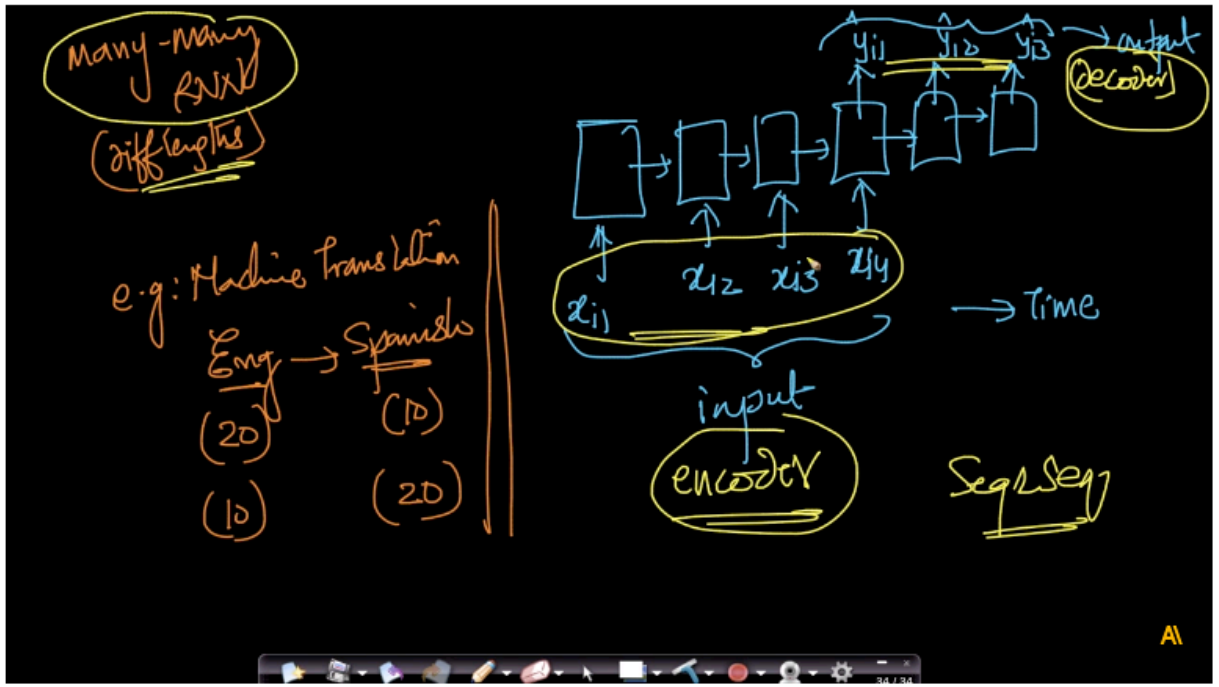
Encoder - Decoder - Models : LSTM - chapter

Types of RNNs.

Instructor: Applied AI Course **Duration:** 14 mins Full Screen



Agenda:

- → Encoder-decoder models
- → Attention models
- → Transformer models
- → BERT : Bidirectional encoder Representations from Transformers.

Assumption:

[covered existing videos in LSTM chapter]

Agenda: encoder-decoder models

- → slow & steady
- → intuition
- → Code-examples
- → Major-Applications

Seminal - research papers :

1. Sequence to Sequence Learning with Neural Networks by Ilya Sutskever, et al. (Google)

2. Learning Phrase Representations using RNN Encoder–Decoder for Statistical Machine Translation by Kyunghyun Cho, et al.

