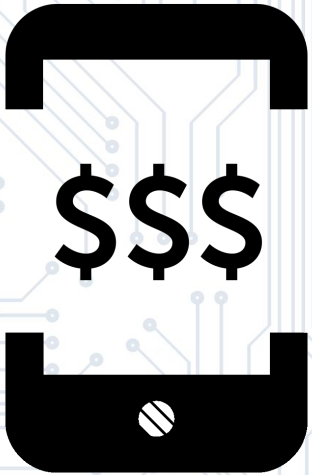


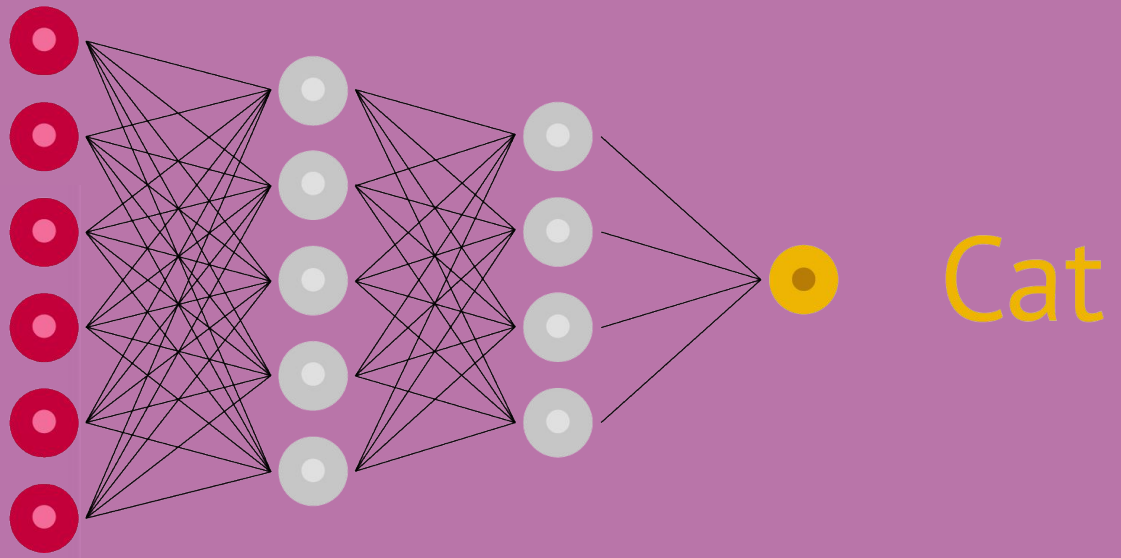
Recurrent Neural Networks

FinTech

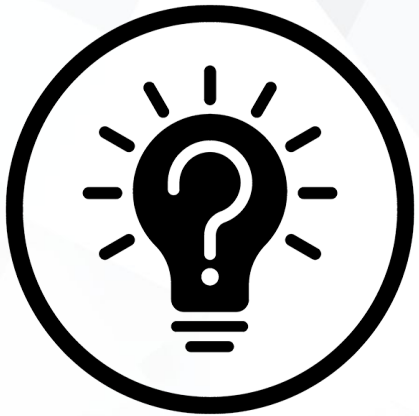
Lesson 14.3

Introducing Recurrent Neural Networks (RNNs)

RNNs are able to remember the past and their decisions are influenced by what it has learned from the past.



(Animated Cat)



What Are Recurrent Neural Networks Used For?

Introducing Recurrent Neural Networks (RNNs)

What are recurrent neural networks used for?

