Long Short Term Memory(LSTM)

Introduction

Long Short-Term Memory (LSTM) networks are a type of recurrent neural network capable of learning order dependence in sequence prediction problems.

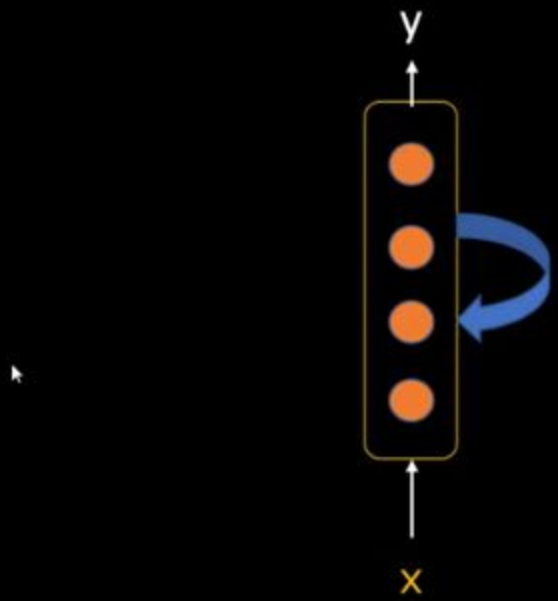
This is a behavior required in complex problem domains like machine translation, speech recognition, and more.

Long Short Term Memory Network is an advanced RNN, a sequential network, that allows information to persist. It is capable of handling the vanishing gradient problem faced by RNN.

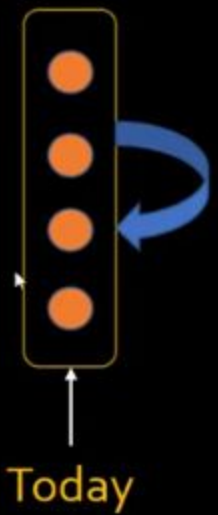
Today, due to my current job situation and family conditions, I need to take a loan.

Last year, due to my current job situation and family conditions, I had to take a loan.

Generic Representation of RNN

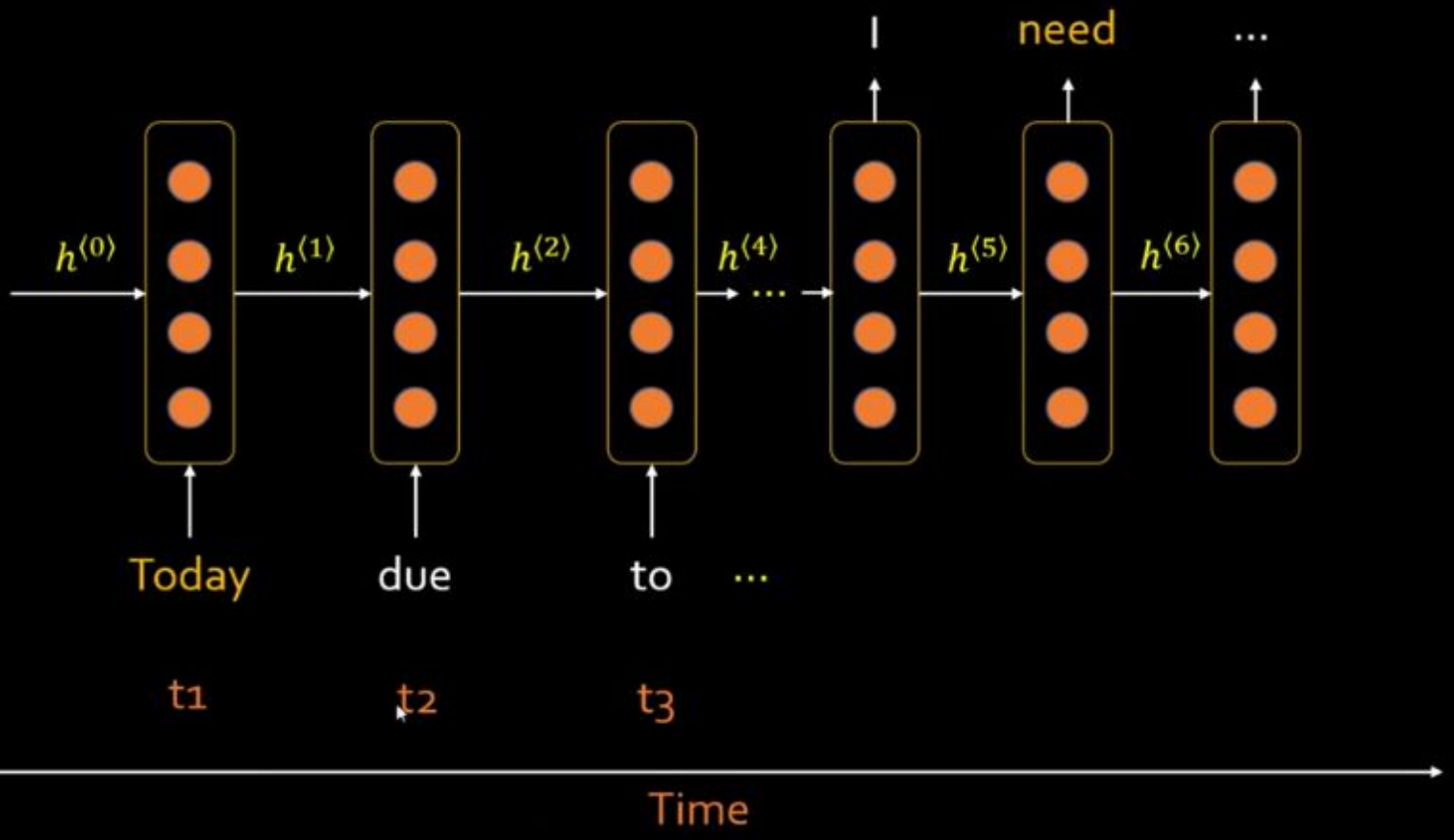


Today, due to my current job situation and family conditions, I need to take a loan.