Seq 2 Seq Models (Machine Translation)

Practical : Used by Google Translate as core algo for a while

Auto - Reply

Image - Text

Machine-Translation:

$x^1 \quad x^2 \quad x^3 \quad x^4 \quad x^5 \quad \ldots \quad x^t \longrightarrow y^1 \quad y^2 \quad y^3 \quad y^4 \quad \ldots \quad y^K$

input (English) — output (Hindi)

(*) t need not equal to K

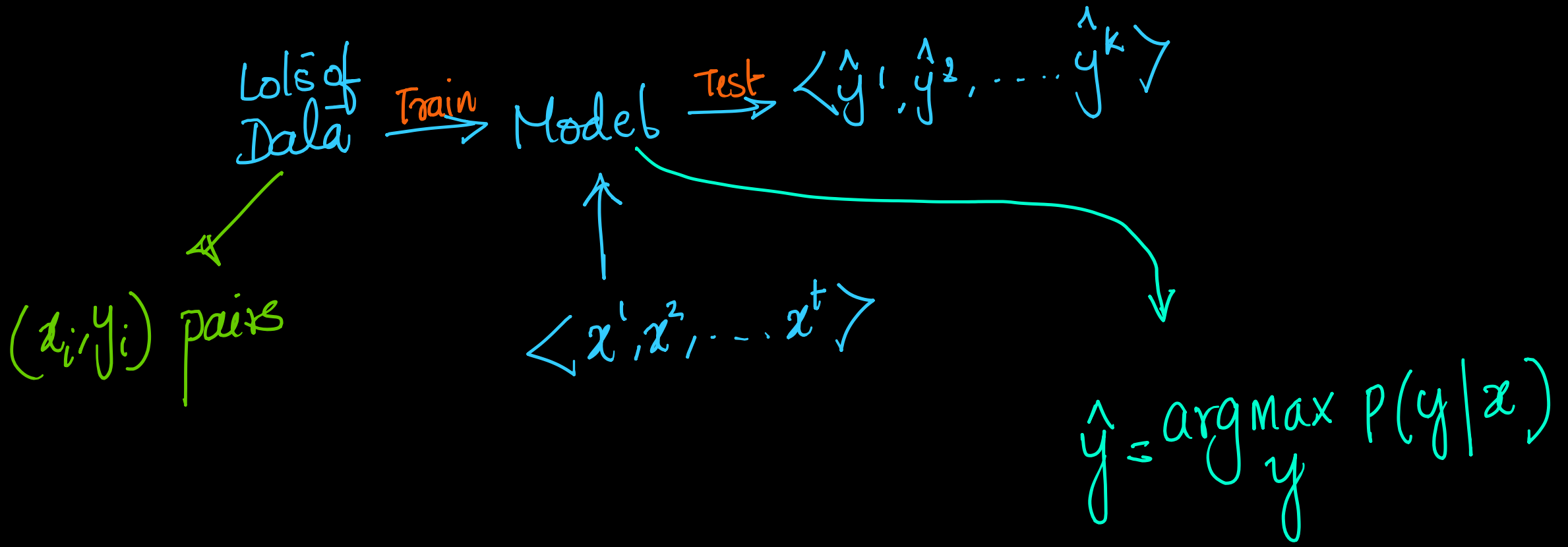
Image-Captioning/descriptions:

