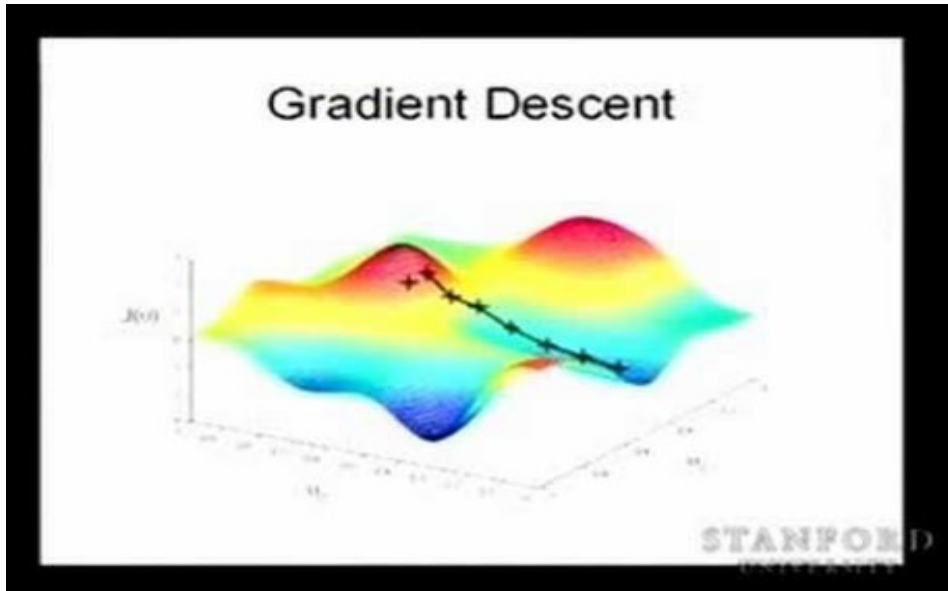


Neural Network Applications



Self Driving Cars (1990's)

Watch: Andrew Ng Course Lecture 2 (YouTube)

Timing: 2:40 to 8:50.

[You can also click here.](#)



(1) Recognizing Digits (2) Machine Learning to Speak

Watch: Andrew Ng Course Lecture 6 (YouTube)

Timing: (1) 37:00 – 39:50. (2) 40:00 – 43:15

[You can also click here.](#)

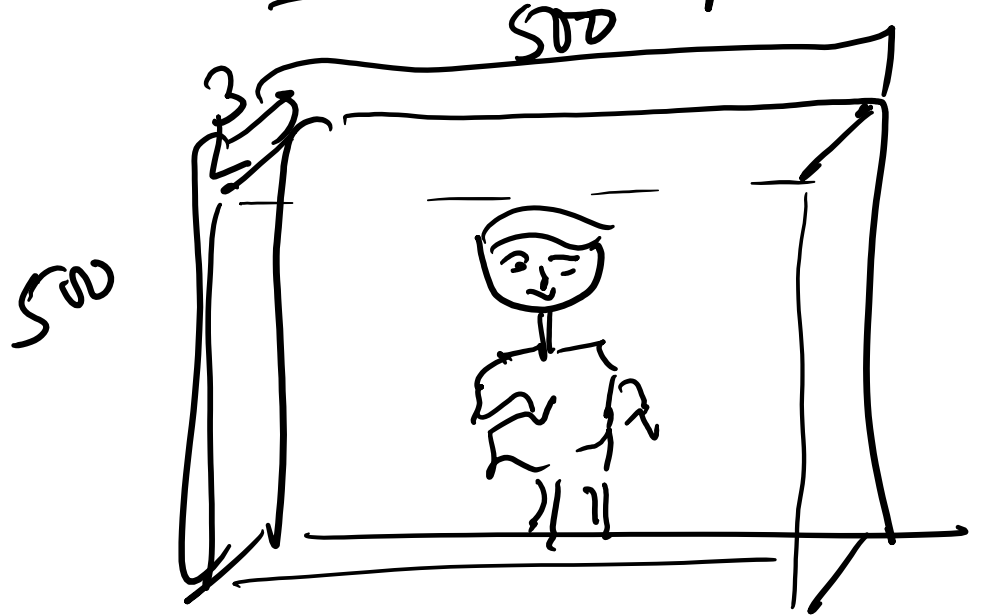
Video Source: Lectures from Andrew Ng Machine Learning Course @ Stanford, available on YouTube

