

EI320A(3) 深度學習使用 Python

Instructors

Tipajin Thaipisutikul (t.greentip@gmail.com)

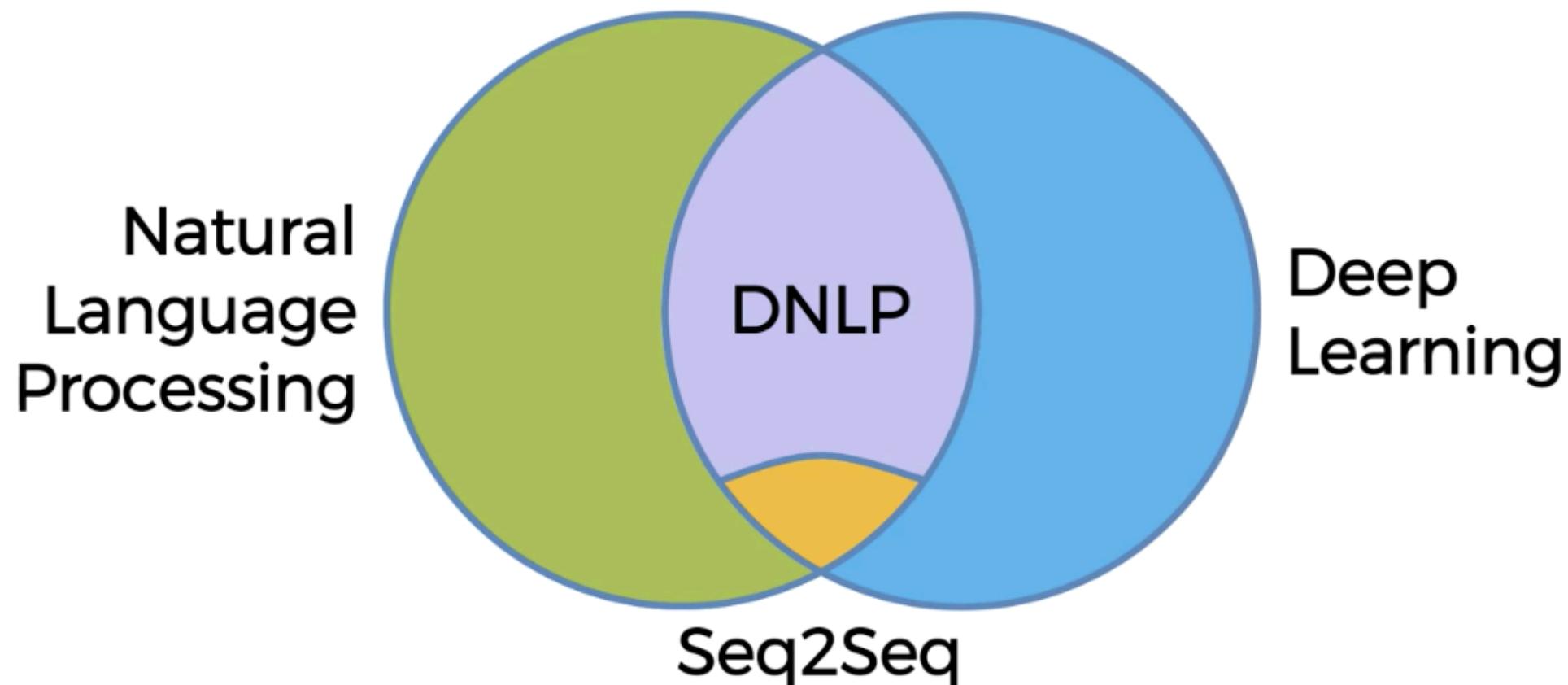
Prof. Huang-Chia Shih (hcshih@Saturn.yzu.edu.tw)

Week	Date	Content	Note	Total
1	2/26	Welcome to the course	Homework (1)	1
2	3/5	Crash Course of Python, NumPy, Pandas, and Matplotlib	In class hands-on (4)	5
3	3/12	Get to know about Data, ML: Classification Models	In class hands-on (5)	10
4	3/19	ML: Regression Models	In class hands-on (5)	15
5	3/26	ML: Clustering/Apriori Models	In class hands-on (5)	20
6	4/2	Holiday		
7	4/9	Introduction to Deep Learning (ANN)		
8	4/16	ANN Labs, Introduction to Convolutional Neural Network (CNN)	In class hands-on (10)	30
9	4/23	Convolutional Neural Network (CNN) & CNN Labs	In class hands-on (5)	35
10	4/30	Introduction to Recurrent Neural Network (RNN)	In class hands-on (5)	40
11	5/7	Recurrent Neural Network (RNN) & RNN Labs	In class hands-on (5)	45
12	5/14	Wrap Up all ANN, CNN, RNN Project Proposal Presentation	Proposal Presentation (10)	55
13	5/21	Generative Adversarial Network (GAN)	In class hands-on (5)	60
14	5/28	Reinforcement Learning (RL)	In class hands-on (5)	65
15	6/4	NLP & S2S & Attention Neural Network	In class hands-on (5)	70
16	6/11	GNN (Recording/Exercise submission)	In class hands-on (5)	75
17	6/18	Final Project Presentation (Online) -> Time Table For Each Group will be informed after 6/11	Final Presentation (25)	100 ₂

Deep NLP Plan of Attack

- Types of Natural Language Processing
- Classical vs. Deep Learning Models
- End-to-End Deep Learning models
- Bag-Of-Words
- Seq2Seq Architecture
- Seq2Seq Training
- Beam Search Decoding
- Attention Mechanisms

Types of Natural Language Processing



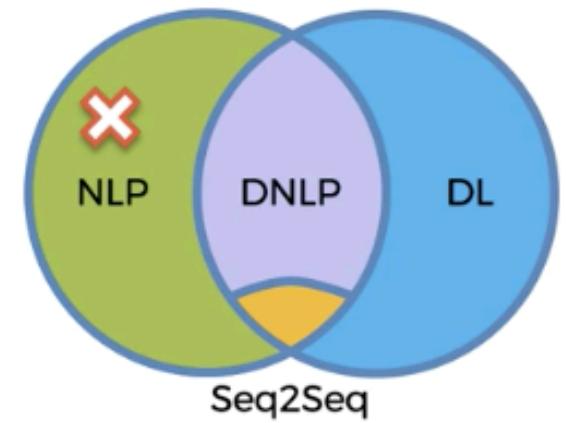
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Classical vs. Deep Learning Models

Some examples:

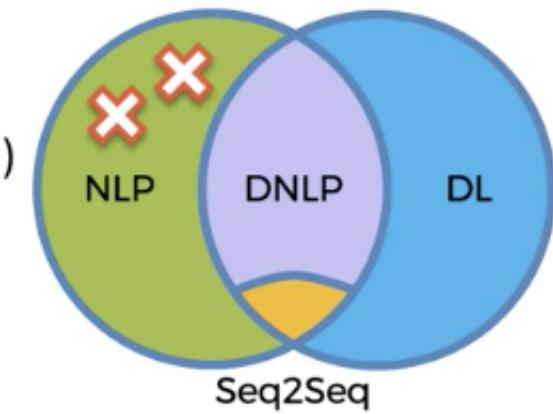
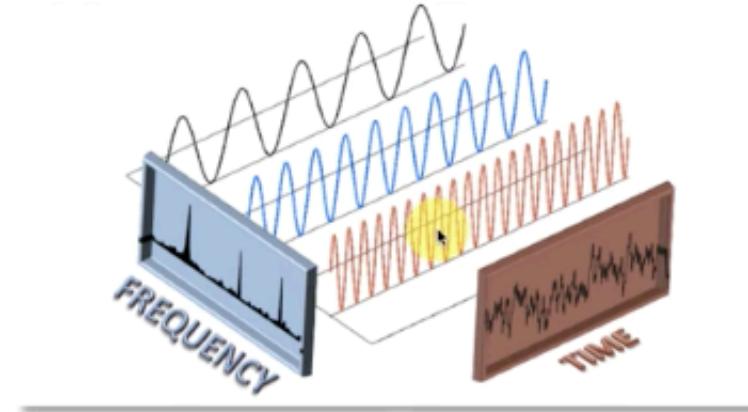
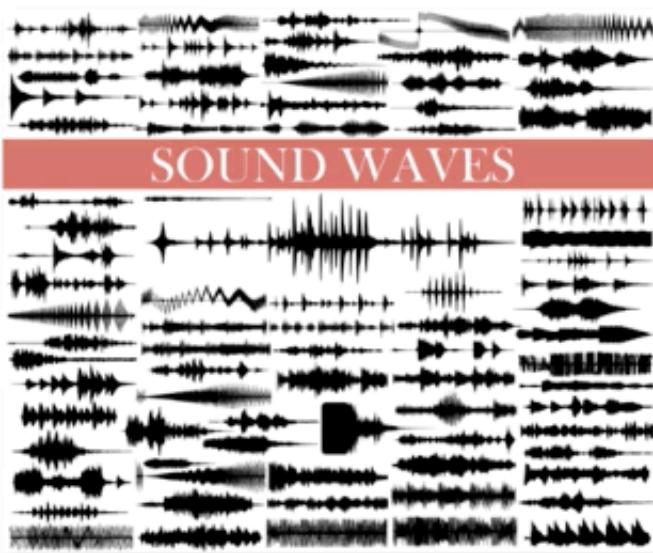
1. If / Else Rules (Chatbot)



Classical vs. Deep Learning Models

Some examples:

1. If / Else Rules (Chatbot)
2. Audio frequency components analysis (Speech Recognition)



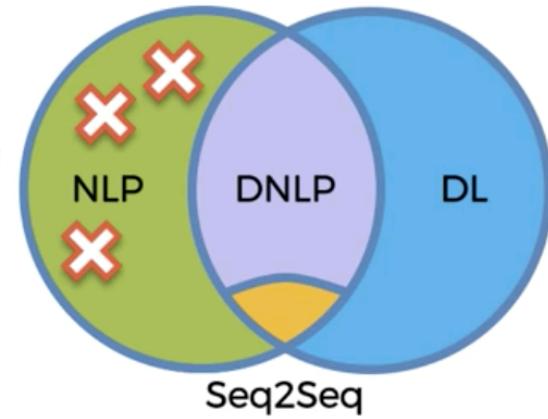
Classical vs. Deep Learning Models

Some examples:

1. If / Else Rules (Chatbot)
2. Audio frequency components analysis (Speech Recognition)
3. Bag-of-words model (Classification)



Comment	Pass/Fail
Great job!	1
Amazing work.	1
Well done.	1
Very well written.	1
Poor effort.	0
Could have done better.	0
Try harder next time.	0
...	...