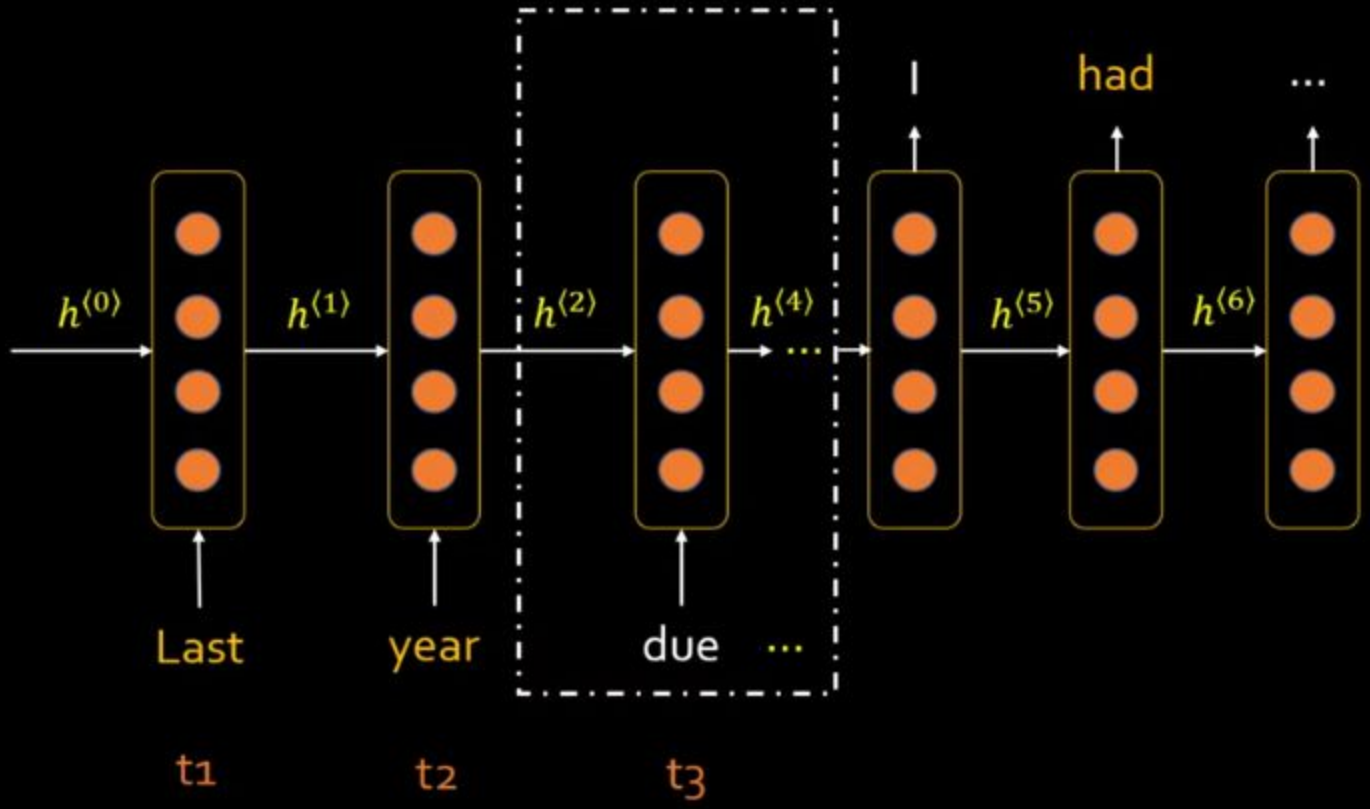


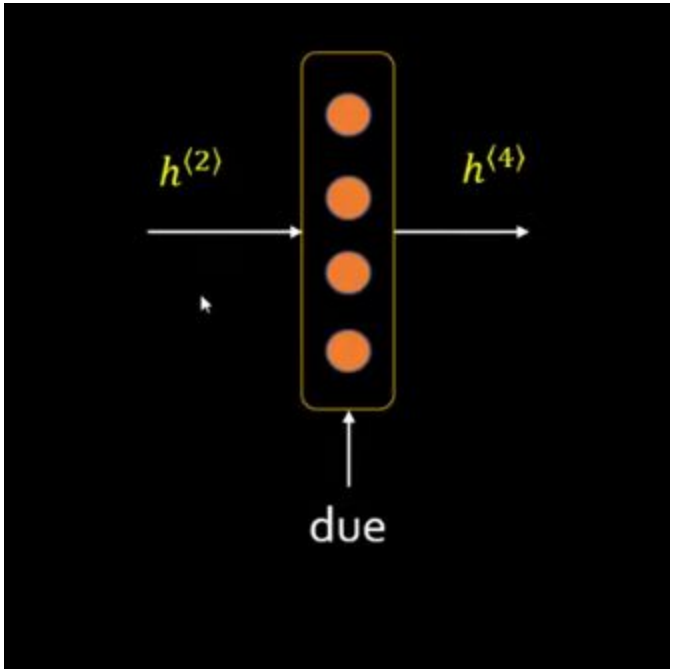
Today, due to my current job situation and family conditions, I need to take a loan.