01 Natural Language Processing (NLP)

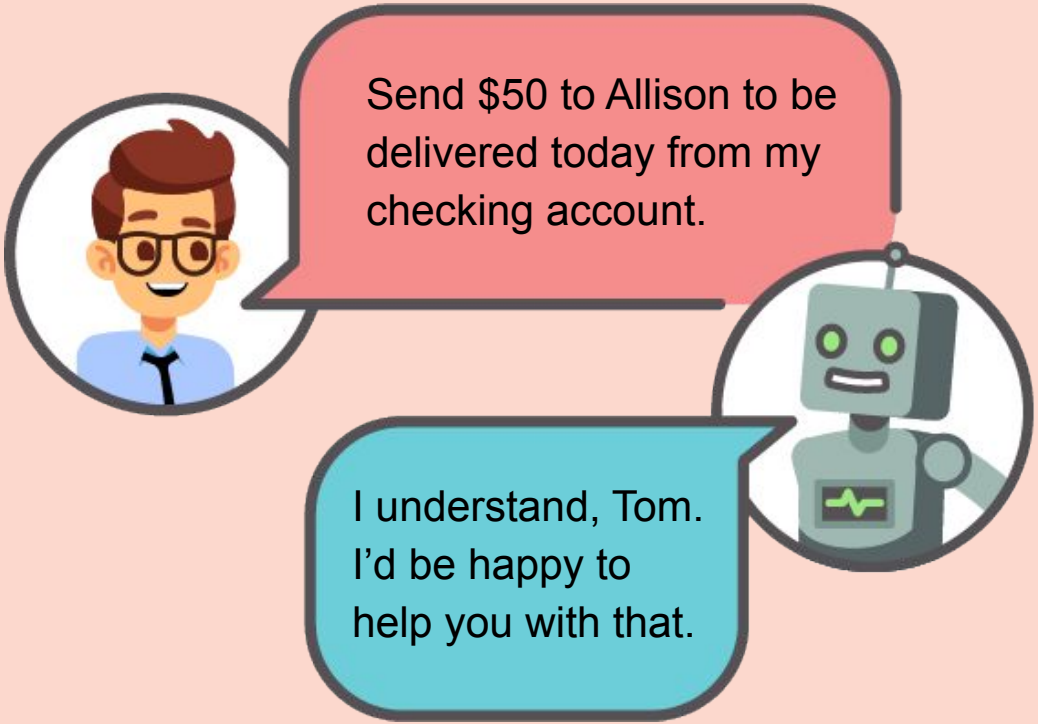
02 DNA sequences

03 Time series data

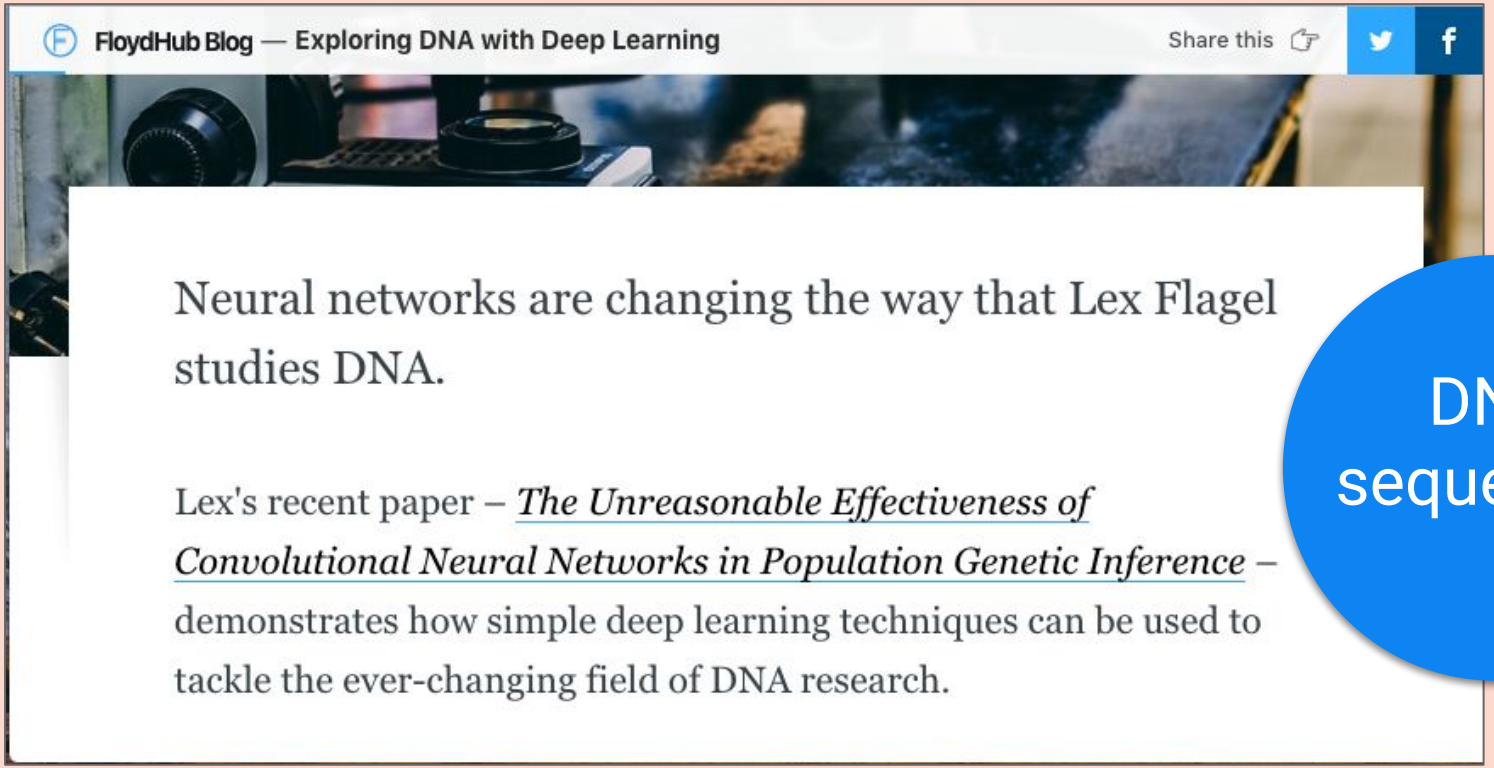
04 Music composition

What Are Recurrent Neural Networks Used For?

Natural Language Processing (NLP)



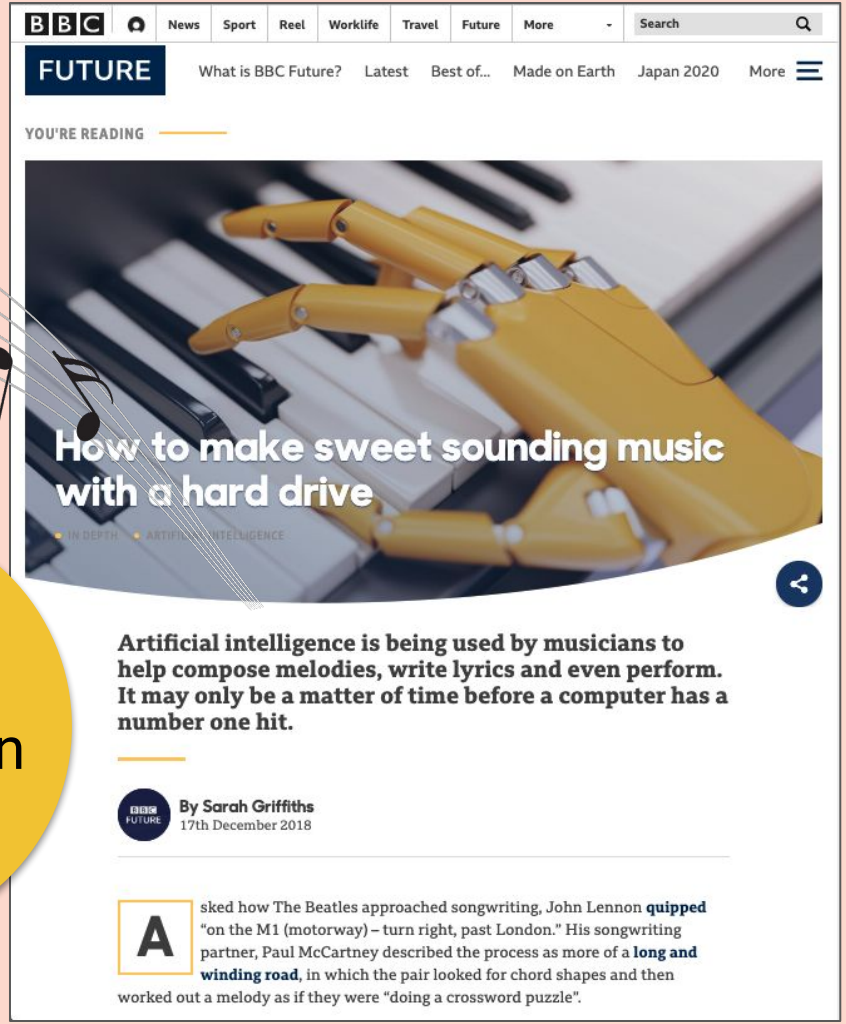
What Are Recurrent Neural Networks Used For?



DNA sequences

What Are Recurrent Neural Networks Used For?