Classical vs. Deep Learning Models

Some examples:

1. If / Else Rules (Chatbot)
2. Audio frequency components analysis (Speech Recognition)
3. Bag-of-words model (Classification)
4. CNN for text Recognition (Classification)

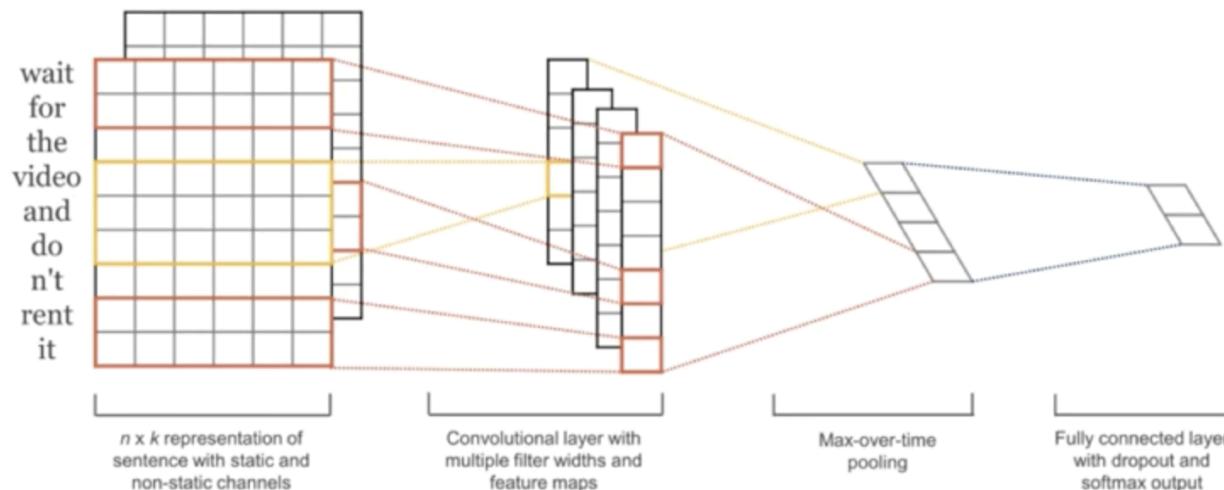
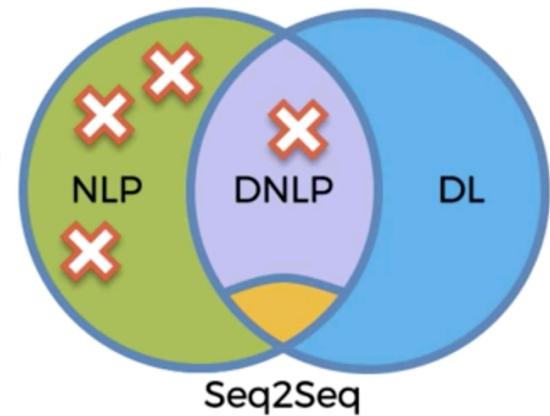


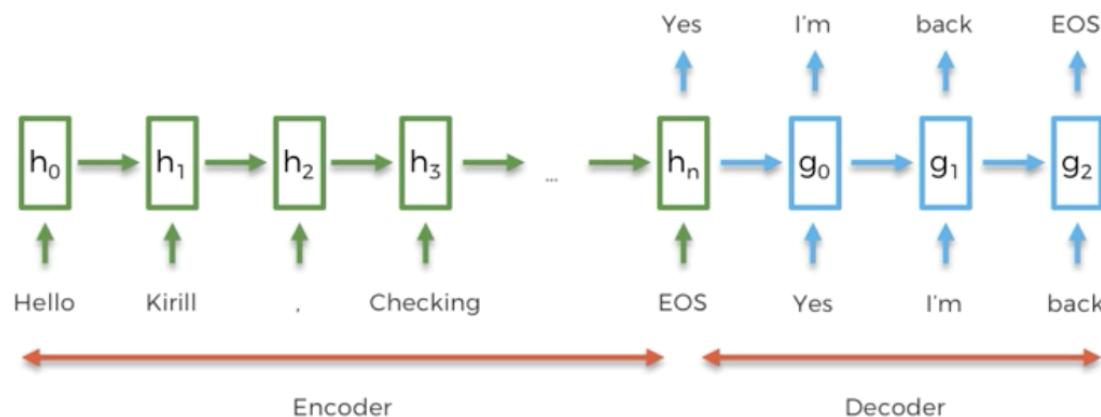
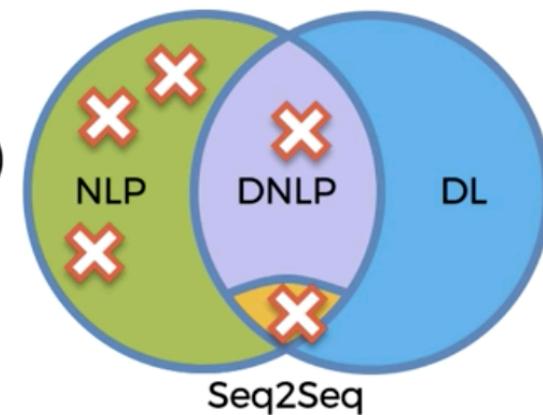
Image Source: www.wildml.com



Classical vs. Deep Learning Models

Some examples:

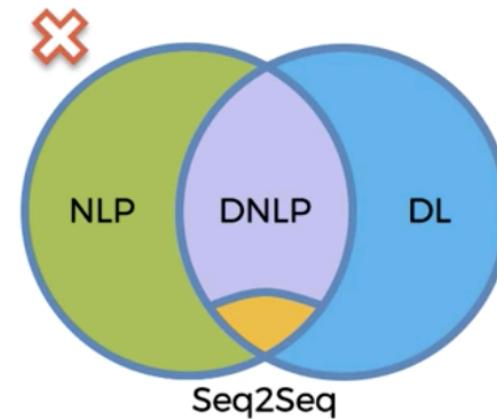
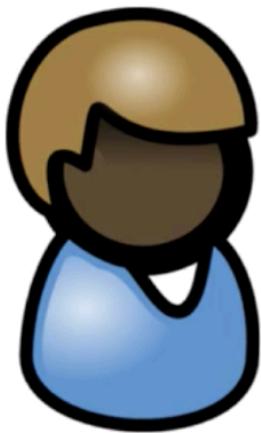
1. If / Else Rules (Chatbot)
2. Audio frequency components analysis (Speech Recognition)
3. Bag-of-words model (Classification)
4. CNN for text Recognition (Classification)
5. Seq2Seq (many applications)



Deep NLP Plan of Attack

- Types of Natural Language Processing
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- **End-to-End Deep Learning models**
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- Attention Mechanisms

End-to-End Deep Learning models



End-to-End Deep Learning models



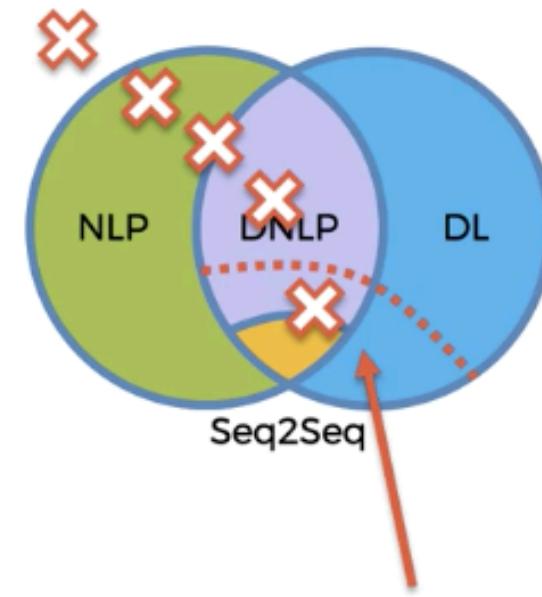
End-to-End Deep Learning models



End-to-End Deep Learning models



End-to-End Deep Learning models



End-to-end
Deep Learning
Models

Deep NLP Plan of Attack

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Bag-Of-Words



kolis kol
to me ▾

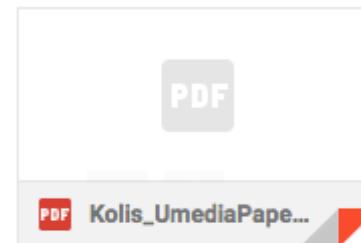
⌚ Tue, Aug 21, 10:15 PM (2 hours ago)

Dear Tip,

Here is the PPT and the paper of my UbiMedia 2018.
i will send the video later after this. and give you the drive link.