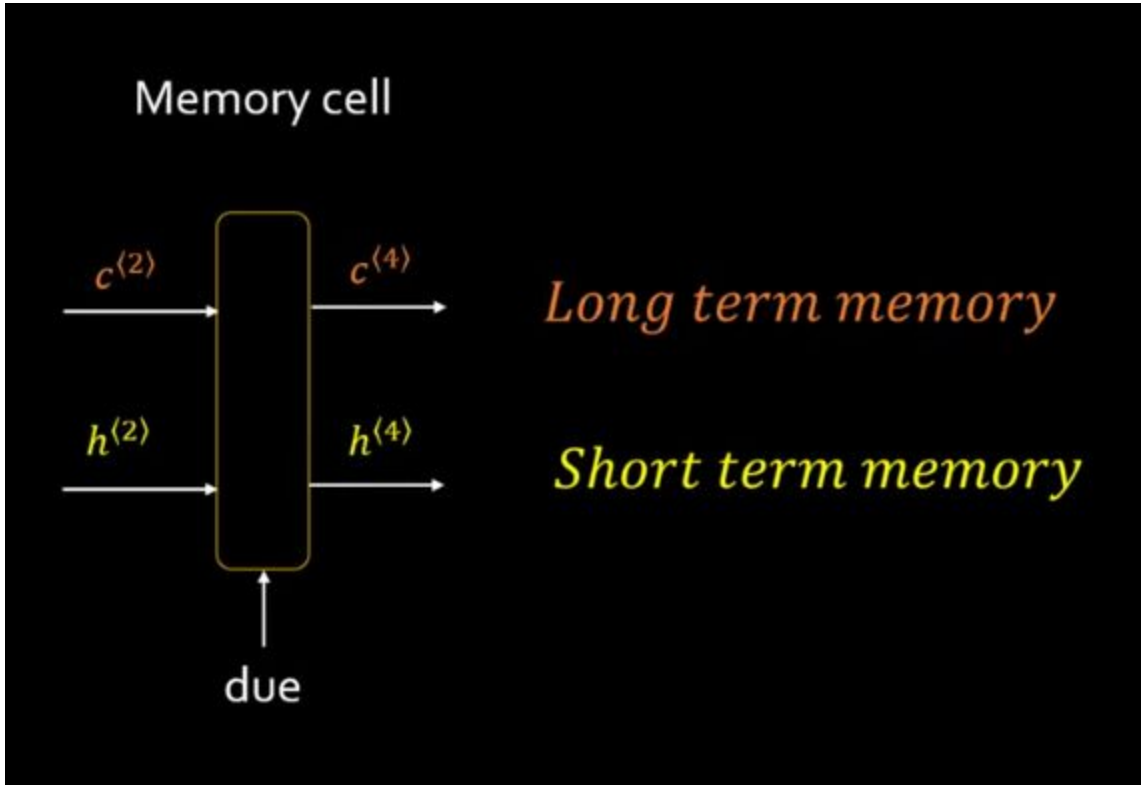
Today, due to my current job situation and family conditions, I need to take a loan.



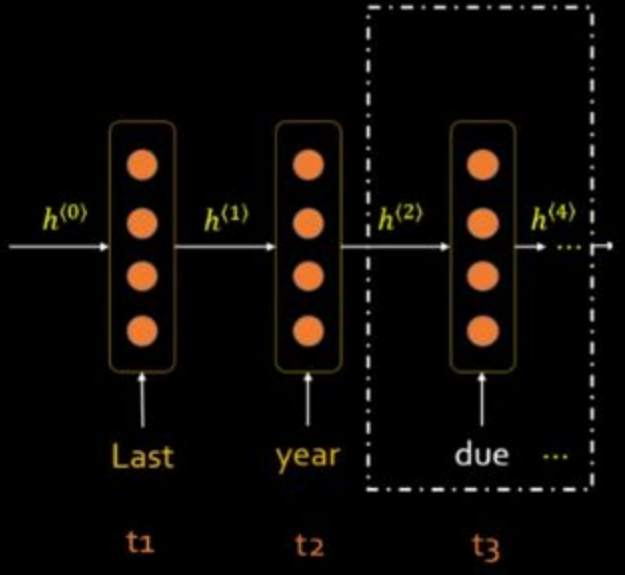
Last year, due to my current job situation and family conditions, I had to take a loan.