Music Composition



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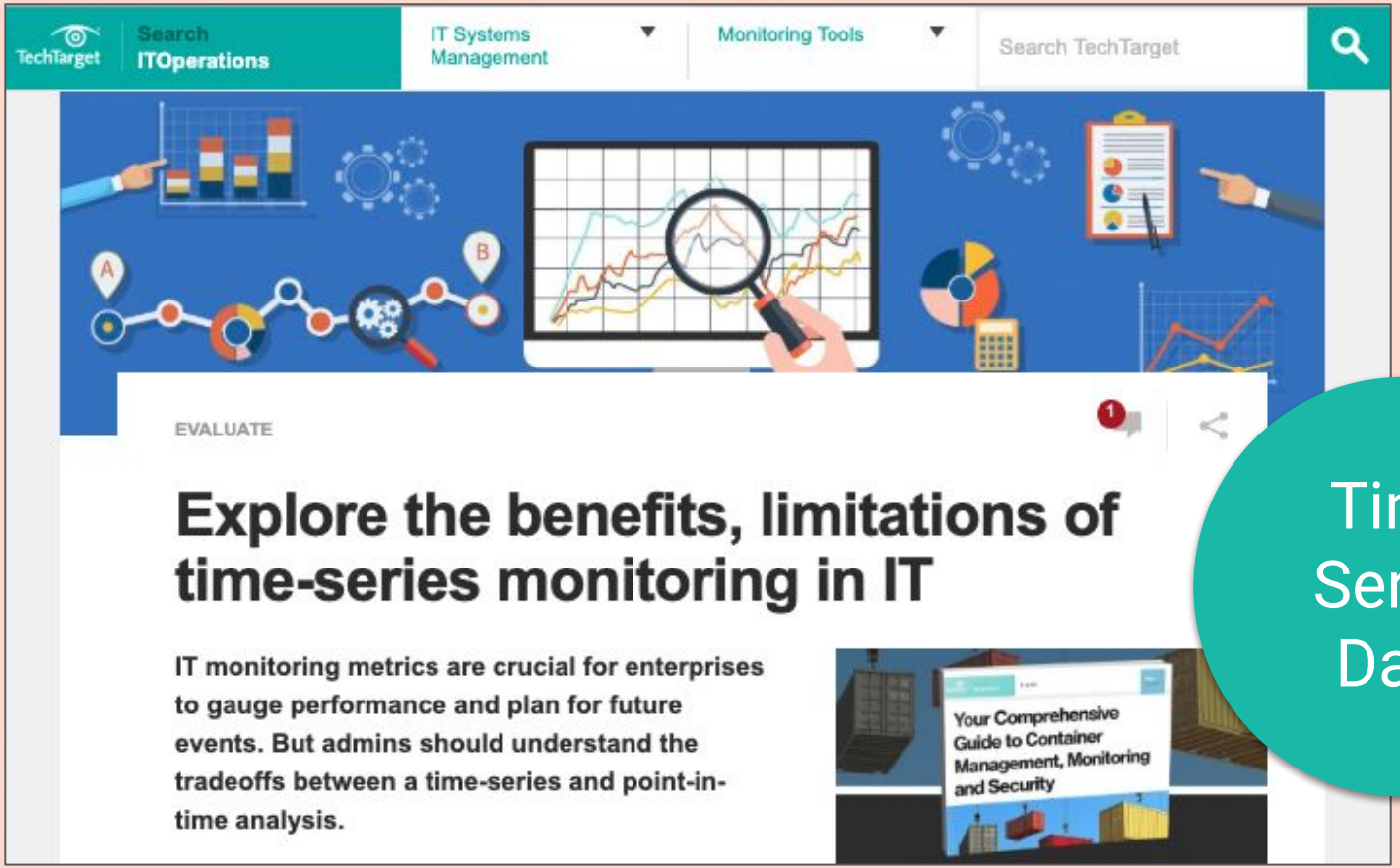
What Are Recurrent Neural Networks Used For?



Time Series Data

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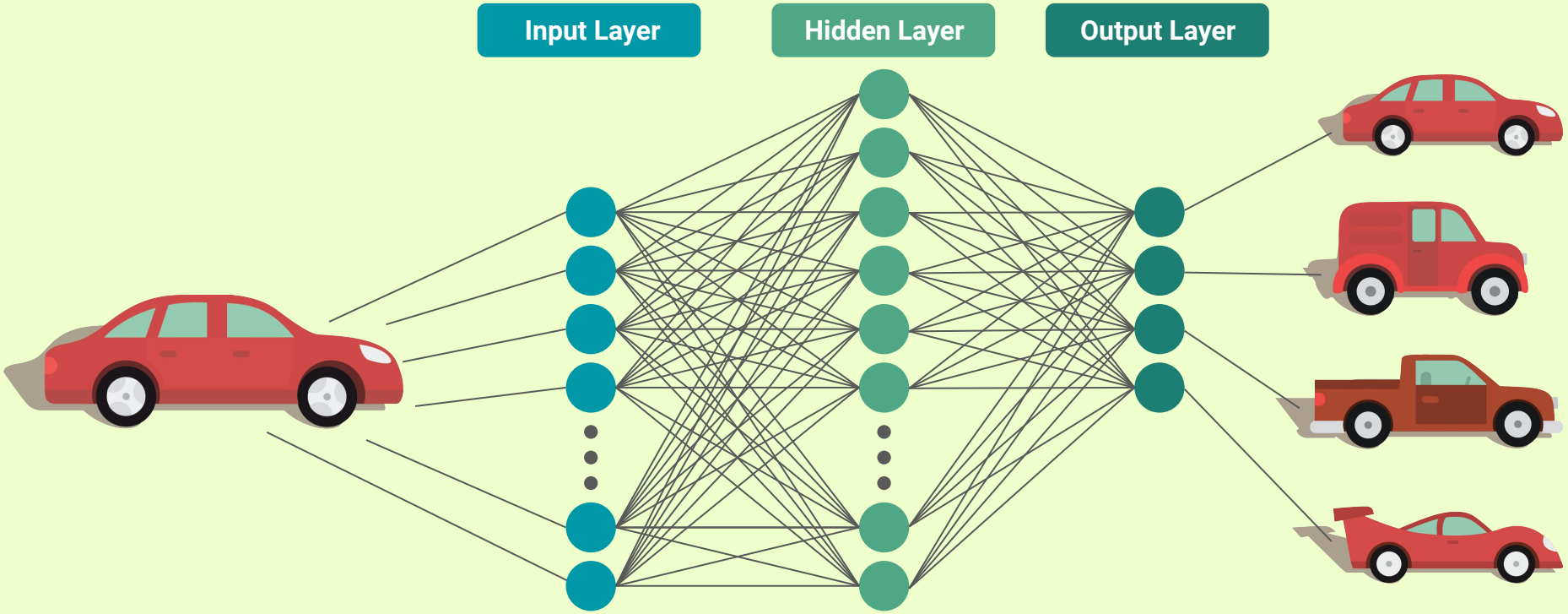
ANNs Vs. RNNs