...

2 Attachments

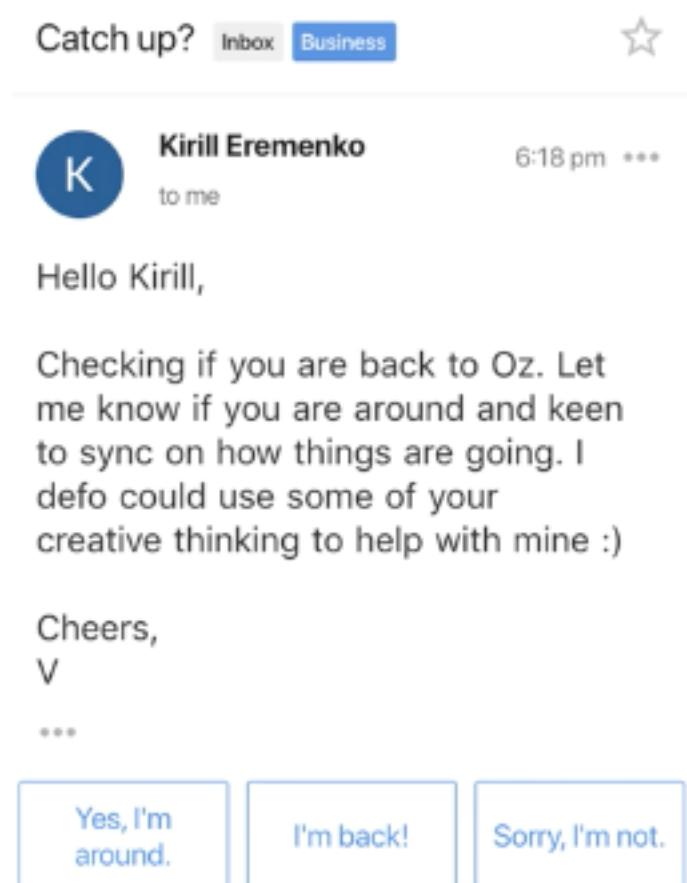


Thanks a lot.

Thanks, I have received it.

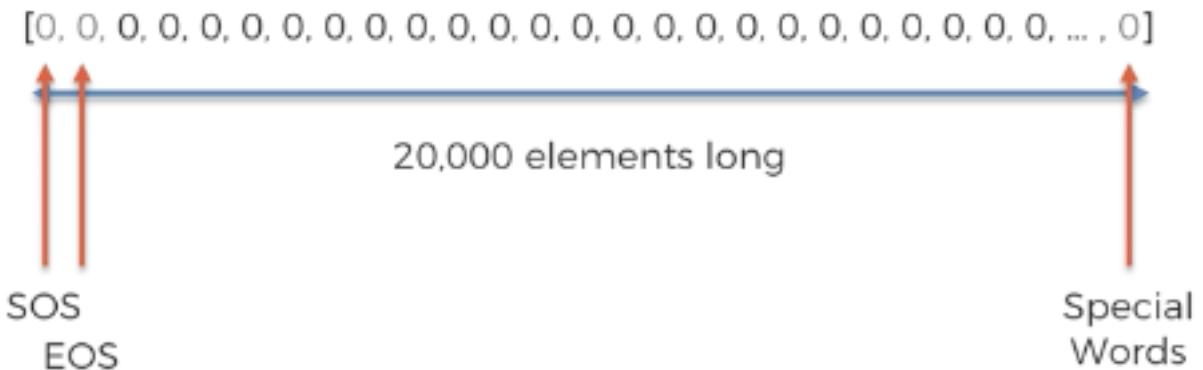
Thanks a lot for sharing.

Bag-Of-Words



Yes / No

Bag-Of-Words



171,476 words

The Second Edition of the 20-volume Oxford English Dictionary contains full entries for 171,476 words in current use, and 47,156 obsolete words. To this may be added around 9,500 derivative words included as subentries.



How many words are there in the English language?

<https://en.oxforddictionaries.com/.../how-many-words-are-there-in-the-english-language>

About this result Feedback

People also ask

How many words in the English language does the average person know?

Most adult native test-takers range from 20,000–35,000 words. Average native test-takers of age 8 already know 10,000 words. Average native test-takers of age 4 already know 5,000 words. Adult native test-takers learn almost 1 new word a day until middle age. May 29, 2013

Lexical facts - The Economist
<https://www.economist.com/blogs/johnson/2013/05/vocabulary-size>

We have seen that the Oxford English Dictionary contains 171,476 words in current use, whereas a vocabulary of just 3000 words provides coverage for around 95% of common texts. If you do the math, that's 1.75% of the total number of words in use! Mar 14, 2013



[How many words in the english language ? How many do i need to ...](https://www.english-test.net/vocabulary/words_in_english/)

Bag-Of-Words

Hello Kirill, Checking if you are back to Oz. Let me know if you are around ... Cheers, V

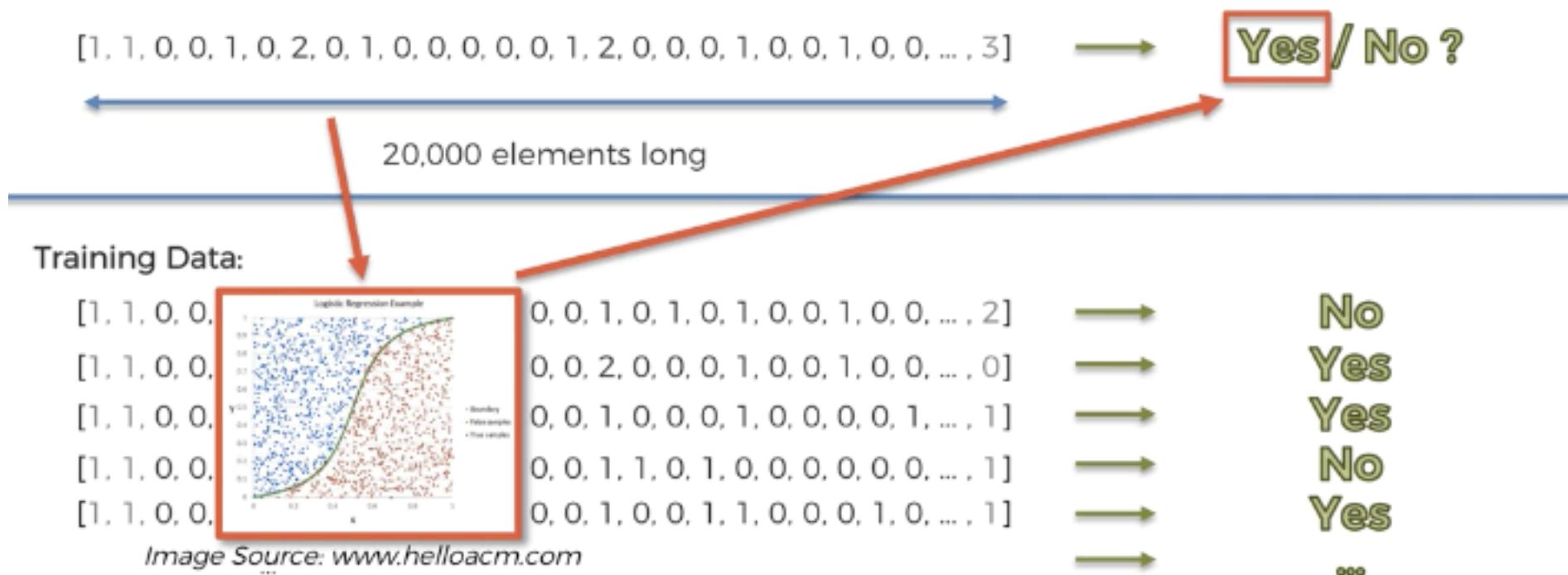


Training Data:

[1, 1, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, ..., 2]	→	No
[1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 2, 0, 0, 0, 1, 0, 0, 1, 0, 0, ..., 0]	→	Yes
[1, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, ..., 1]	→	Yes
[1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, ..., 1]	→	No
[1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, ..., 1]	→	Yes
...	→	...

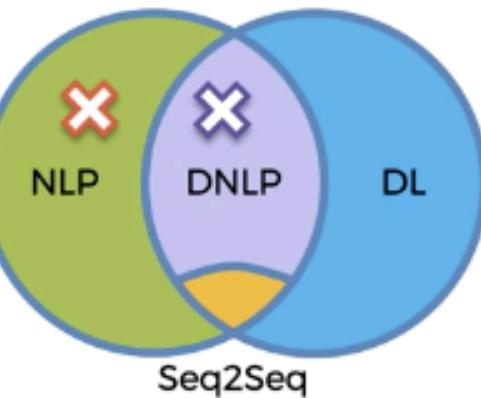
Bag-Of-Words

Hello Kirill, Checking if you are back to Oz. Let me know if you are around ... Cheers, V



Bag-Of-Words

Hello Kirill, Checking if you are back to Oz. Let me know if you are around ... Cheers, V



```
[1, 1, 0, 0, 1, 0, 2, 0, 1, 0, 0, 0, 0, 0, 1, 2, 0, 0, 0, 1, 0, 0, 1, 0, 0, ..., 3]
```

Yes / No ?

