



deeplearning.ai

Sequence to sequence models

Error analysis on beam search

Example

Jane visite l'Afrique en septembre.

→ RNN

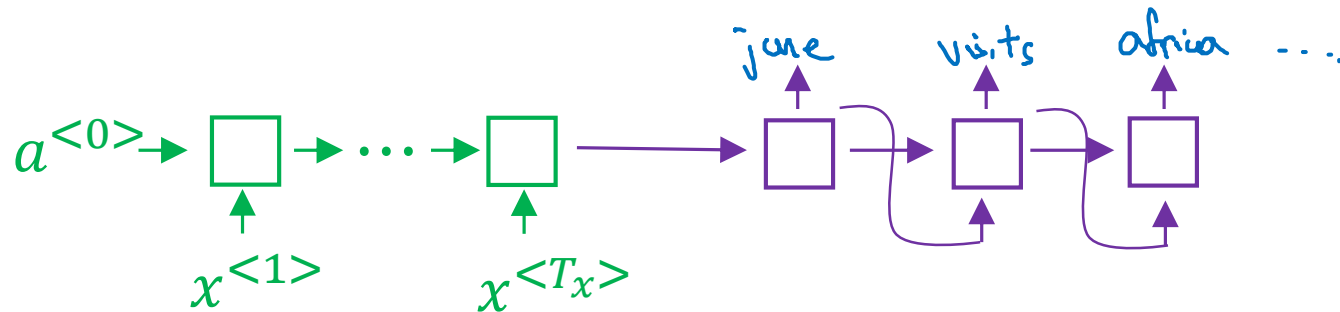
→ Beam Search

BT

Human: Jane visits Africa in September. (y^*)

Algorithm: Jane visited Africa last September. (\hat{y}) ←

RNN computes $P(y^*|x) \geq P(\hat{y}|x)$



Error analysis on beam search

Human: Jane visits Africa in September. (y^*)

$$P(y^*|x)$$

Algorithm: Jane visited Africa last September. (\hat{y})

$$P(\hat{y}|x)$$

Case 1: $P(y^*|x) > P(\hat{y}|x)$ ←

$$\arg \max_y P(y|x)$$

Beam search chose \hat{y} . But y^* attains higher $P(y|x)$.

Conclusion: Beam search is at fault.

Case 2: $P(y^*|x) \leq P(\hat{y}|x)$ ←

y^* is a better translation than \hat{y} . But RNN predicted $P(y^*|x) < P(\hat{y}|x)$.

Conclusion: RNN model is at fault.

Error analysis process

Human	Algorithm	$P(y^* x)$	$P(\hat{y} x)$	At fault?
Jane visits Africa in September. - - - ...	Jane visited Africa last September. - - - ...	$\frac{2 \times 10^{-10}}{\text{---}}$ ---	$\frac{1 \times 10^{-10}}{\text{---}}$ ---	<div>B</div> <div>R</div> <div>R</div> <div>R</div> <div>R</div> <div>...</div>

Figures out what fraction of errors are “due to” beam search vs. RNN model