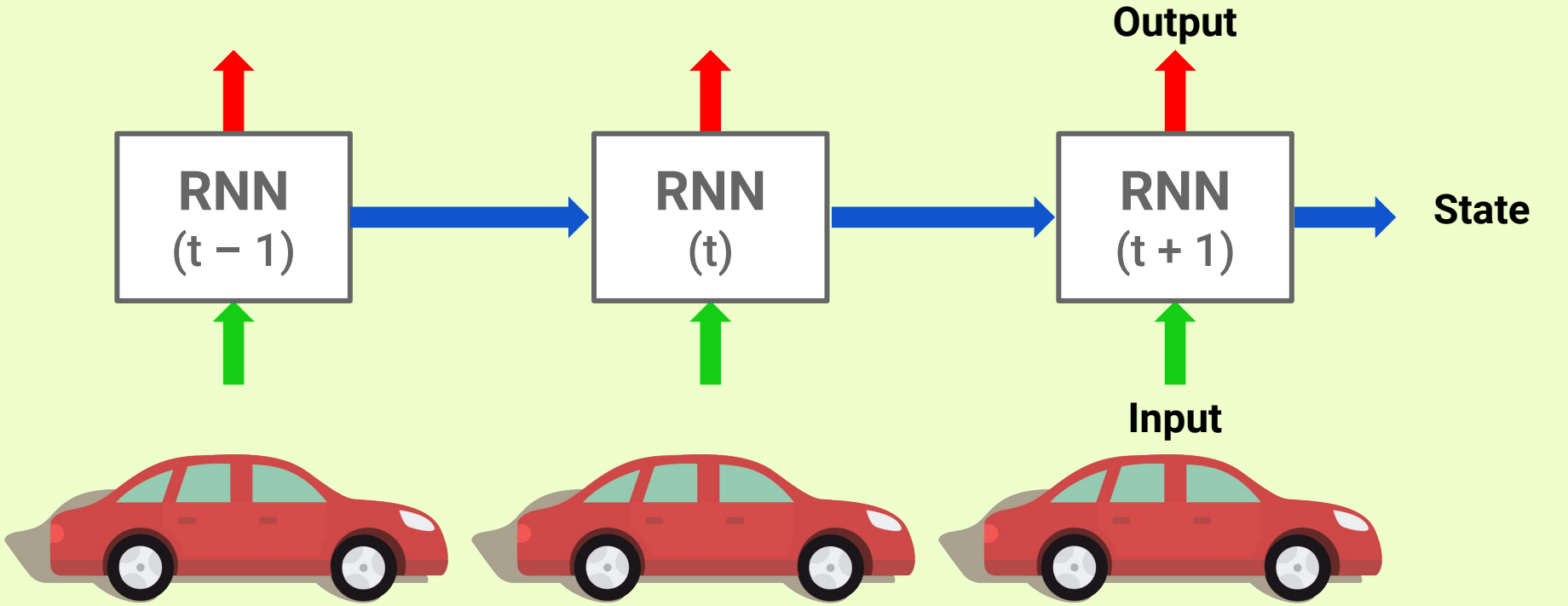
ANNs Vs. RNNs

We can use ANNs to identify the type of car from a still image.
However, can we predict the direction of a car in movement?



ANNs Vs. RNNs

RNNs are good at modeling sequence data thanks to their *sequential memory*. Using RNNs we can predict that the car is moving to the right.



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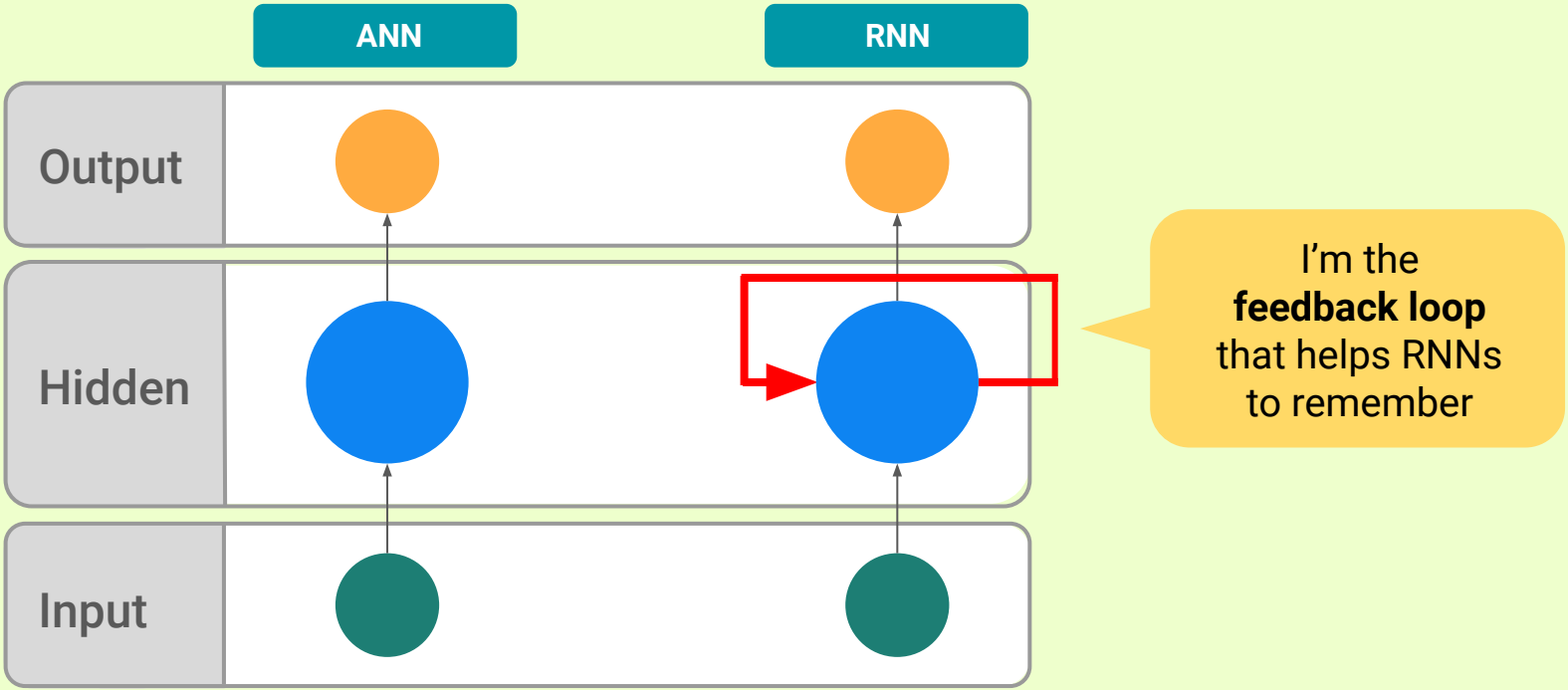
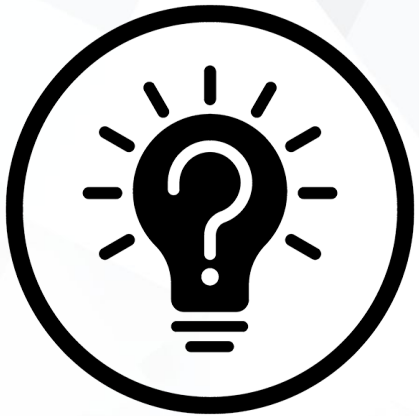
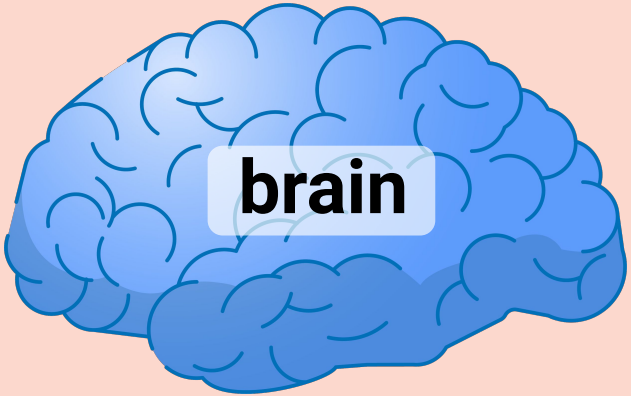