20,000 elements long

Training Data:

[1, 1, 0, 0]
[1, 1, 0, 0]
[1, 1, 0, 0]
[1, 1, 0, 0]
[1, 1, 0, 0]

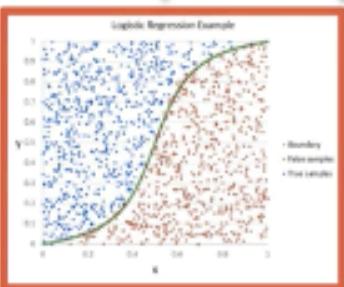
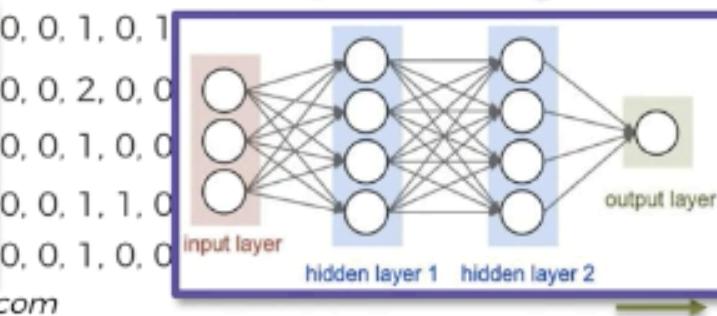


Image Source: www.helloacm.com



No
Yes
Yes
No
Yes



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Seq2Seq Architecture

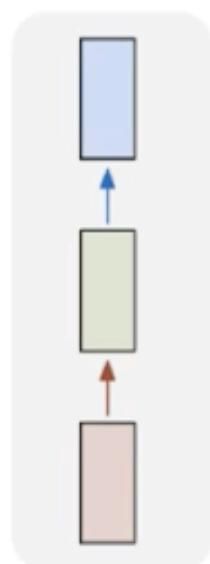
Issues with the Bag-of-words model:

1. Fixed-sized input
2. Doesn't take word order into account
3. Fixed-sized output

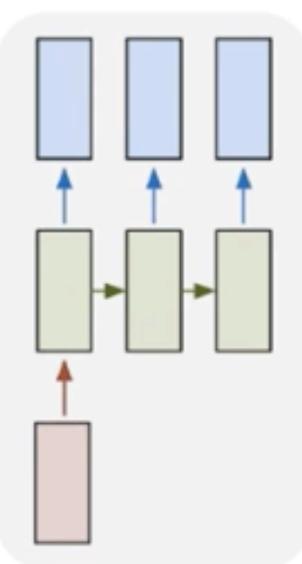
Seq2Seq Architecture

RNN

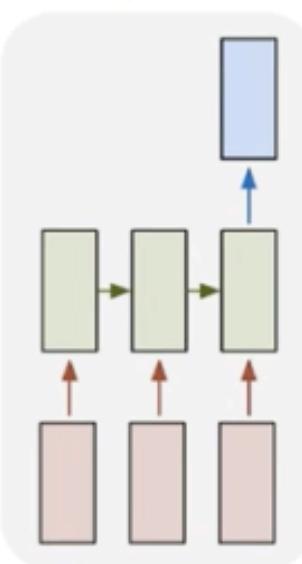
one to one



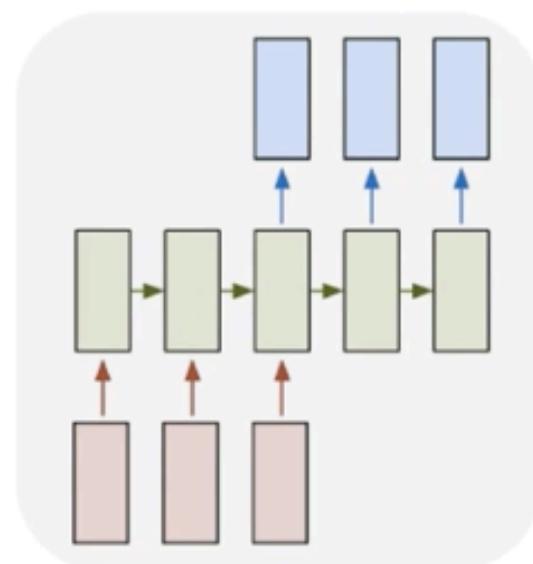
one to many



many to one



many to many



many to many

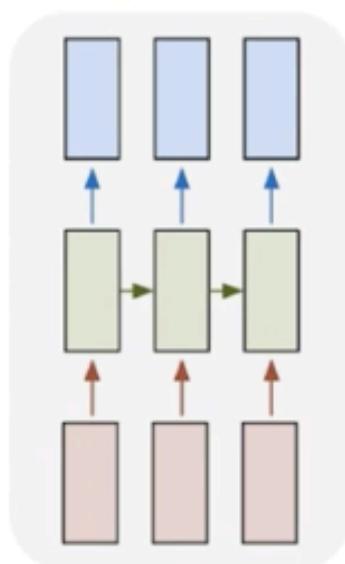
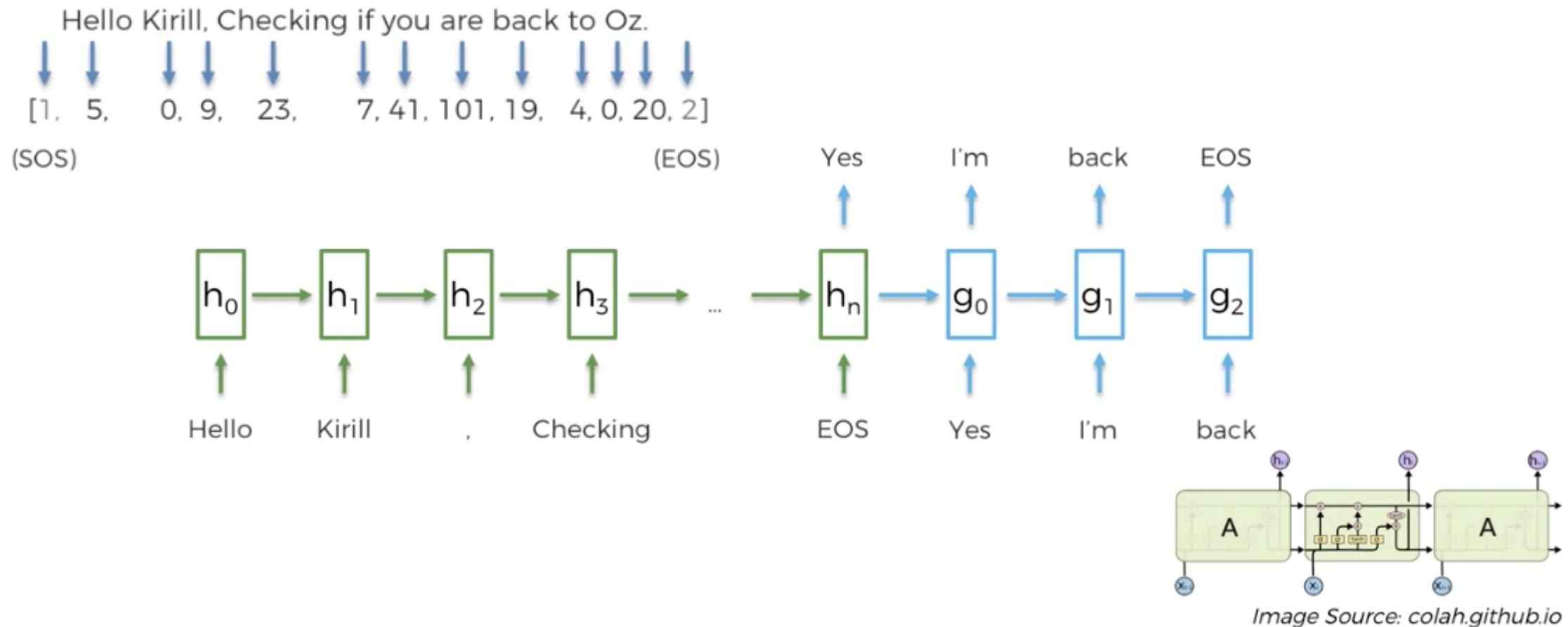
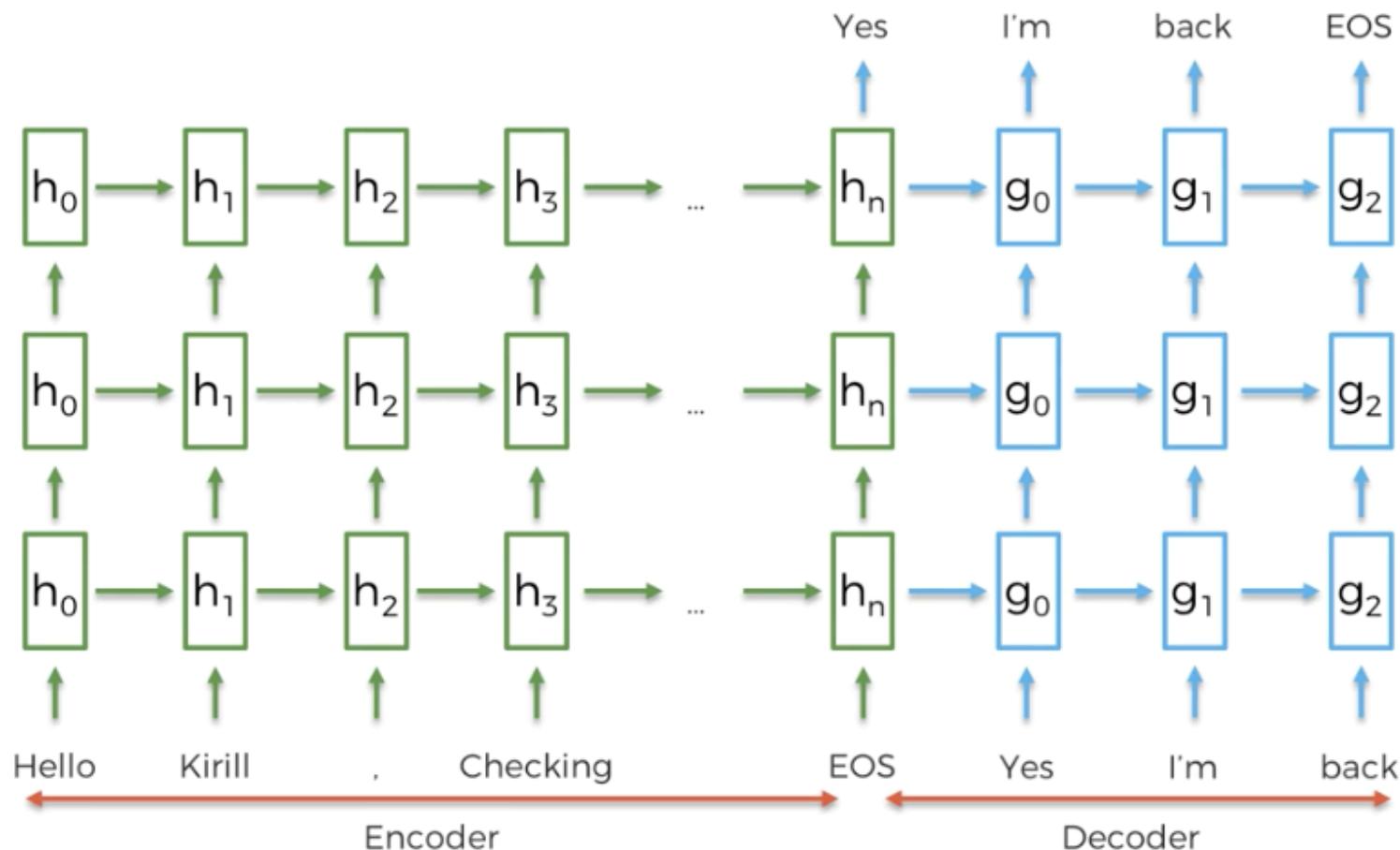