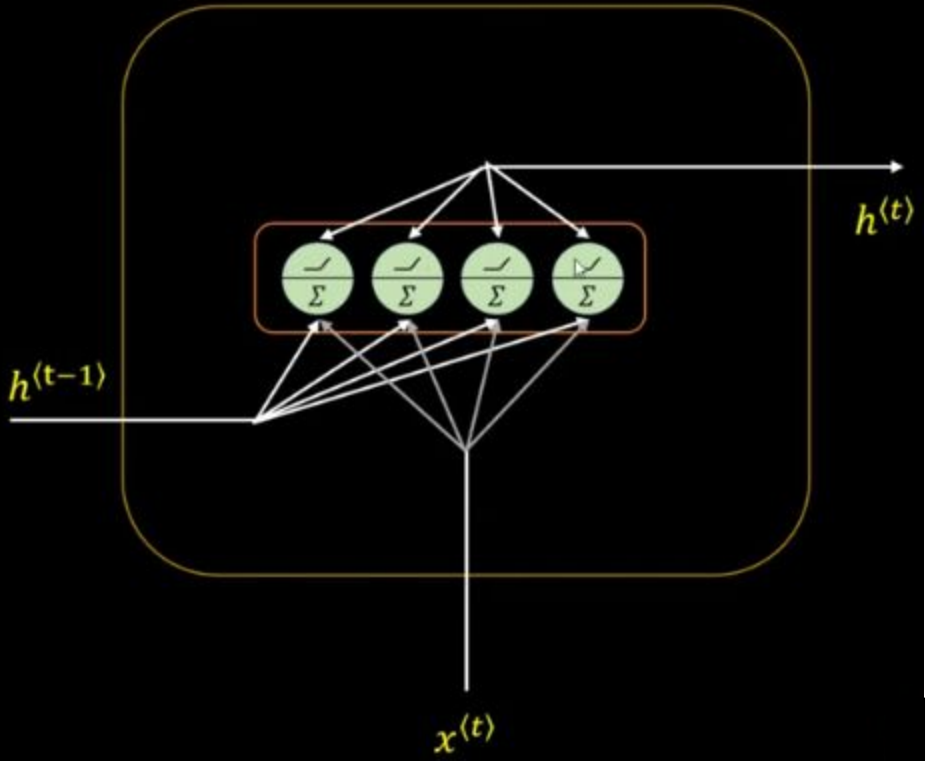



$h^{\langle 2 \rangle}$
$h^{\langle 4 \rangle}$
due

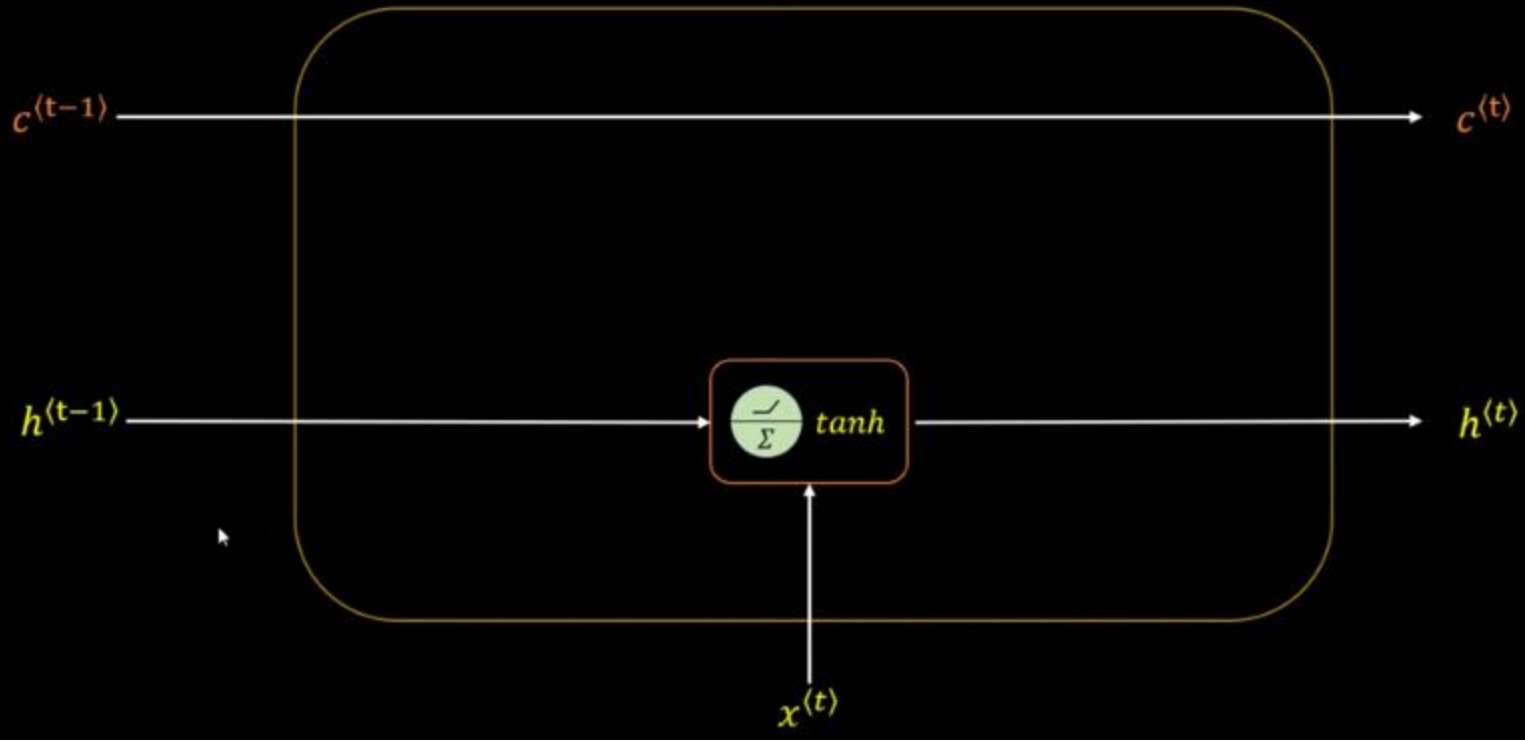

Memory cell
$c^{\langle 2 \rangle}$
$c^{\langle 4 \rangle}$
Long term memory
$h^{\langle 2 \rangle}$
$h^{\langle 4 \rangle}$
Short term memory
due

