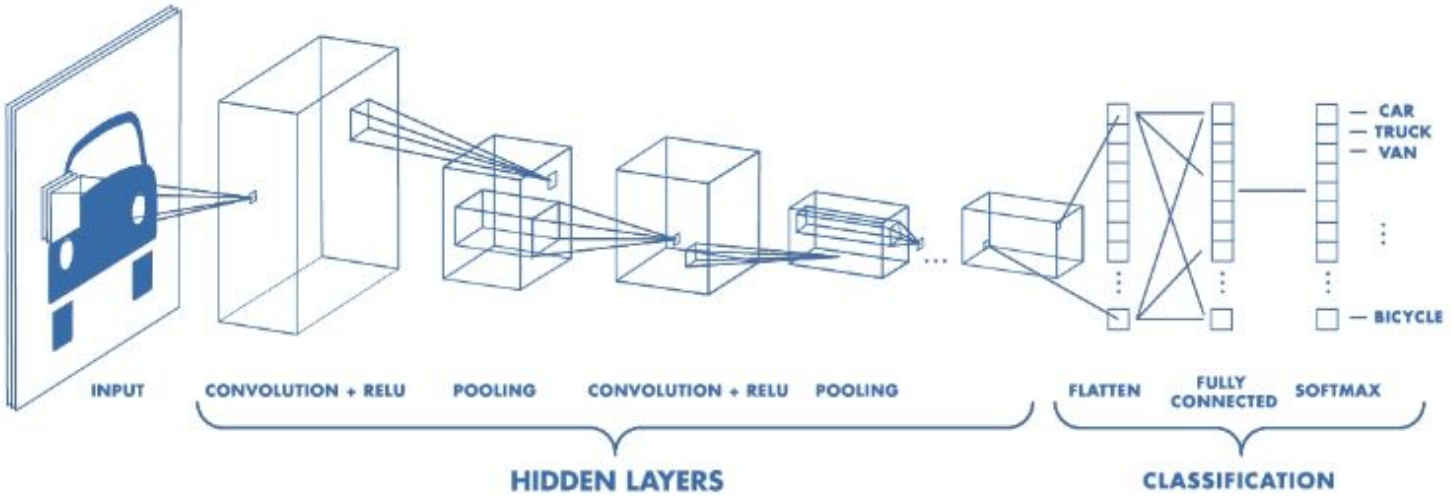
So is text.

So what is the difference between CNNs and RNNs?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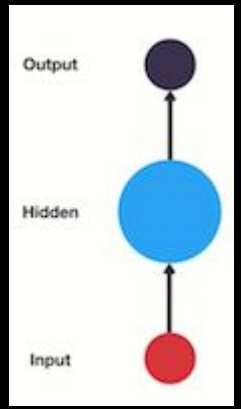
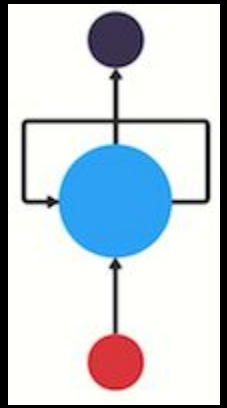
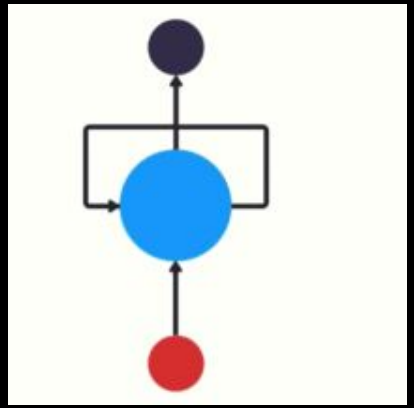
CLASSIFICATION