Image Source: karpathy.github.io

Seq2Seq Architecture



Seq2Seq Architecture

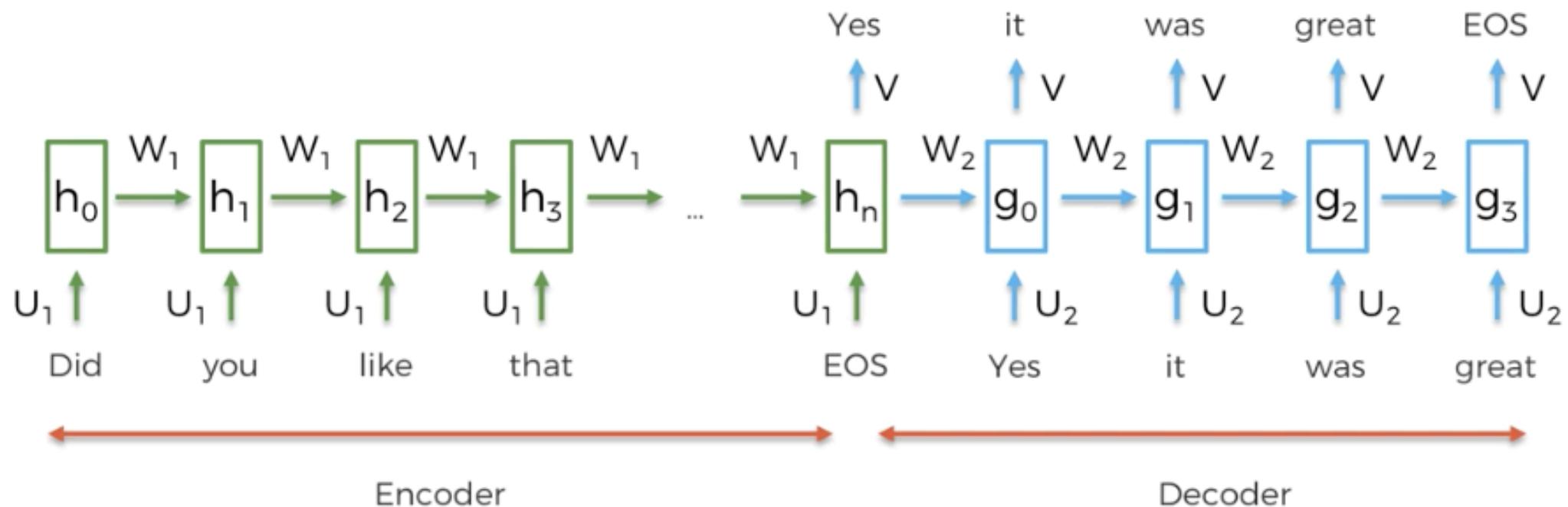


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Seq2Seq Training

Did you like that recipe I sent you last week?



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Beam Search Decoding

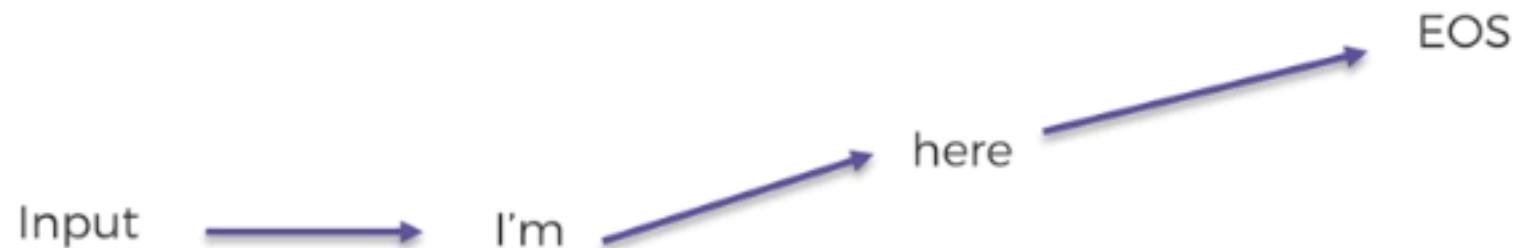
Greedy
Decoding

V.S.