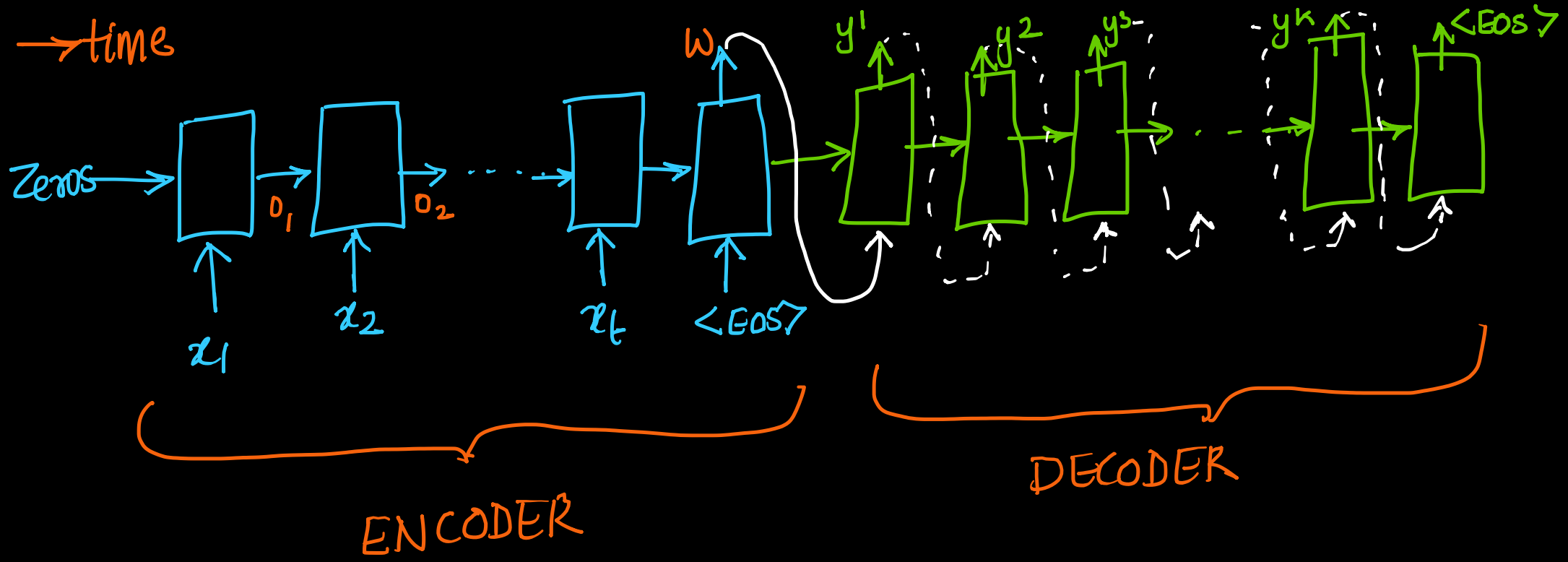
(3) [Deep Visual-Semantic Alignments for Generating Image Descriptions, Andrej Karpathy, Li Fei-Fei]

Image $\longrightarrow y^1 \quad y^2 \quad y^3 \quad \ldots \quad y^K$

"man in black shirt is playing guitar."

Mathematically: $P(\langle y^1, y^2, y^3, y^4, \ldots y^k \rangle \mid \langle x^1, x^2, x^3, \ldots, x^t \rangle)$





SEQ2SEQ

w : context-vector

[sutskever et. al]