Neural Network like CNN

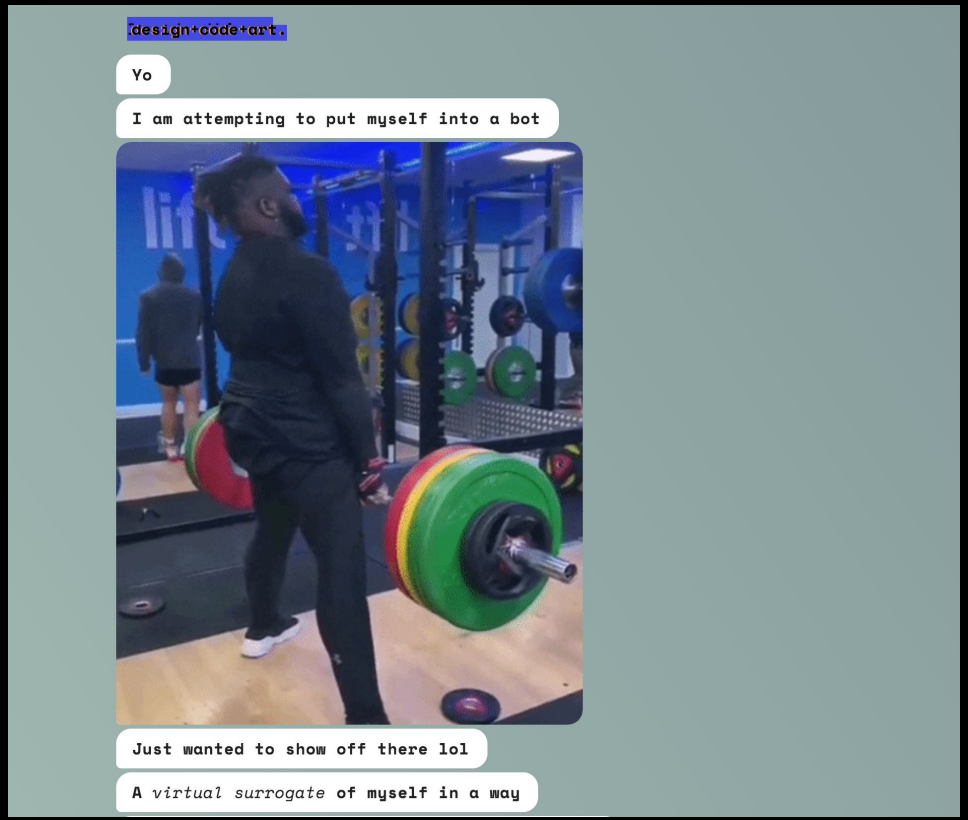
Neural Network like RNNs

https://towardsdatascience.com/illustrated-guide-to-recurrent-neural-networks-79e5eb8049c9

Sequential memory

Say the alphabet in your head.
Now say it backwards.
Now start from F.

You learn the alphabet as a sequence. Sequential memory is a mechanism that makes it easier for your brain to recognize sequence patterns.



https://www.lexmakesthings.fun/

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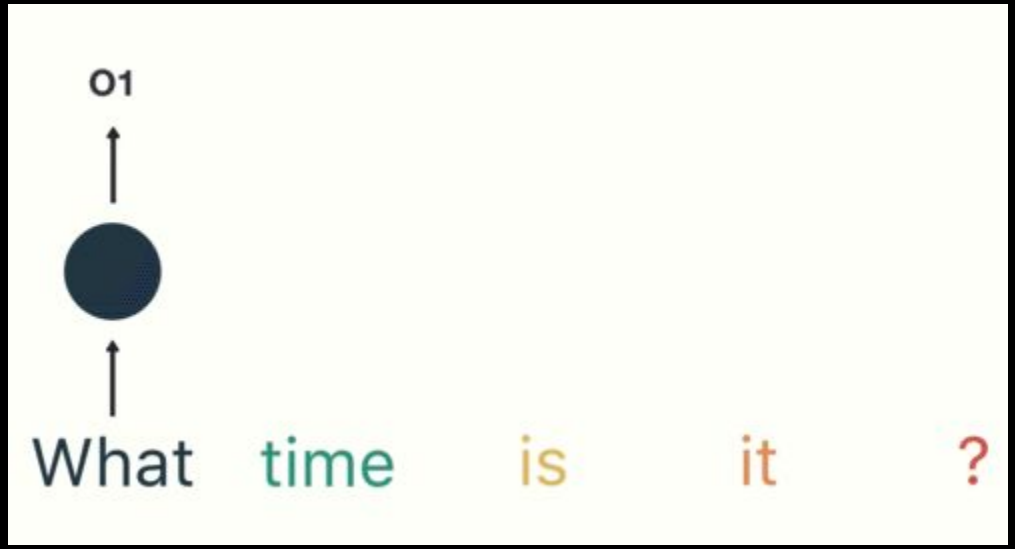