How Do RNNs Work?

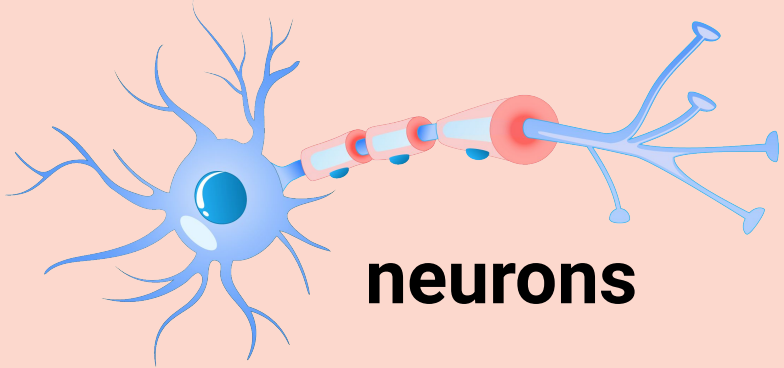
How RNNs Work

When you read this sentence, your



is able to decode it and understand . . .

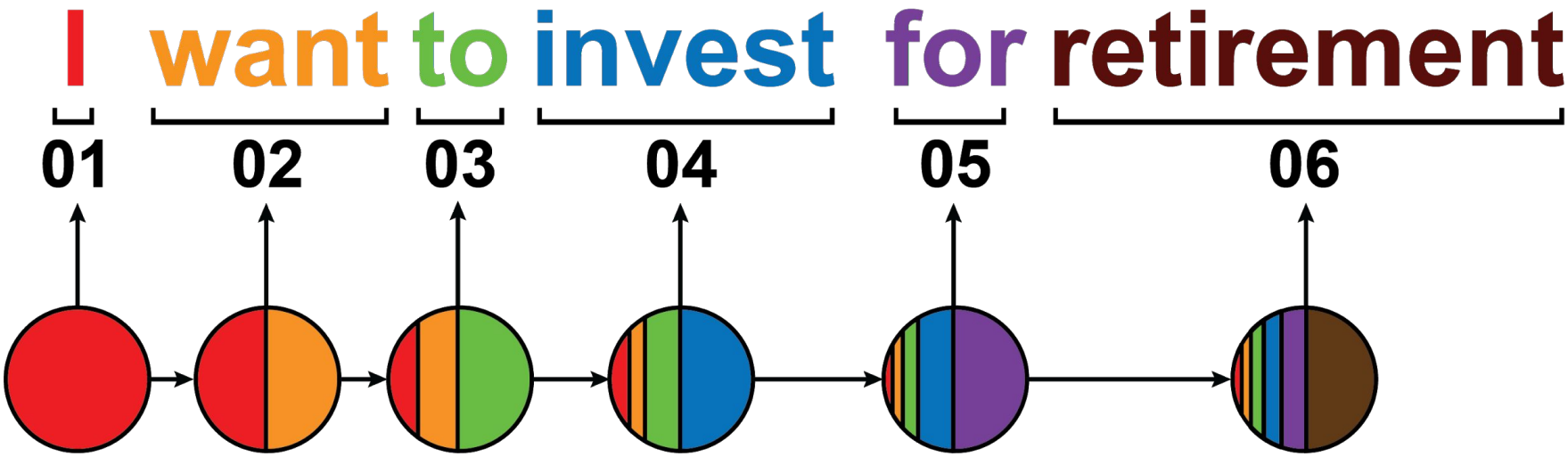
. . . because our



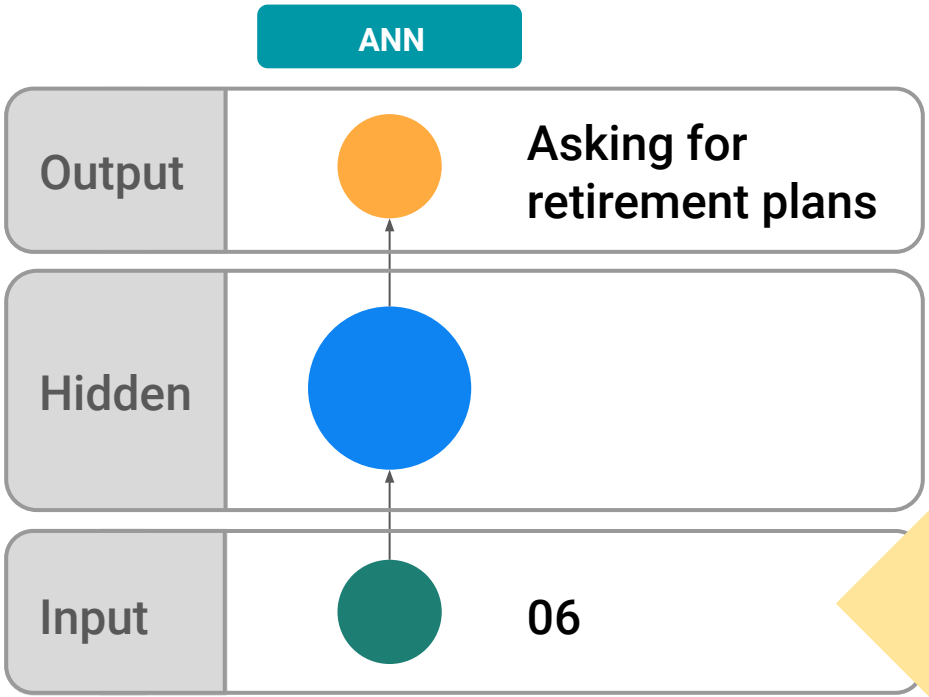
have memory like RNNs.