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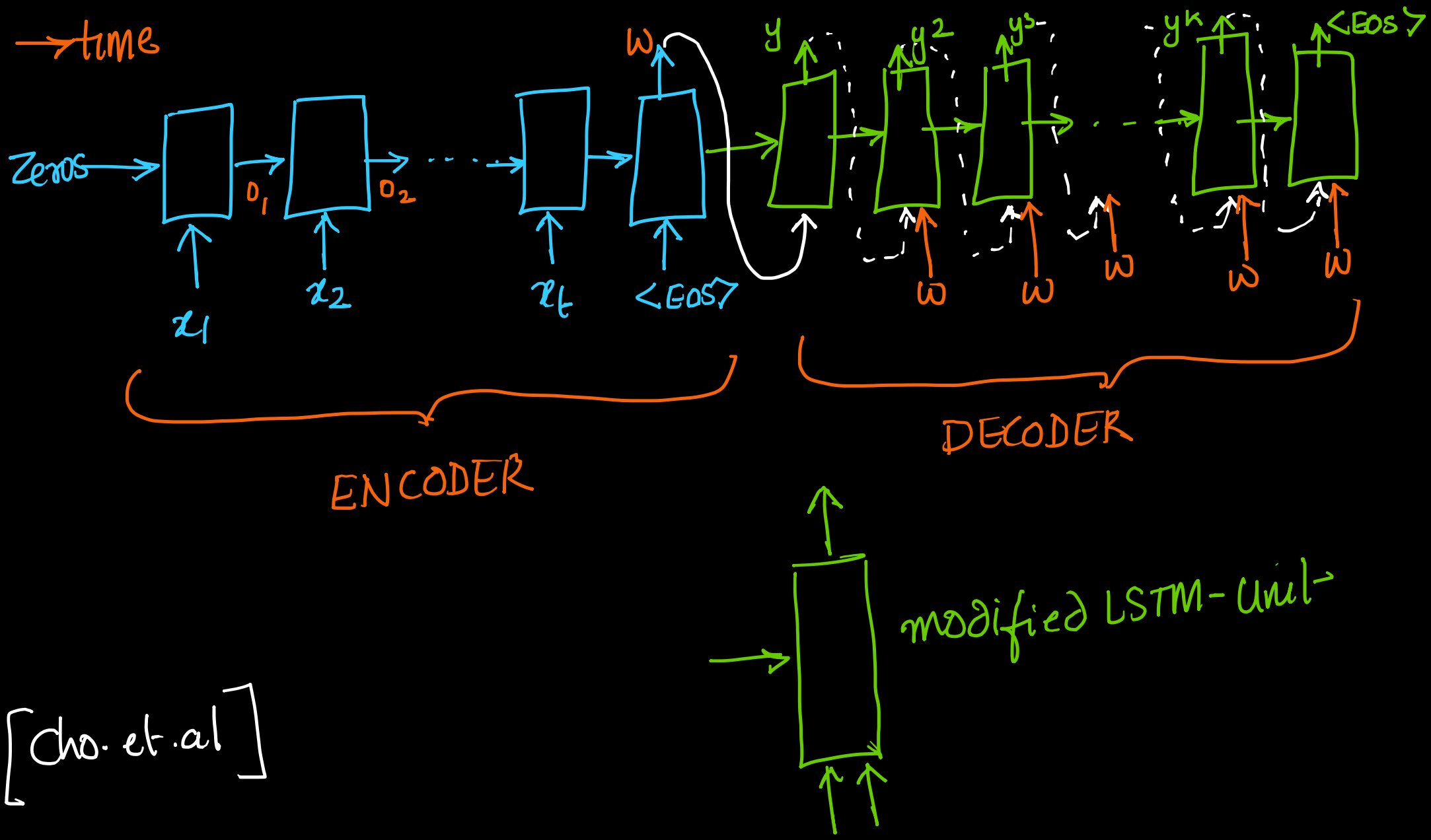
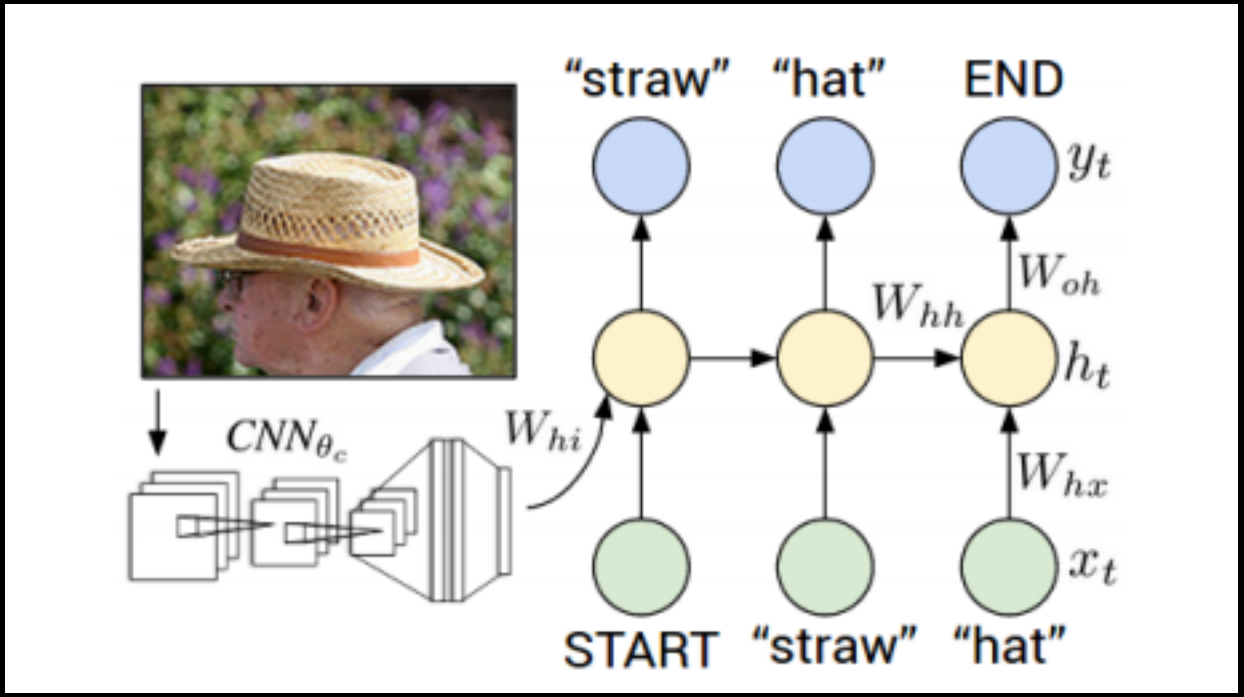