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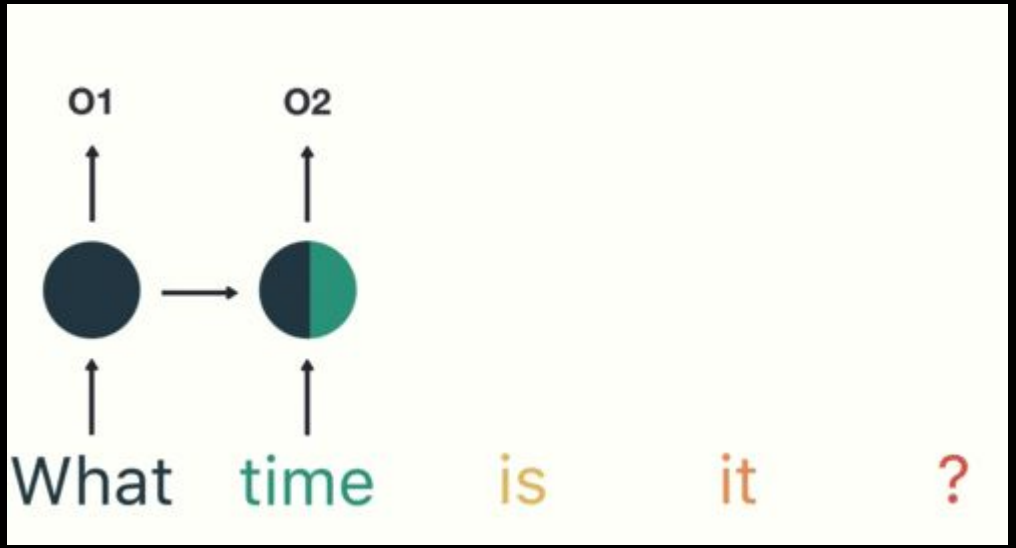

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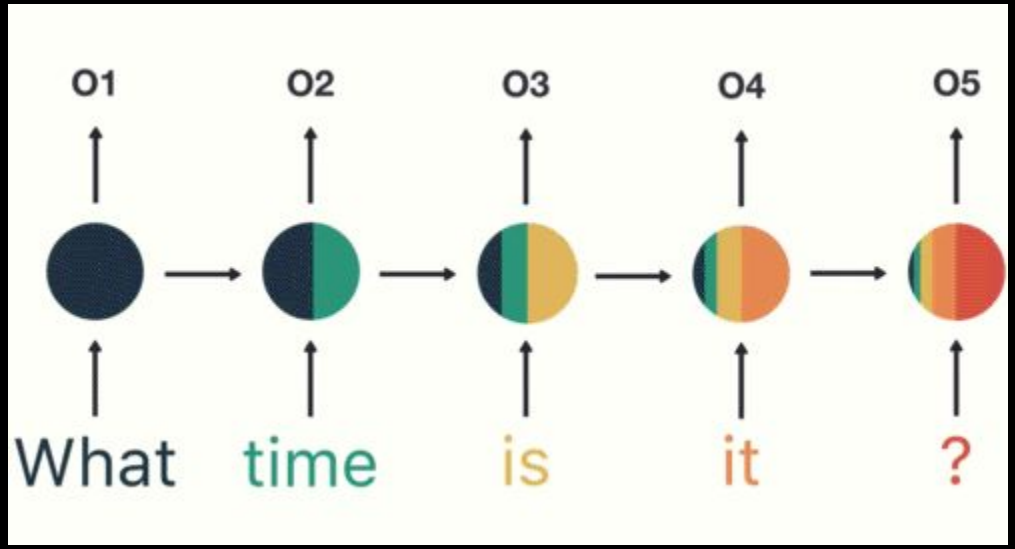

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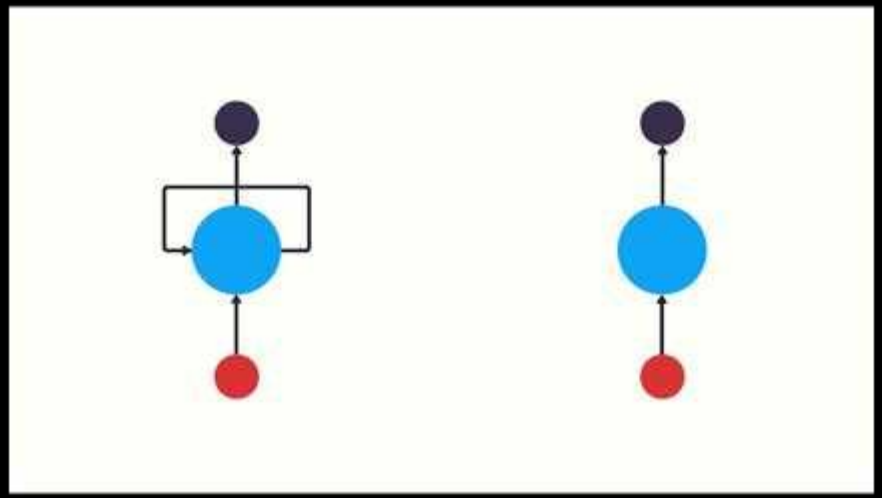

Illustrated Guide to Recurrent Neural Networks

Michael Nguyen

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But computers/machines are stupid!