How RNNs Work

The sentence is split into individual words. RNNs work sequentially so we feed it one word at a time. By the final step the RNN has encoded information from all the words in previous steps.



How RNNs Work

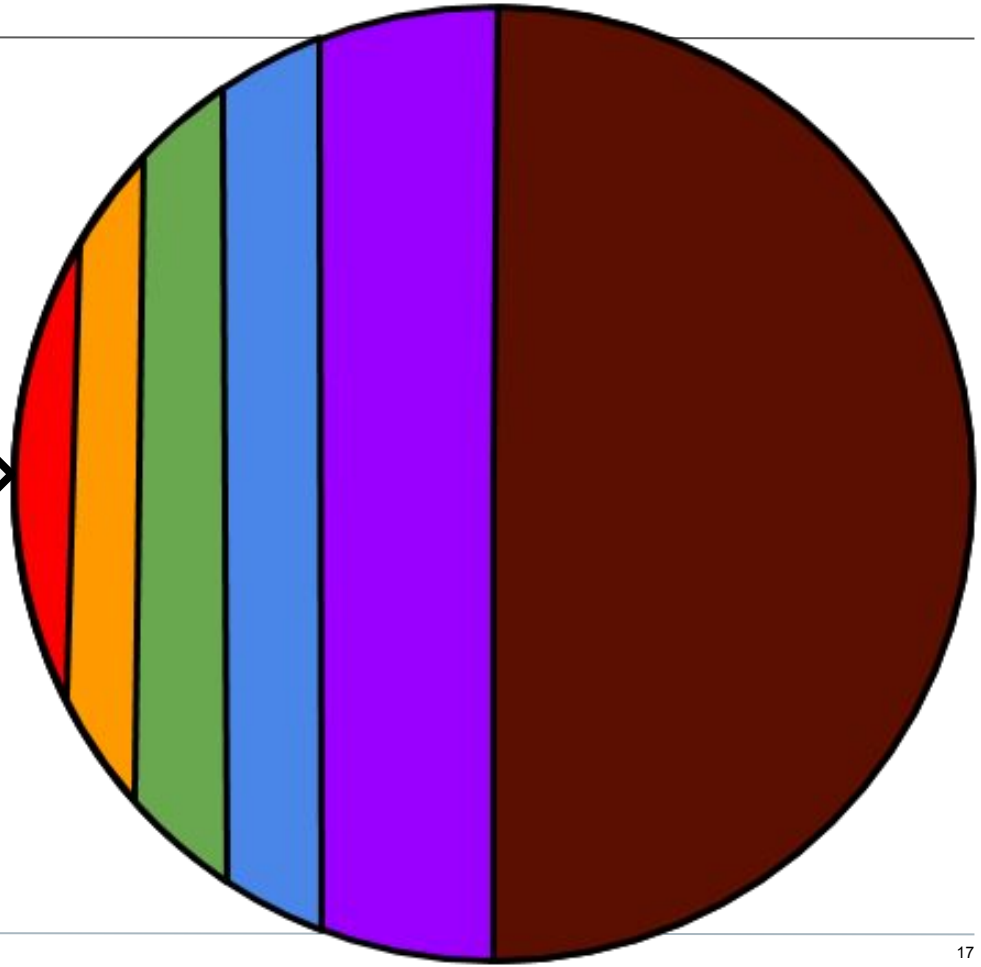


The final output (06) was created from the rest of the sequence, to predict what the phrase means, we take the final output and pass it to the feed-forward layer of the RNN to classify the intent.

RNNs are Forgetful

RNNs only “remember”
the most recent few steps.

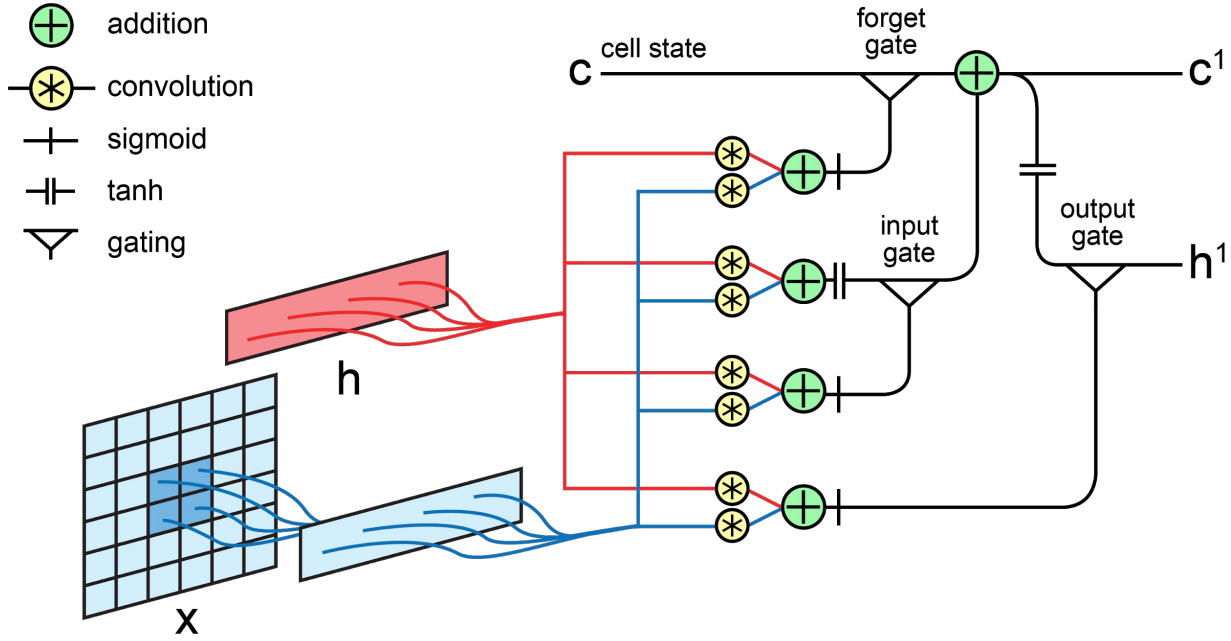
The vanishing gradient in the hidden states illustrates an issue with RNN’s known as **short-term memory**.