Beam
Search
Decoding

Beam Search Decoding

Greedy Decoding

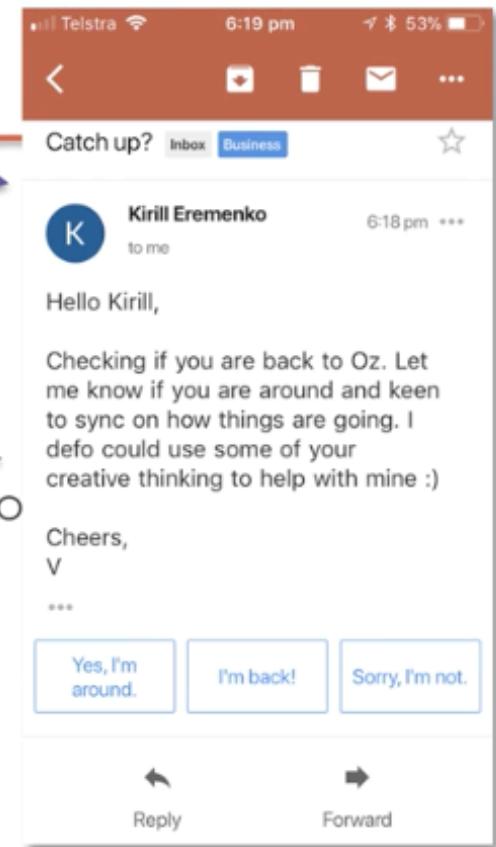


Beam Search Decoding

Beam Search Decoding



Beam Search Decoding

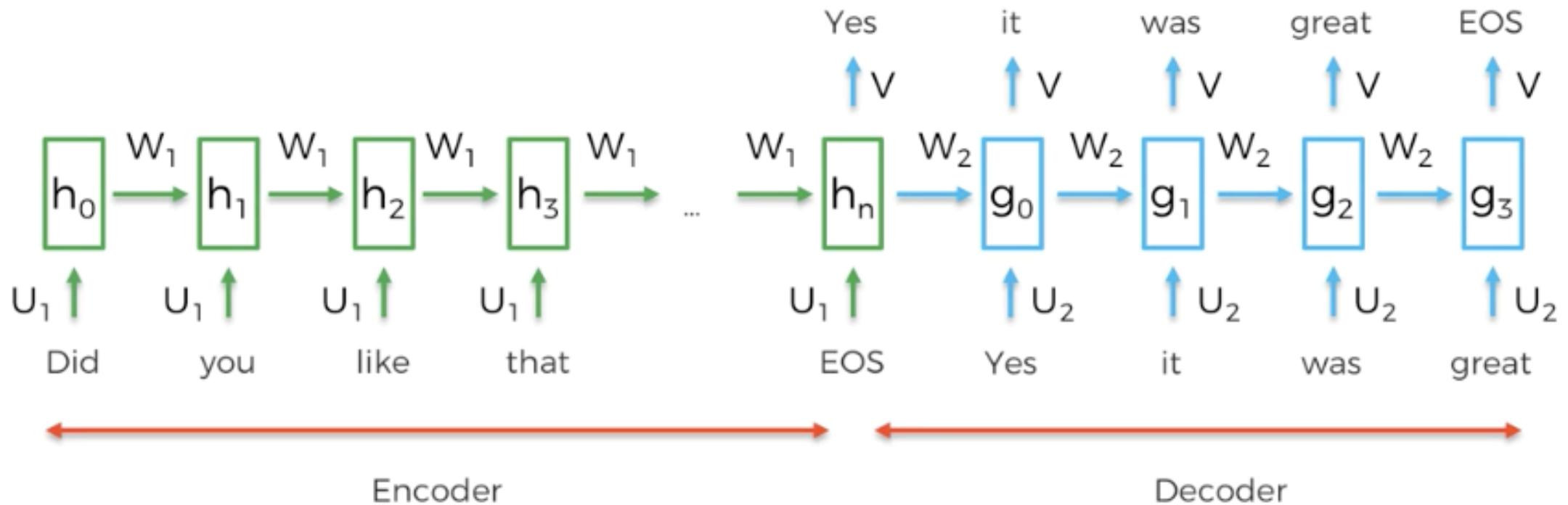


Deep NLP Plan of Attack

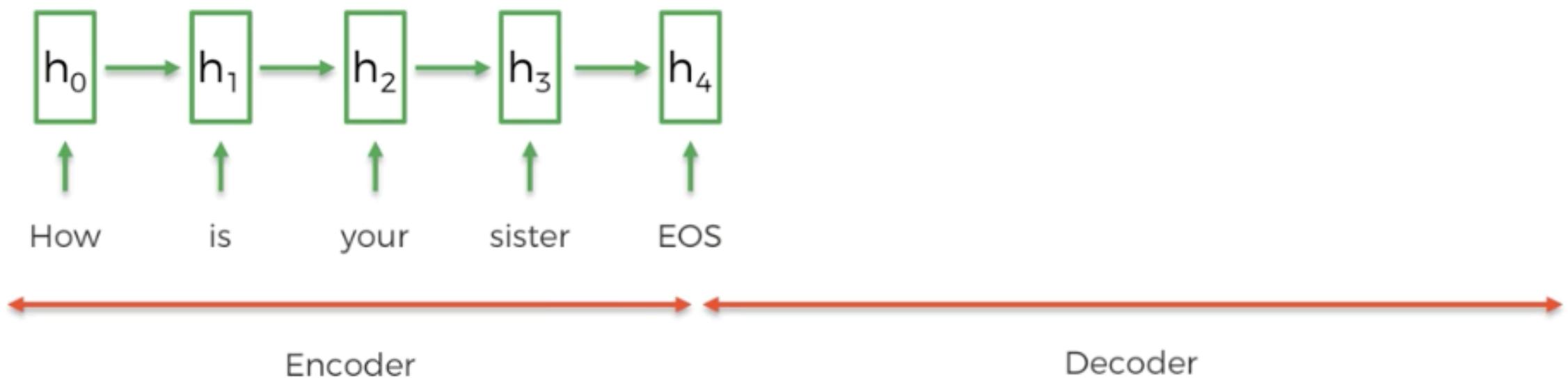
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Attention Mechanisms