Short term memory cell in traditional RNN





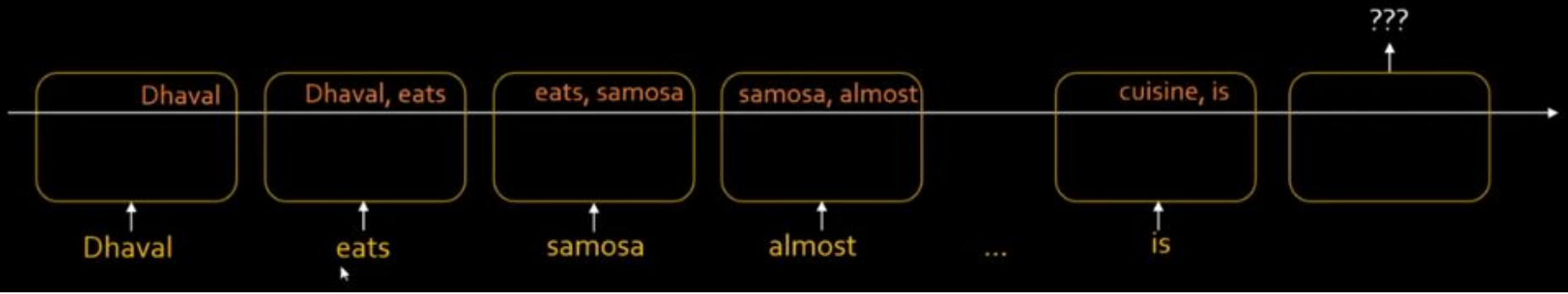
Short term memory and long term memory



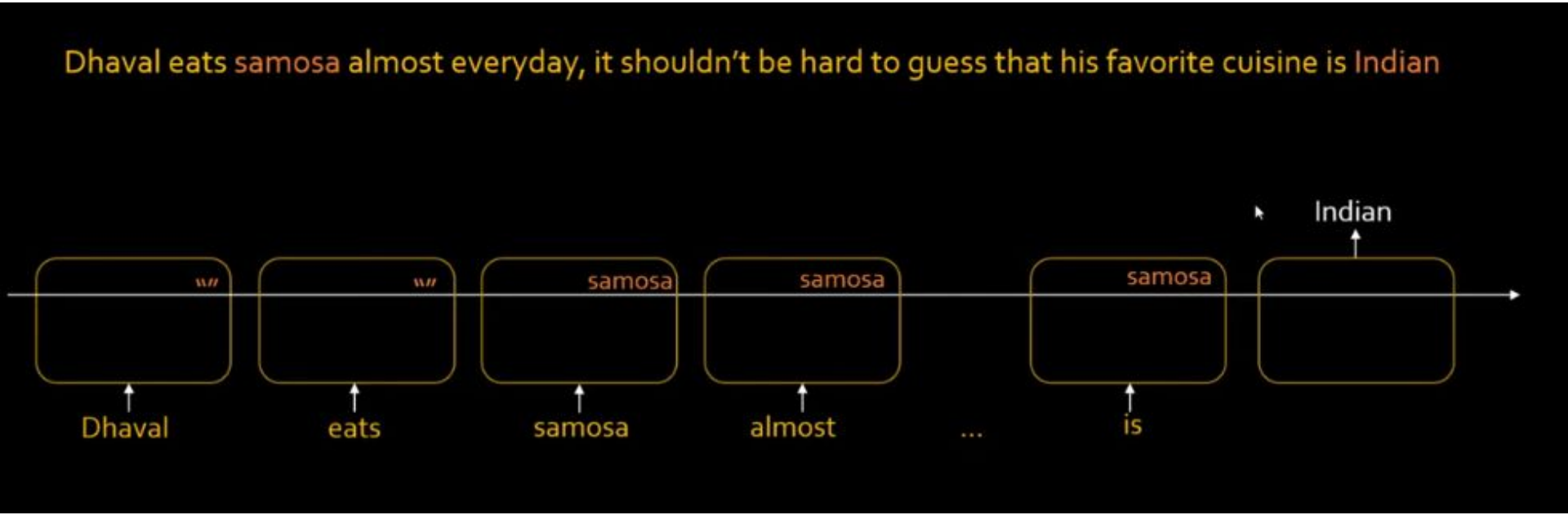
Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian

Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian

Traditional RNN

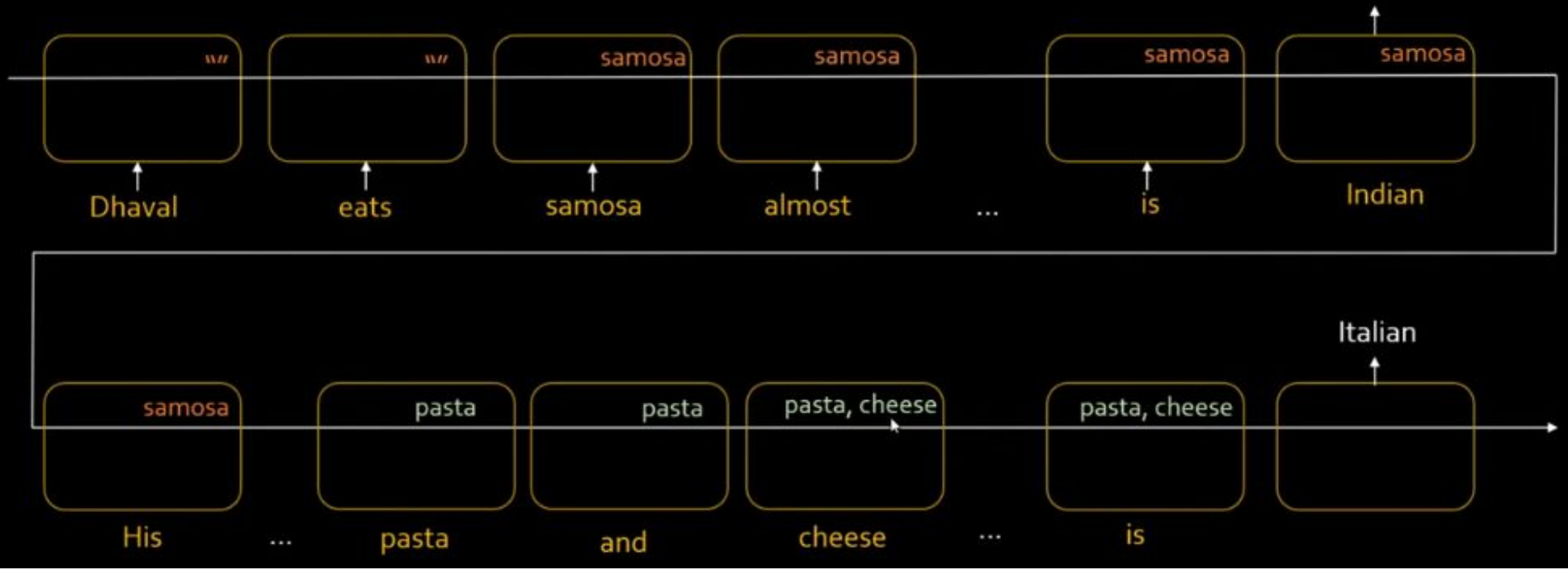


Long Term Memory

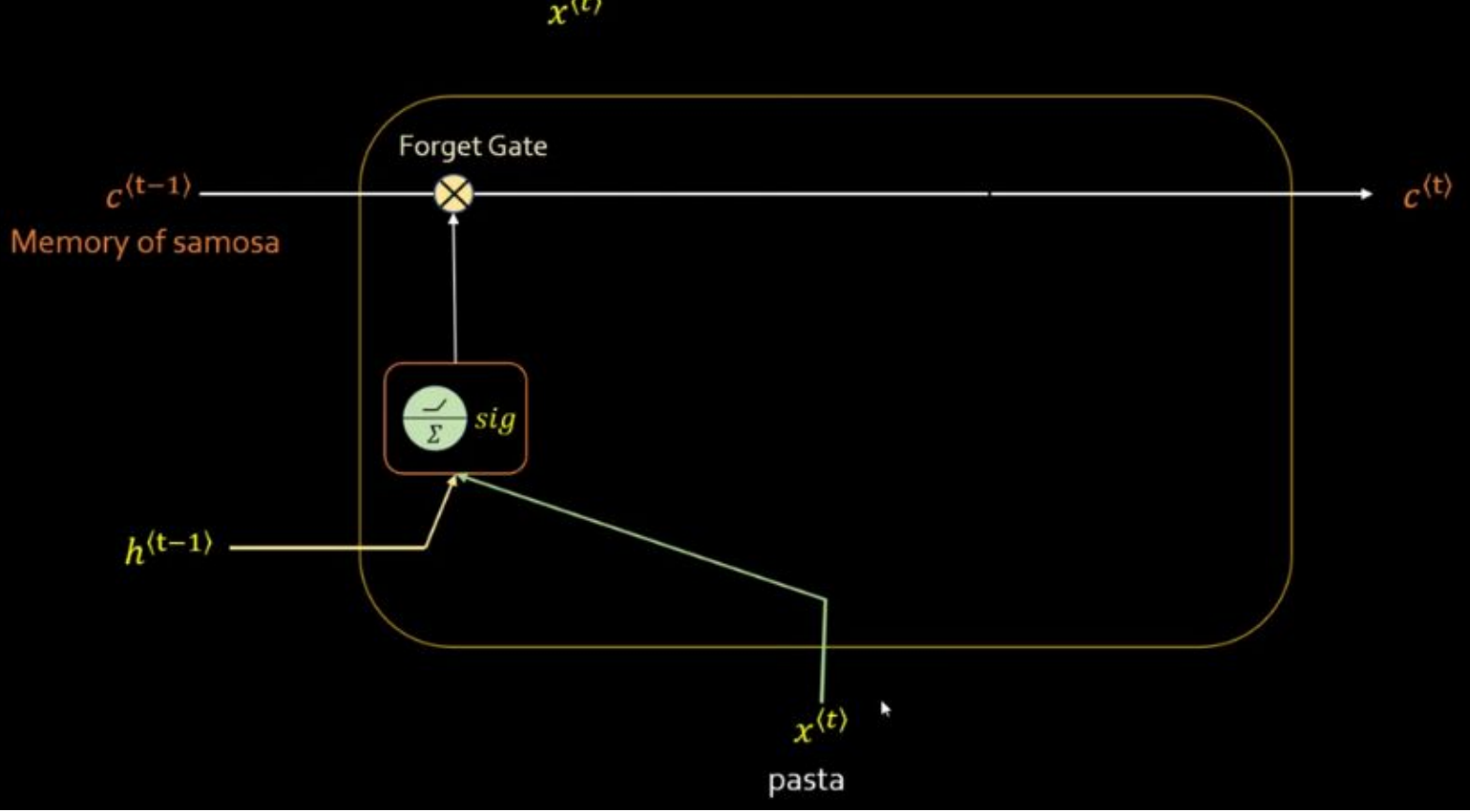


Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pastas and cheese that means Bhavin's favorite cuisine is Italian