They suffer from memory loss.

As the RNN processes more steps, it has troubles retaining information from previous steps.

Long Short-Term Memory or LSTM's

LSTMs are explicitly designed to avoid the long-term dependency problem.

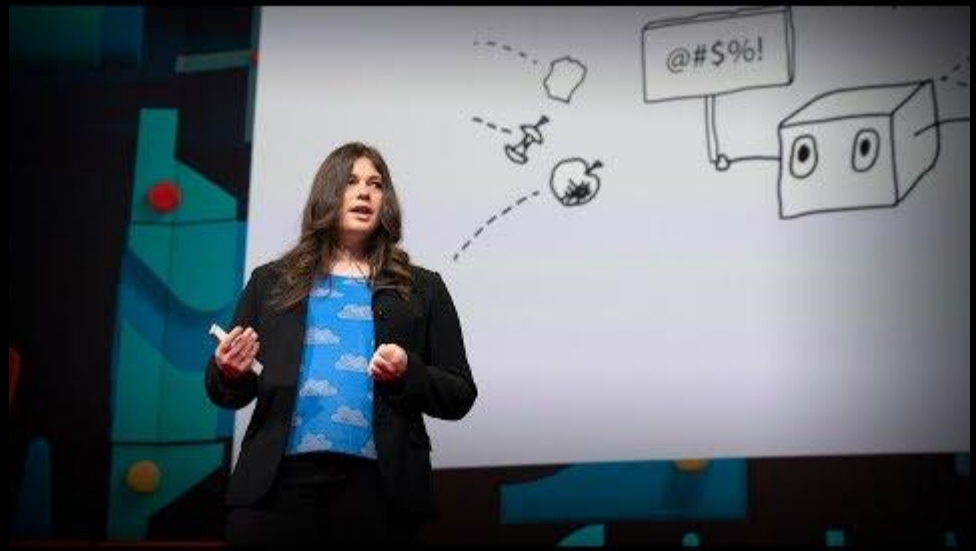
Remembering information for long periods of time is practically their default behavior, not something they struggle to learn!

This is just an intro.

I left loads of resources on RNNs in github.

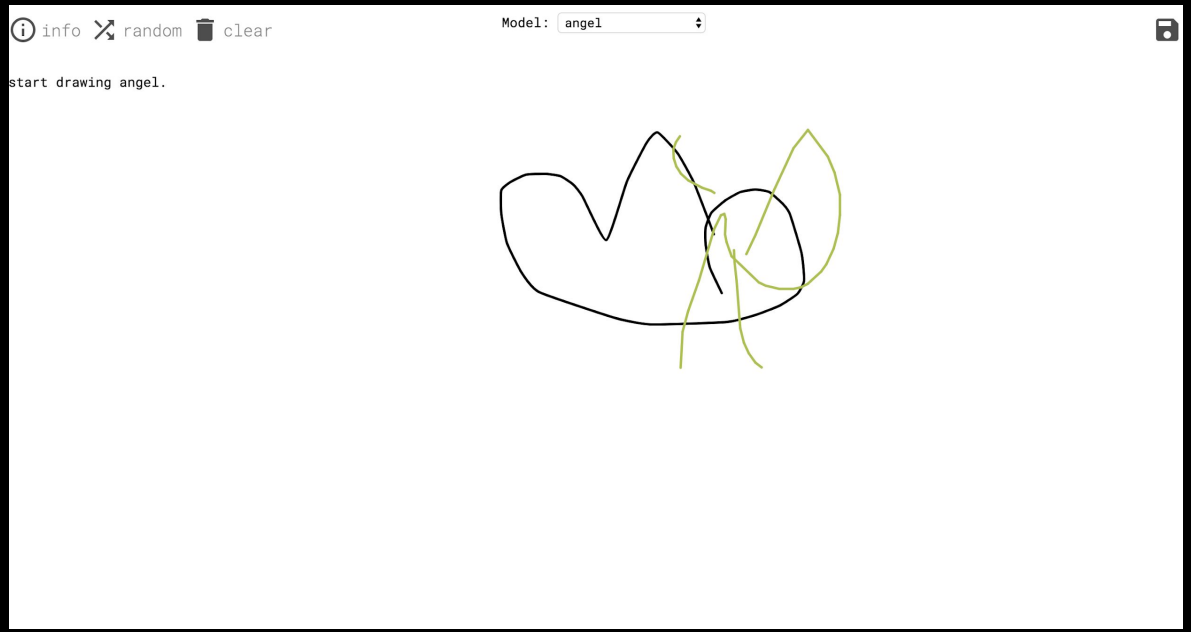
Slide here for a Break

Exercise



The danger of AI is weirder than you think

Janelle Shane



https://magenta.tensorflow.org/assets/sketch_rnn_demo/index.html

Make your own over the christmas.