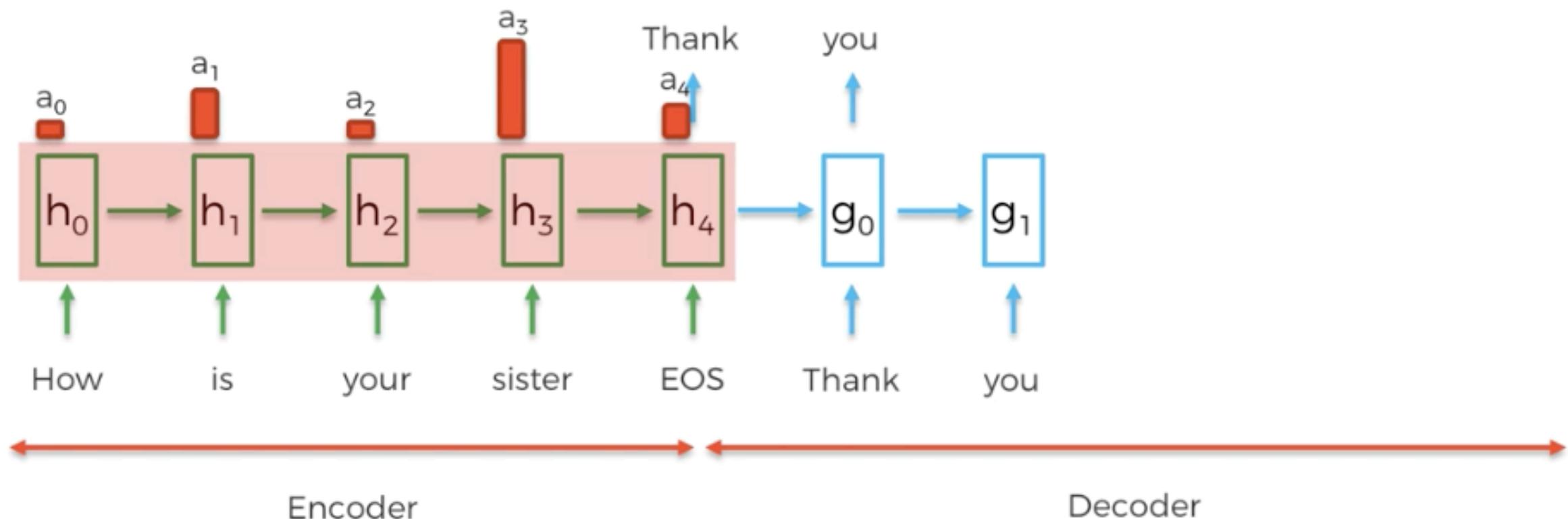
Problem~



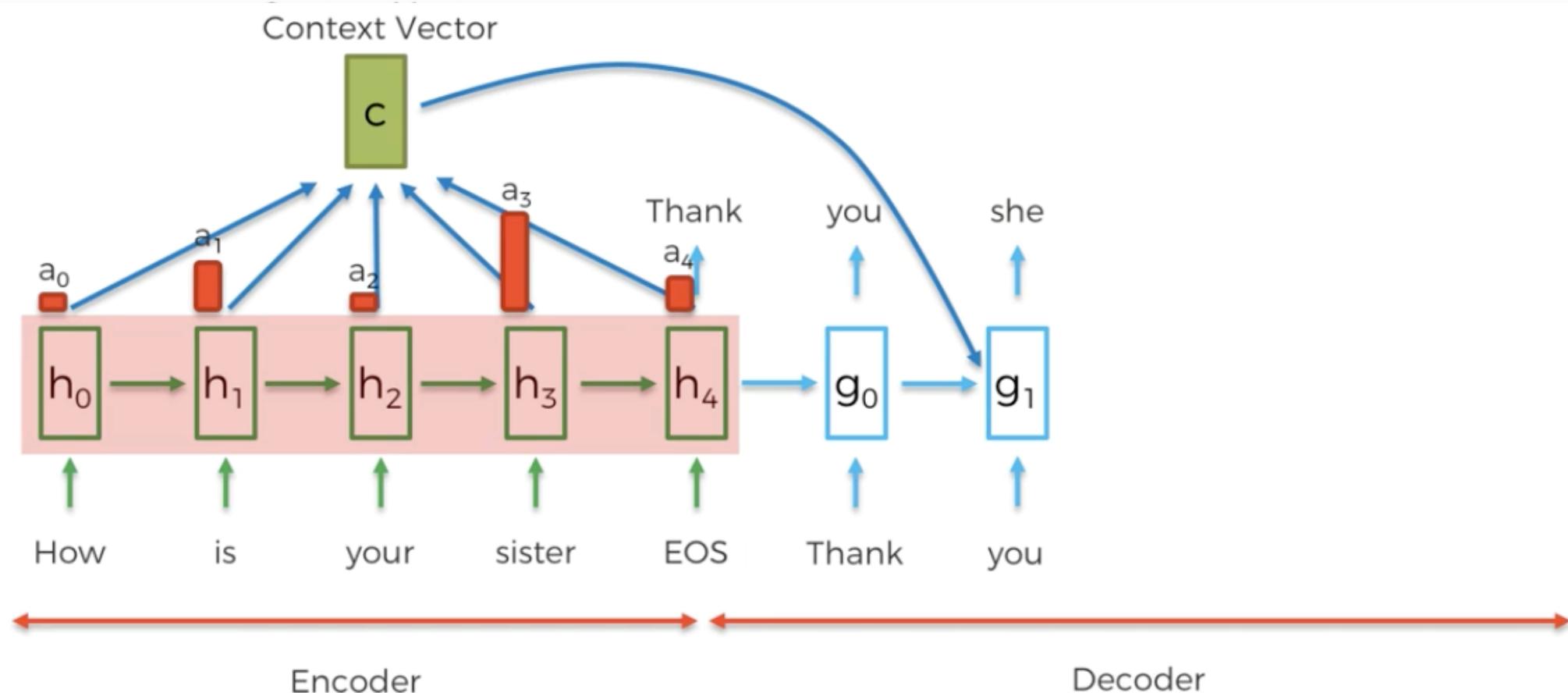
Attention Mechanisms



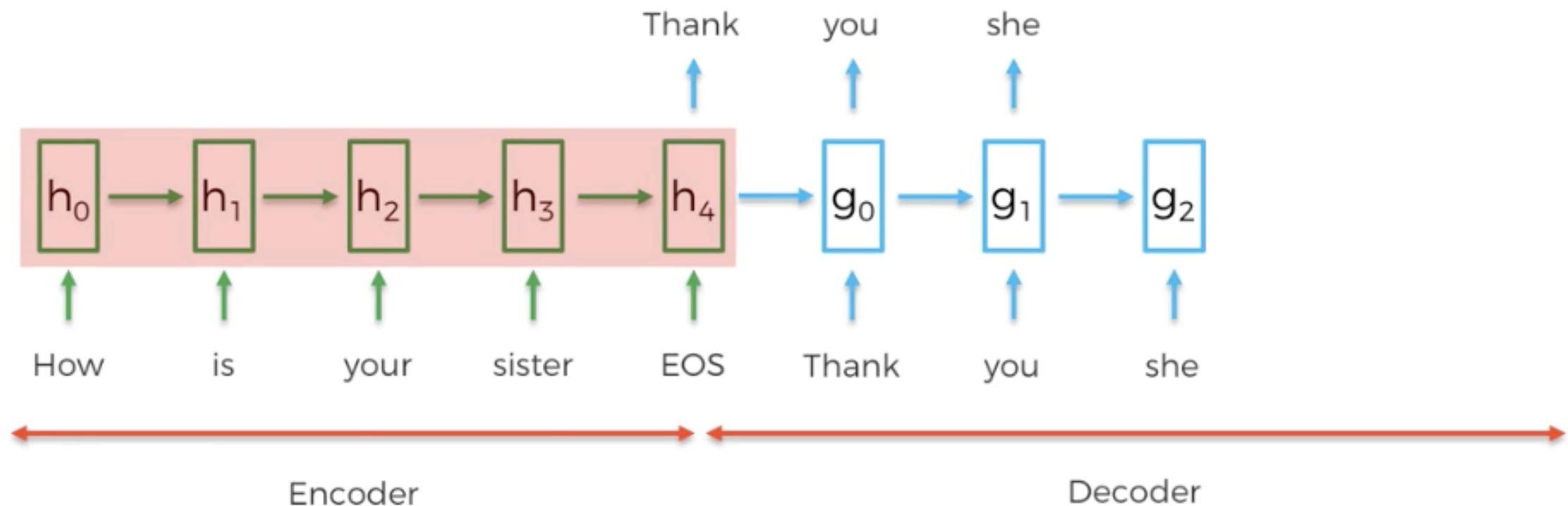
Attention Mechanisms



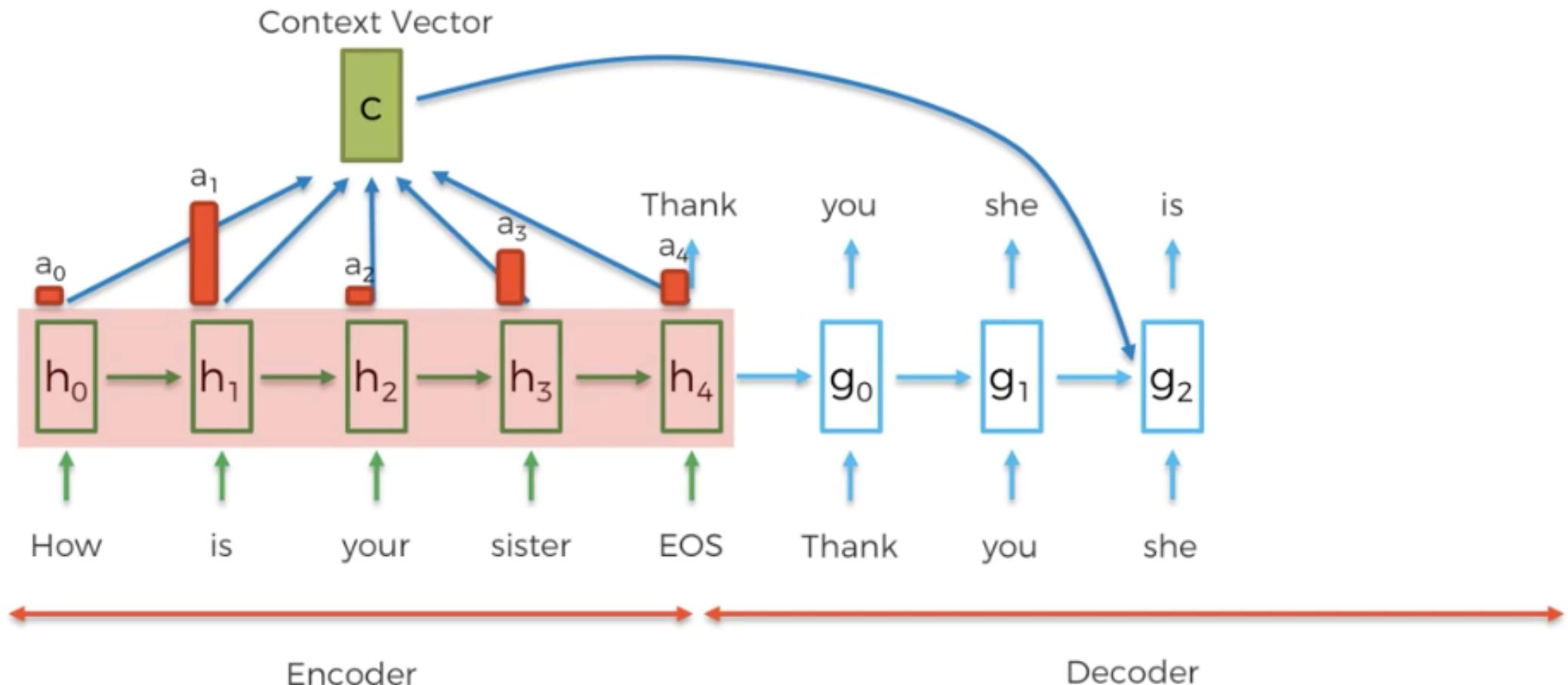
Attention Mechanisms



Attention Mechanisms



Attention Mechanisms



Attention Mechanisms

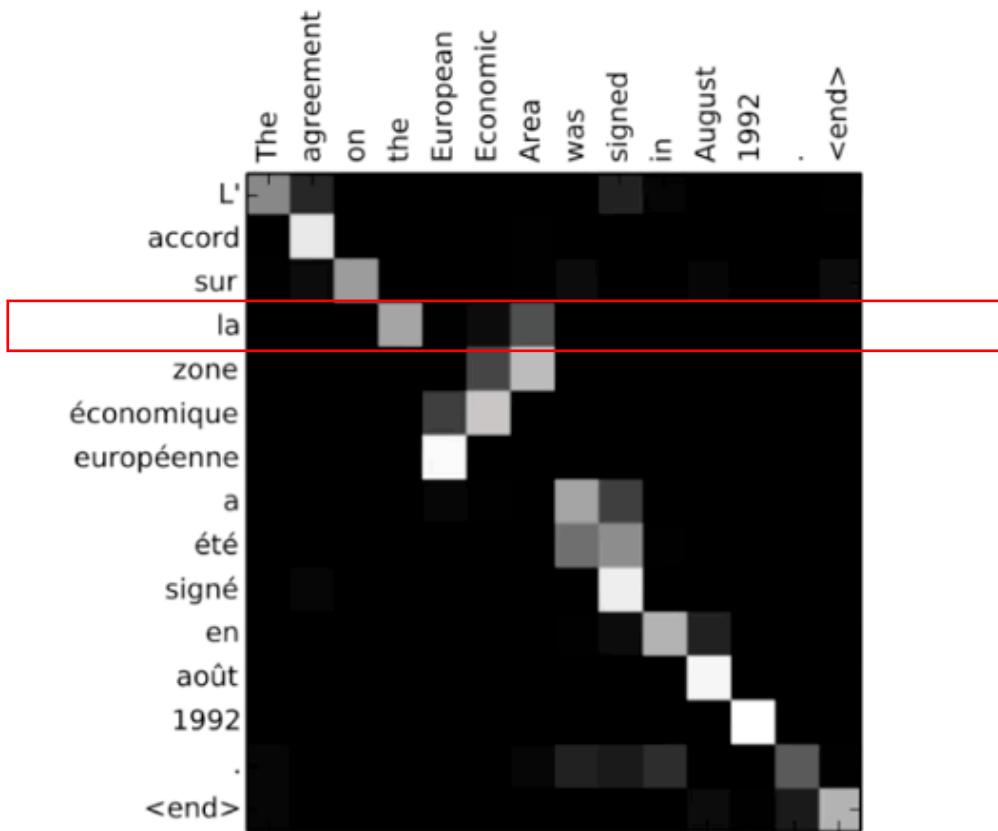


Image Source: <https://arxiv.org/pdf/1409.0473.pdf>

Attention Mechanisms

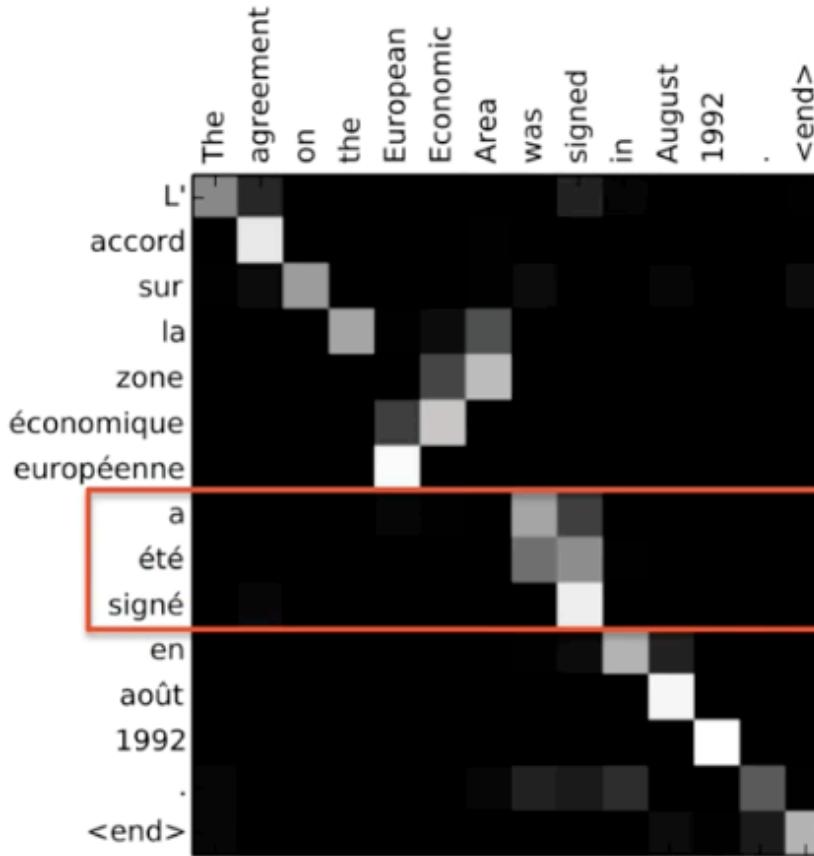


Image Source: <https://arxiv.org/pdf/1409.0473.pdf>

Attention Mechanisms

Effective Approaches to Attention-based Neural Machine Transaltion by Mihn-Thang Luong et al. (2015)