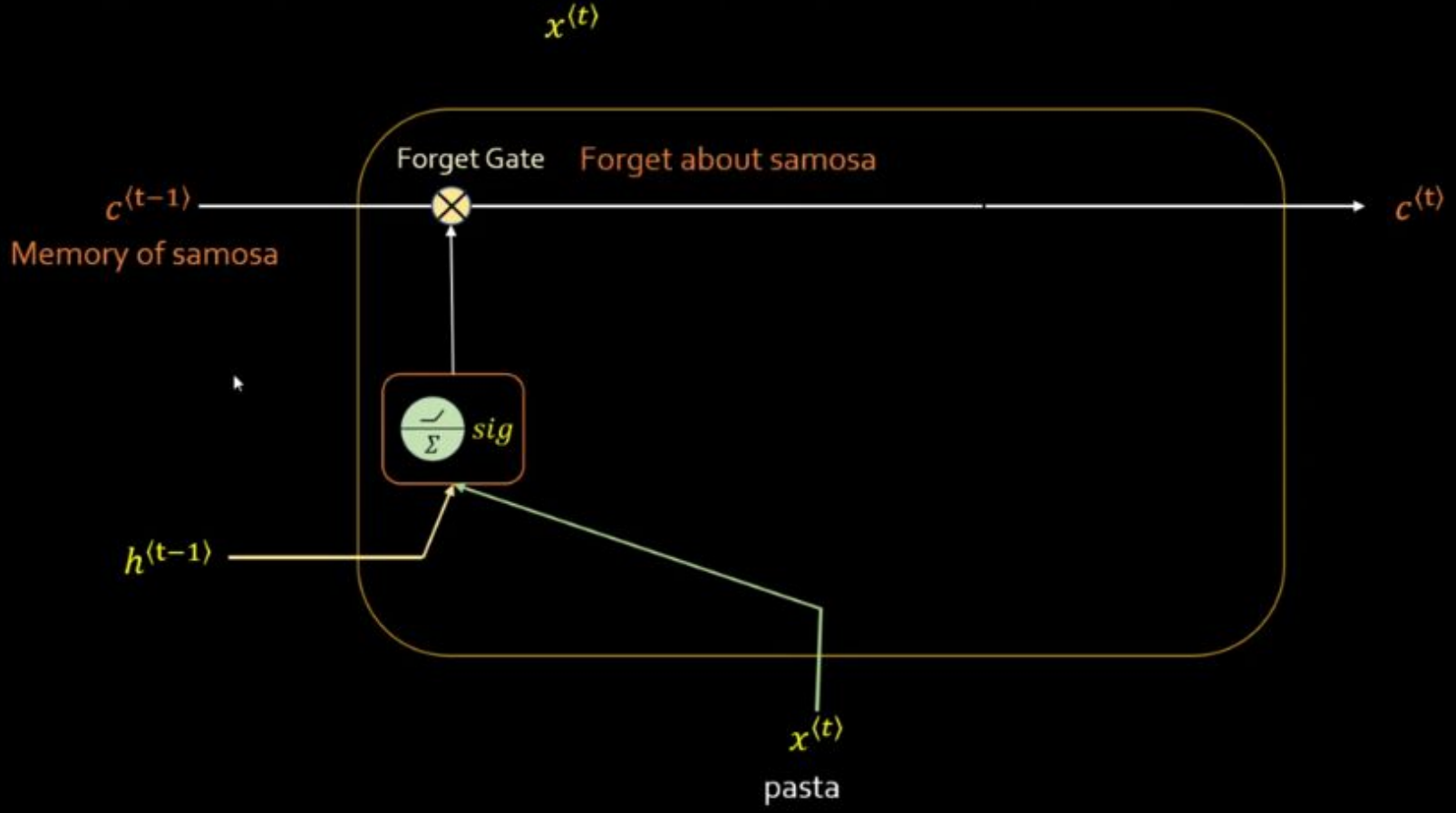
Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pasta and cheese that means Bhavin's favorite cuisine is Italian



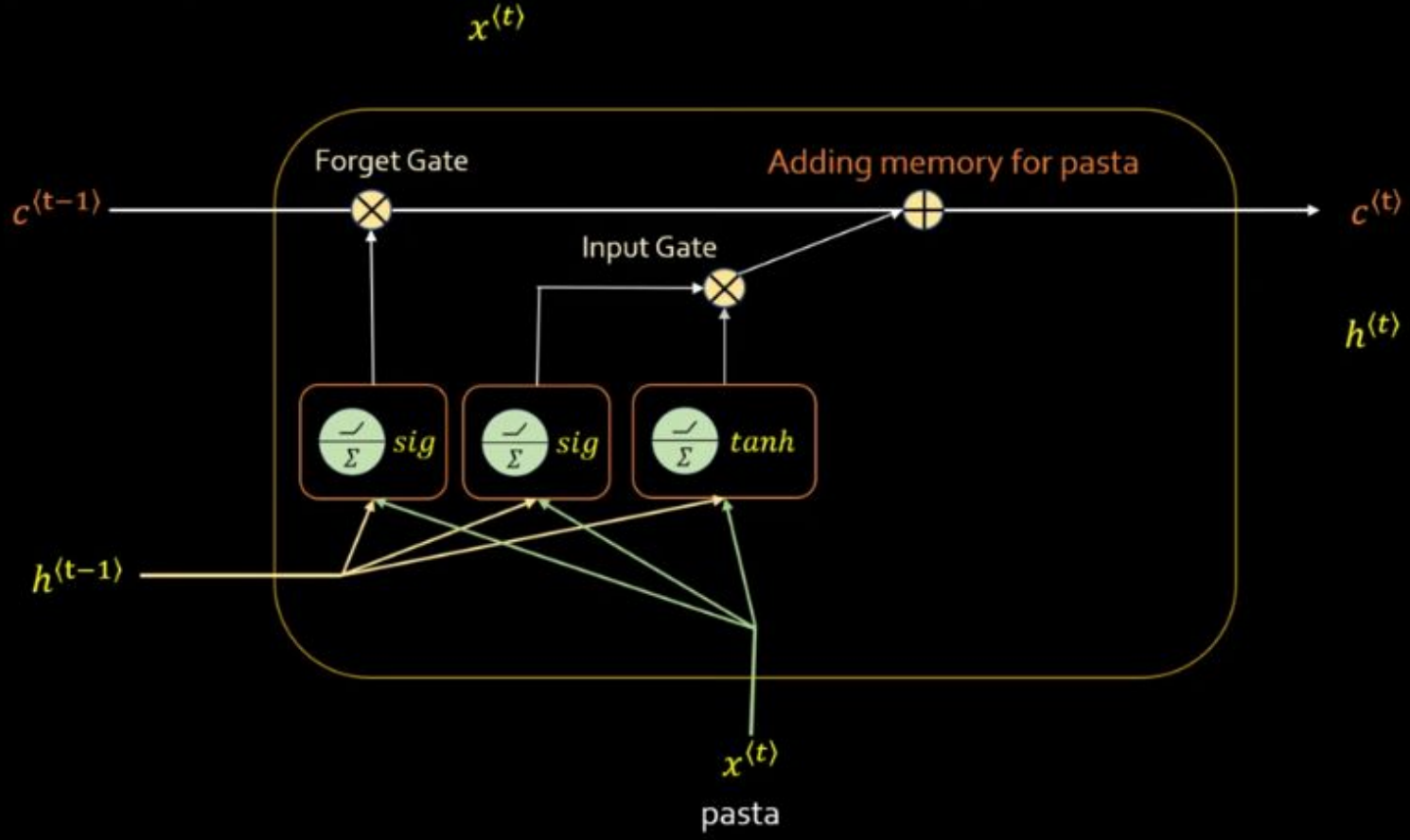
Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pasta and cheese that means Bhavin's favorite cuisine is Italian