Deep learning

↳ Introduction/Intuition

DNN! - Deep Neural Networks

Image Classification



Input \rightarrow 1/0 \rightarrow o.w.
↳ Binary in the image

size! - $500 \times 500 \times 3$

= 15 million

$\approx 7,50,000$

$\rightarrow 7,50,000 \times 1000$ sized (to connect)

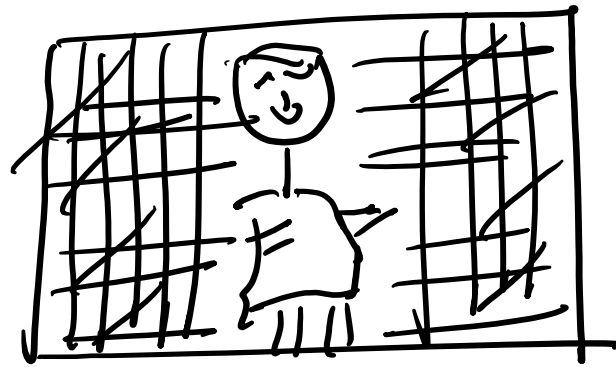
One hidden layer

1000 neurons

SIFT
HOG
HOF

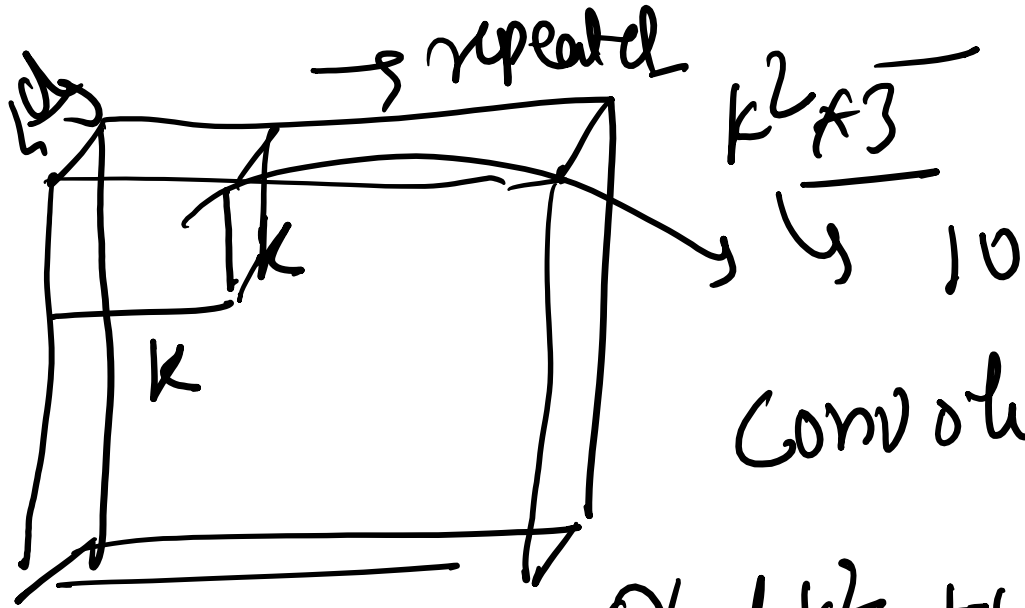


Compositional



→ Intuitive
→ Scalable





spatial locality

convolution / filter

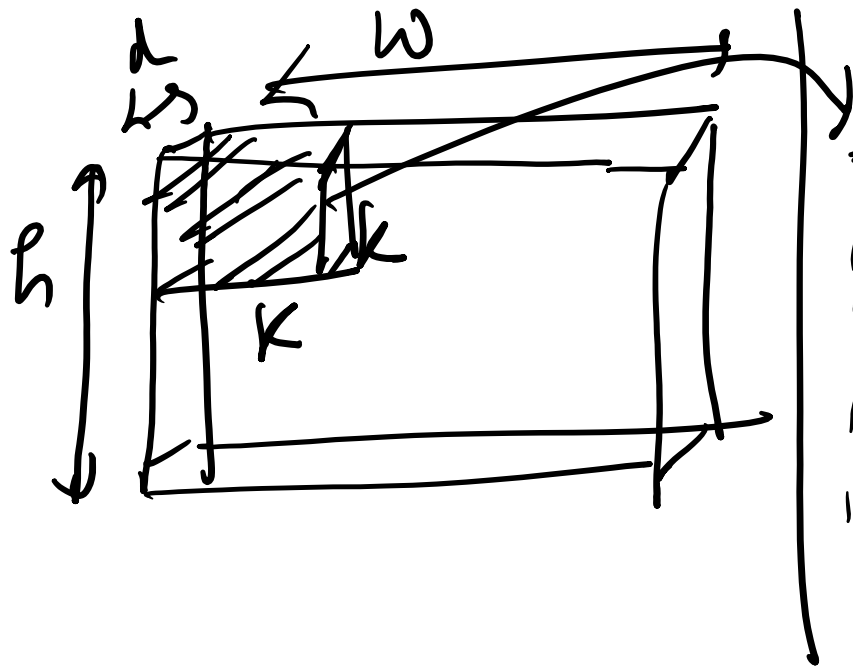