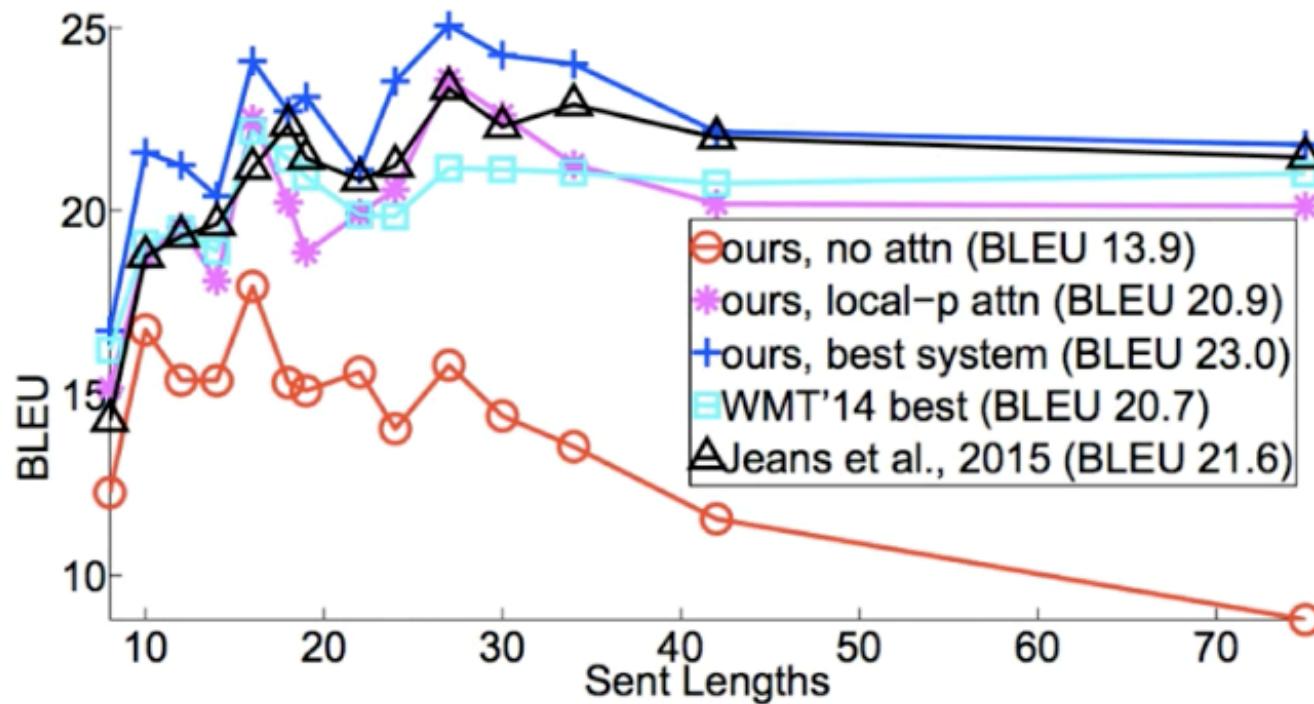
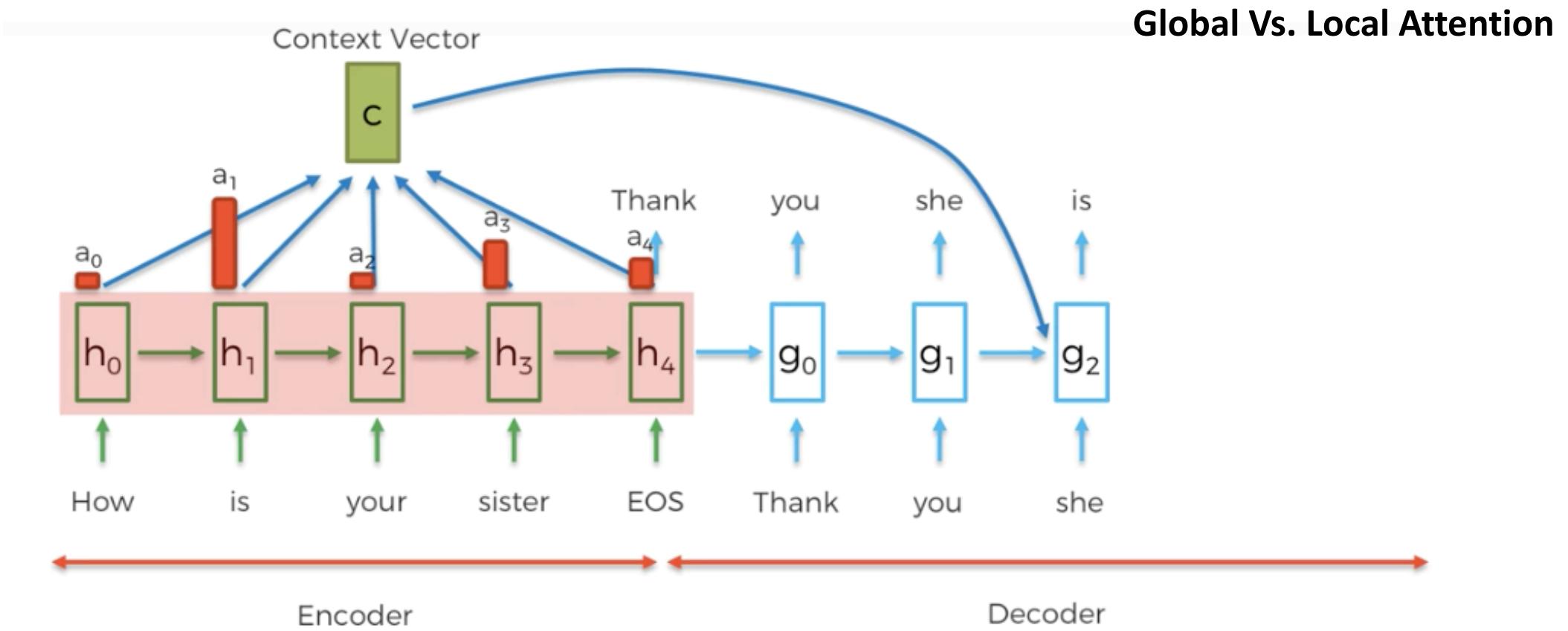


Image Source: <https://arxiv.org/pdf/1508.04025.pdf>

Attention Mechanisms



Code Examples

- <https://medium.com/deep-learning-with-keras/seq2seq-part-f-encoder-decoder-with-bahdanau-luong-attention-mechanism-ca619e240c55>
- <https://levelup.gitconnected.com/building-seq2seq-lstm-with-luong-attention-in-keras-for-time-series-forecasting-1ee00958decb>
- [https://www.tensorflow.org/text/tutorials/nmt with attention](https://www.tensorflow.org/text/tutorials/nmt_with_attention)
- <https://machinelearningmastery.com/encoder-decoder-attention-sequence-to-sequence-prediction-keras/>