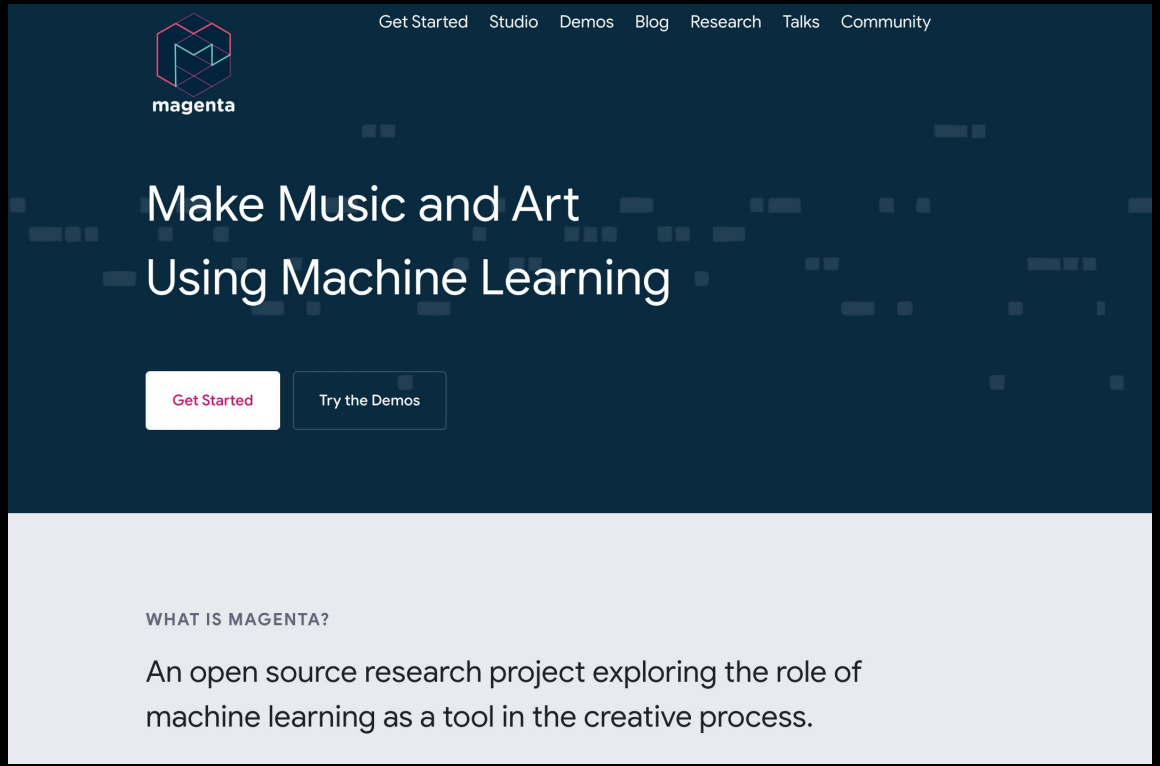
I left the code + tutorial in github.


Fork
lyrics.rip
Generate lyrics like they're from Drake or
Rihanna - all magic done by a Markov Chain
Search for an artist...
Generate
Made with the Genius API by @thesephist and @jajoosam
Like lyrics.rip? Help out on Patreon.

lyrics.rip

Markov Chains are important to learn.

I left the code + tutorial in github.



https://magenta.tensorflow.org/

Making music with magenta.js

Magenta.js is a JavaScript library that helps you generate art and music on the web. In this tutorial, we'll talk about the music generation bits in `@magenta/music` -- how to make your browser sing, and in particular, how to make your browser sing *like you*!

As a library, `@magenta/music` can help you:

1. make music in the browser by having some neat abstractions over the WebAudio API.
2. use Machine Learning models to generate music in the browser.

https://hello-magenta.glitch.me/

Our goal

To become familiar with Magenta.js and RNN models for generating music.

Steps for the exercise is in Github.

Class done.
You are free!