many different filters

$O(dk^2 + 1)$ parameters

→ tied across the imgl

→ layers of convolution operations





$$\left[\left(\frac{(w-k)+1}{s} \right) \times \left(\frac{(h-k)+1}{s} \right) \right] \times \downarrow$$

stride :- 1

↳ pooling

↓ size of # of
output filters

① composition ② scalability } CNN → convolution neural networks

Convolution Neural Networks

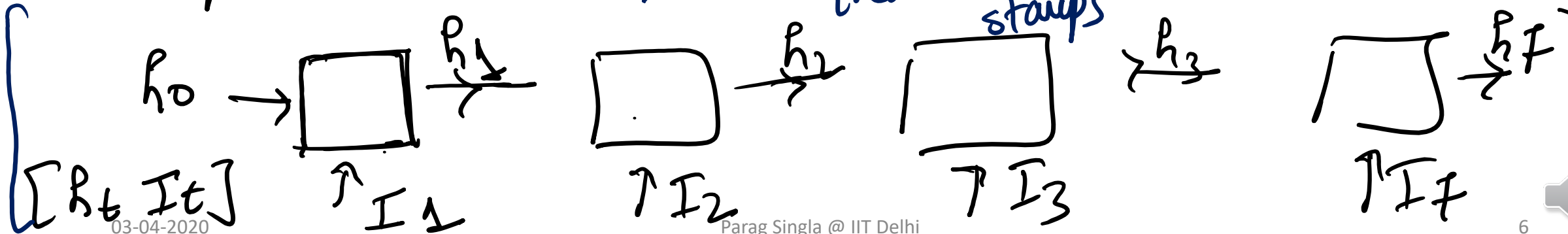
RNNs - Recurrent Neural Networks

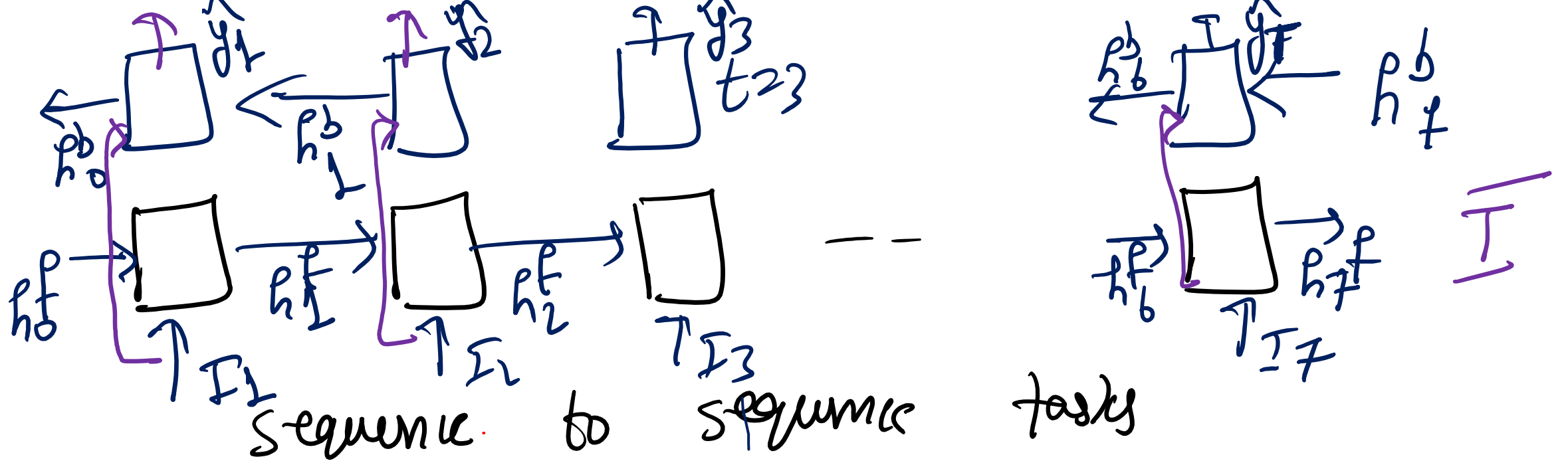
Unfortunately, World is suffering from COVID-19 outbreak