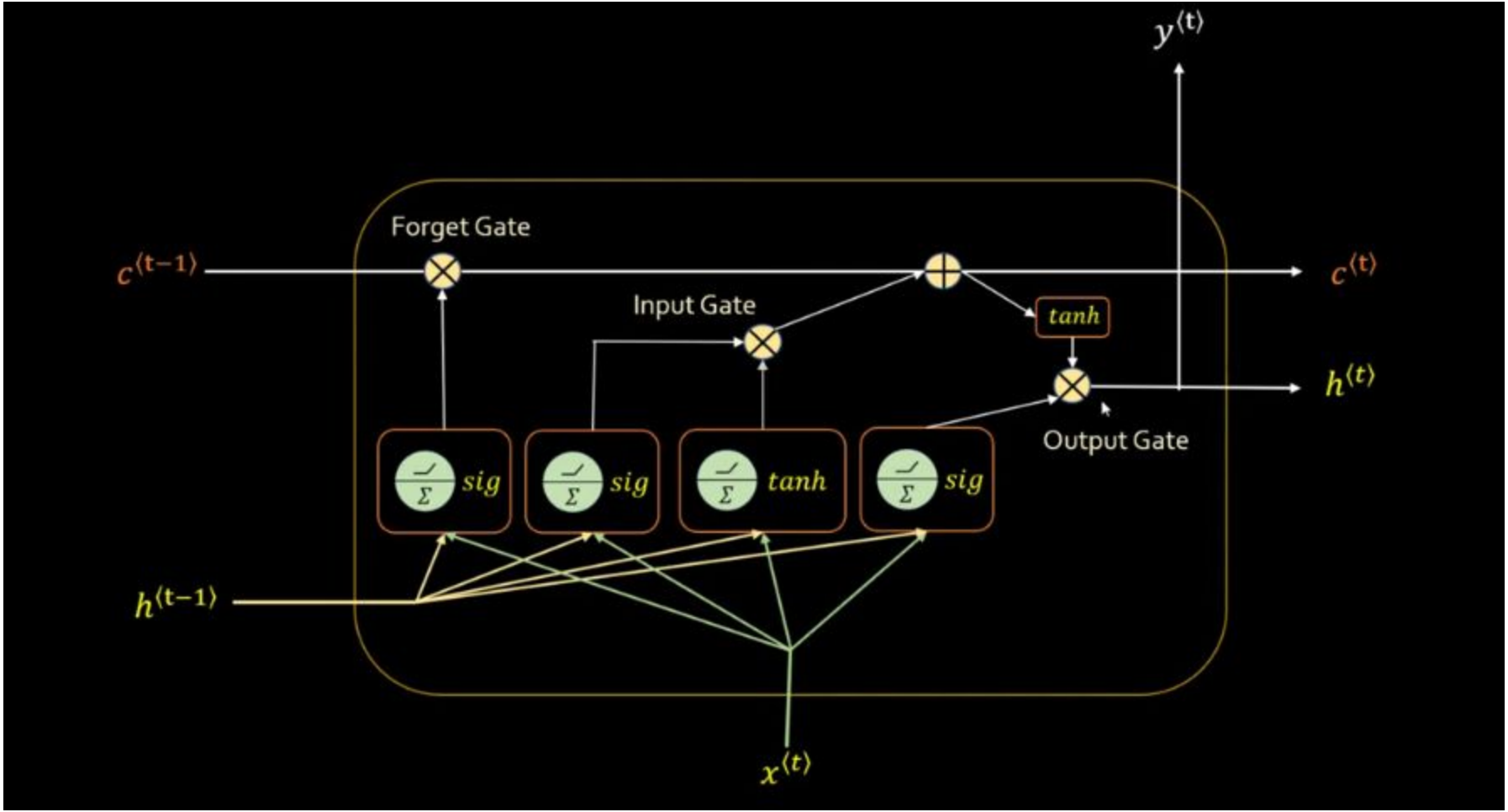


Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pasta and cheese that means Bhavin's favorite cuisine is Italian



Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pasta and cheese that means Bhavin's favorite cuisine is Italian




$y^{\langle t \rangle}$
Forget Gate
$c^{\langle t-1 \rangle}$
$c^{\langle t \rangle}$
Input Gate
tanh
$h^{\langle t \rangle}$
Output Gate
sig
sig
tanh
sig
$h^{\langle t-1 \rangle}$
$x^{\langle t \rangle}$

Link:

Understanding LSTM Networks

http://colah.github.io/posts/2015-08-Understanding-LSTMs/

Introduction to Long Short Term Memory (LSTM)

https://www.analyticsvidhya.com/blog/2021/03/introduction-to-long-short-term-memory-lstm/