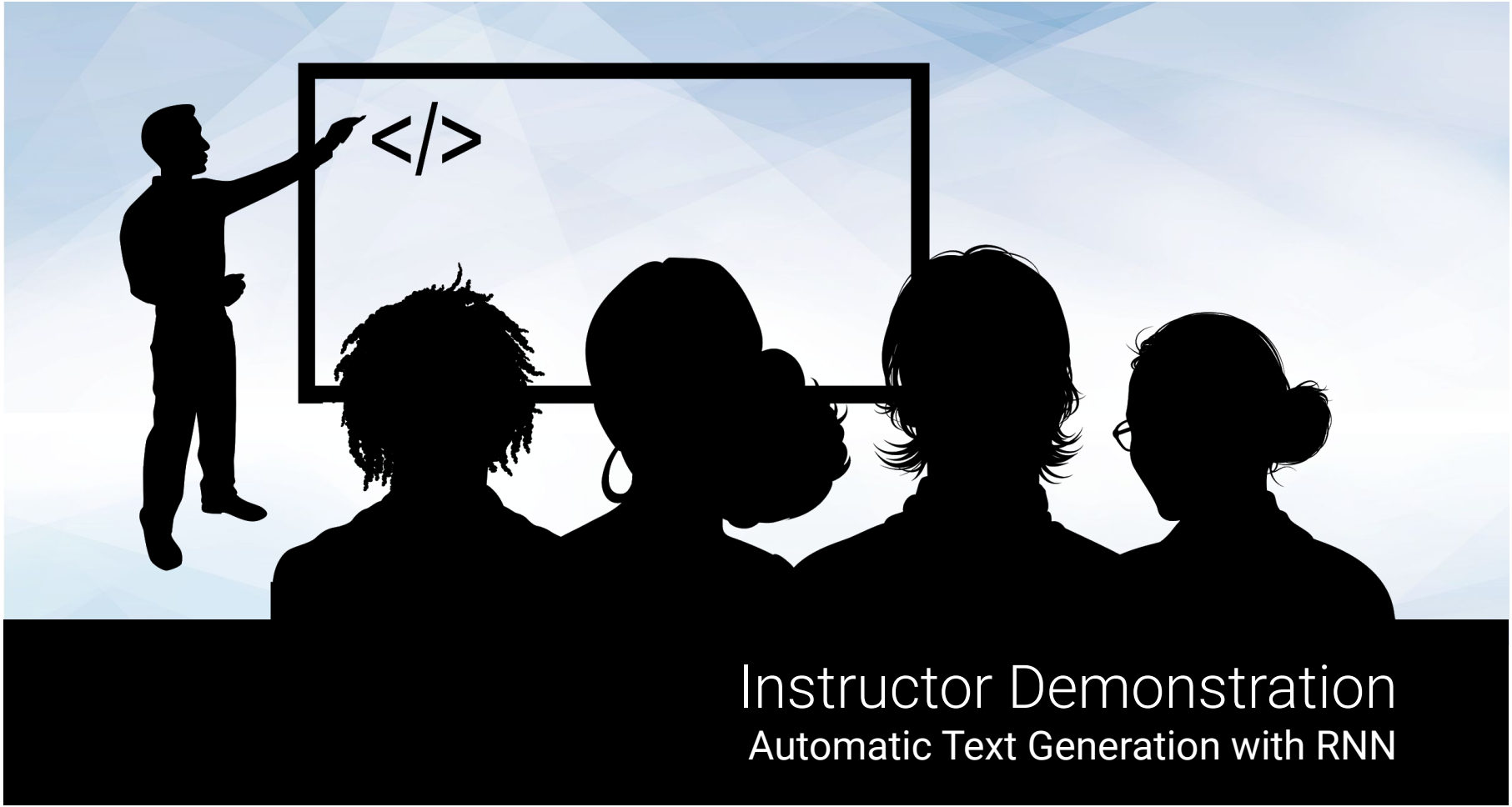
Long Short Term Memory (LSTM)

LSTMs to the Rescue

LSTM (Long Short Term Memory) RNNs are one solution for longer time windows. An LSTM RNN works like an original RNN, but it decides selectively which types of longer-term events are worth remembering, and which are OK to forget.



(Source)