"Temporal locality"

↳ sentiment } → +ve
→ not neutral
→ -ve further processing

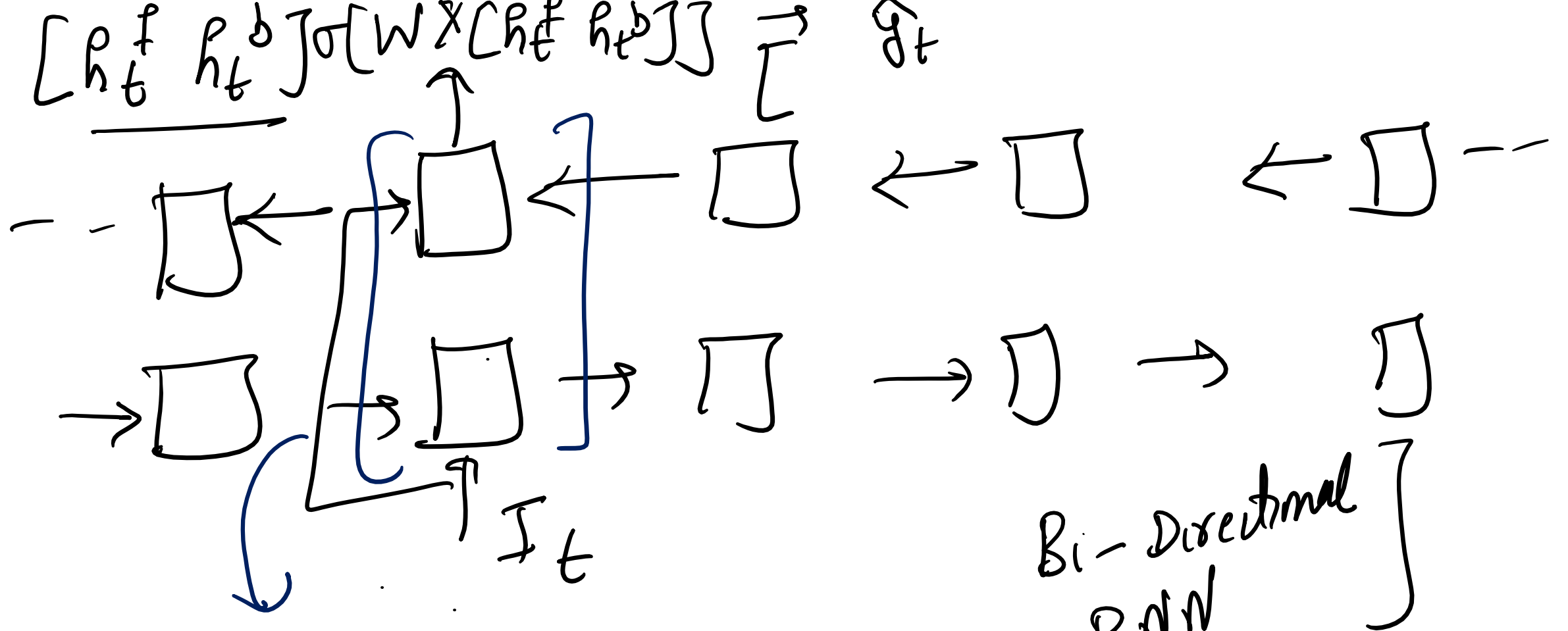
↳ parameters are tied across time steps





Unfortunately, world is suffering from COVID-19 outbreak





Bi-Directional RNN

LSTM - Long Short Term Memory

(cells)

"vanishing" gradients

Adversarial Game

GAN ↳ Generative Adversarial Networks

Dataset $D = \{I_i\}_{i=1}^m$ ←

$x \sim \text{Dataset}$ ↳ Image I