[karpathy et.al]

Applications:

1. Translate https://ai.googleblog.com/2016/09/a-neural-network-for-machine.html

2. Email Auto-reply & Smart Compose: https://ai.googleblog.com/2018/05/smart-compose-using-neural-networks-to.html

3. Code-errors https://medium.com/@martin.monperrus/sequence-to-sequence-learning-program-repair-e39dc5c0119b

4. Image-descriptions: https://towardsdatascience.com/image-captioning-with-keras-teaching-computers-to-describe-pictures-c88a46a311b8

[our student's blog]

Code - Sample:

English - French Dataset : http://www.manythings.org/anki/

https://blog.keras.io/a-ten-minute-introduction-to-sequence-to-sequence-learning-in-keras.html

Character - level - model

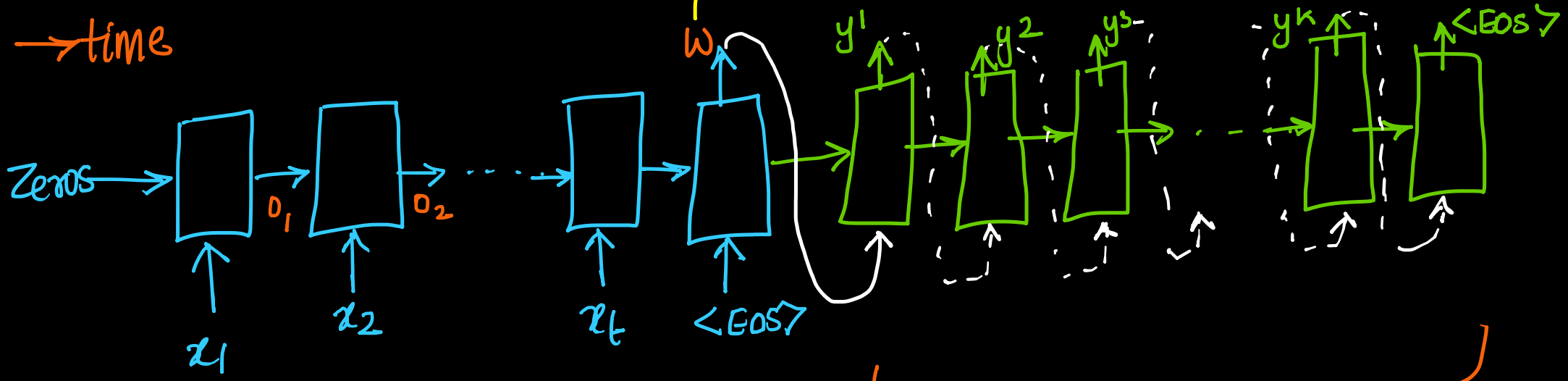
https://github.com/keras-team/keras/blob/master/examples/lstm_seq2seq.py

Real-world : word - level (W2Vec)

Problems with simple seq2seq model:

→ lengthy sentences

Not human-like
cannot capture the essence of a.



[ATTENTION]

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