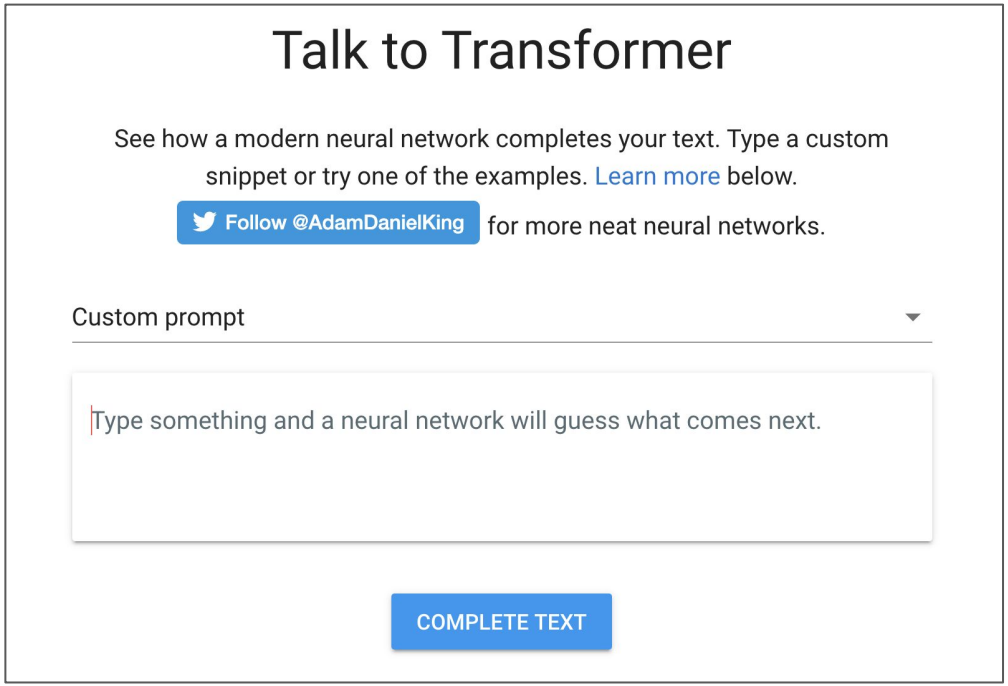


Instructor Demonstration

Automatic Text Generation with RNN

Automatic Text Generation with RNN

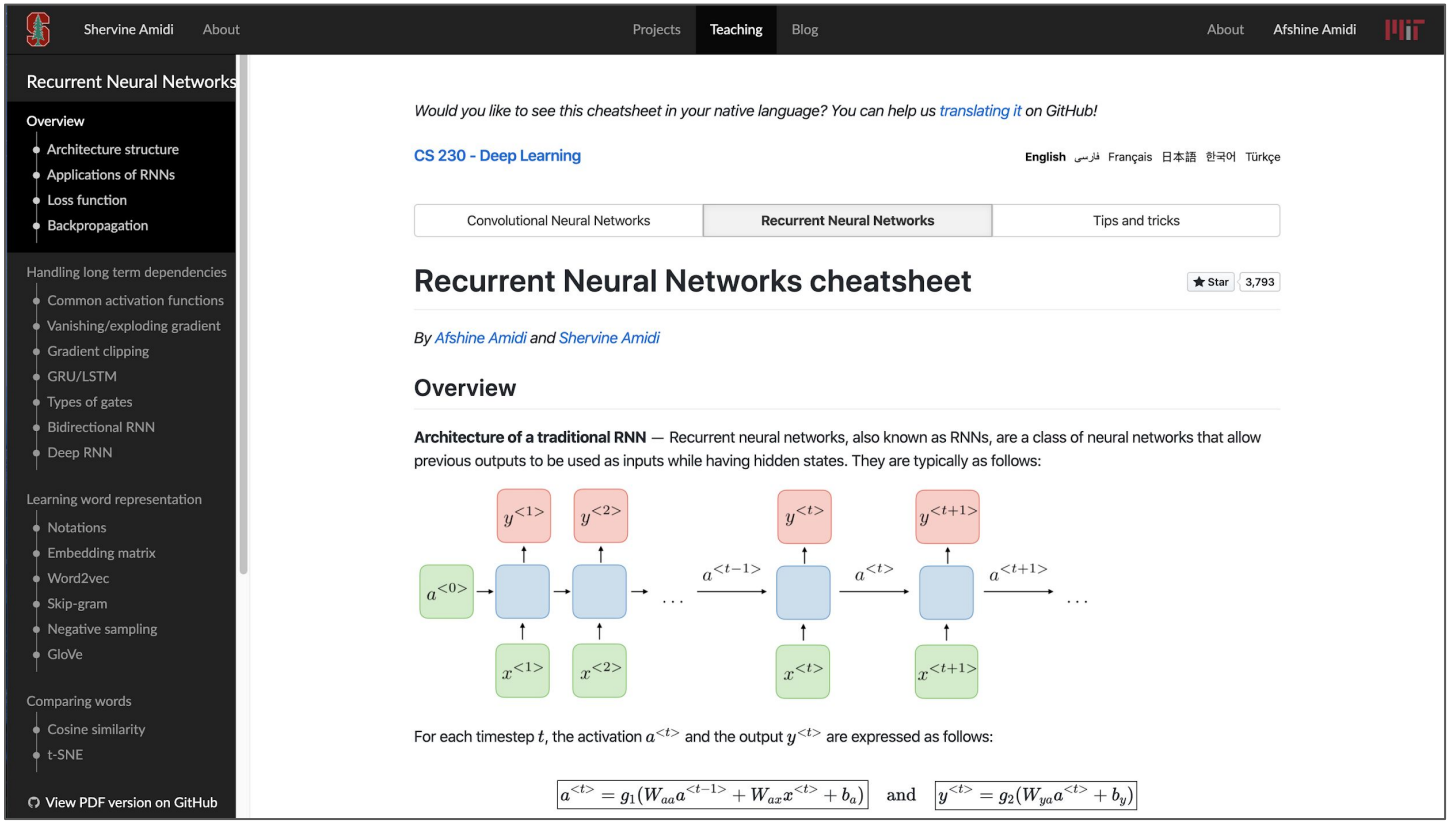
In this demo, we will explore how an RNN can be used to automatically generate text.



(Talk to Transformer)

Want to learn more about RNNs?

Take a Look at This Recurrent Neural Networks Cheat Sheet



(Source)

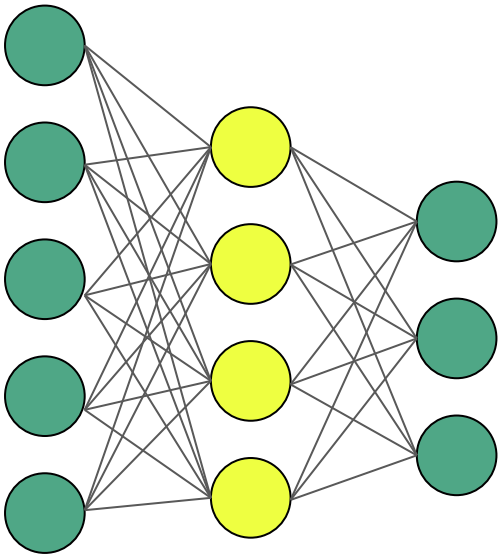
Introduction to Dropout

Introduction to Dropout

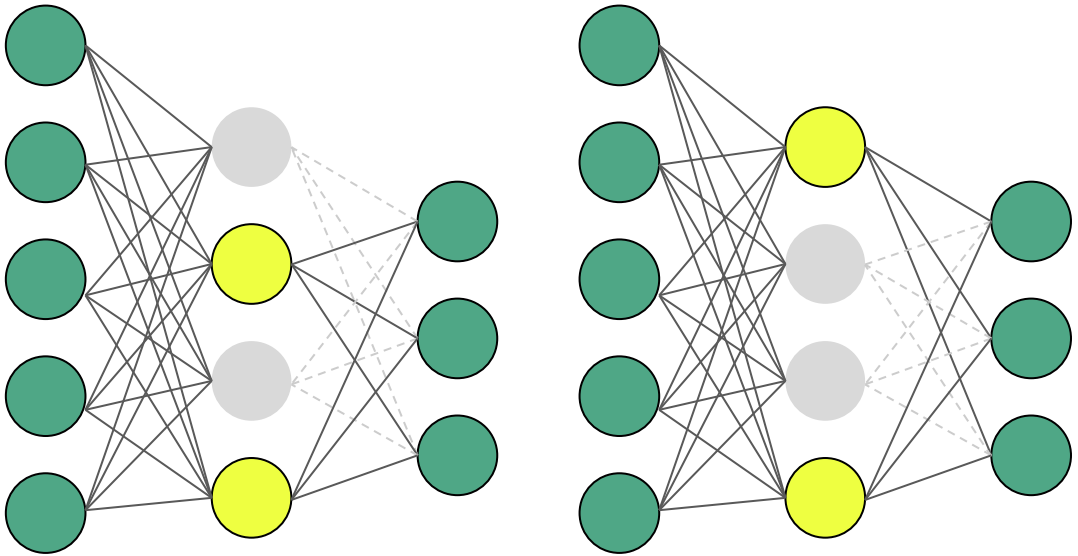
Dropout consists of removing units from the hidden layers, by randomly select a fraction of the hidden nodes and set their output to zero, regardless of the input.

A different subset of units is randomly selected every time we feed a training example.

Dropout



DropConnect



Questions?


The End