



deeplearning.ai

Sequence to sequence models

Error analysis on beam search

Example

Jane visite l'Afrique en septembre.

→ RNN

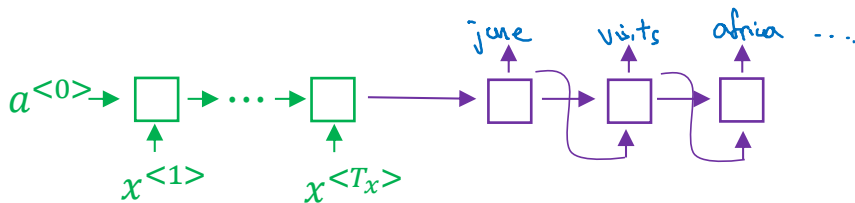
→ Beam Search



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

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

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



Error analysis on beam search

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

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

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

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

Case 1: $P(y^*|x) > P(\hat{y}|x)$ \leftarrow

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

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

Conclusion: Beam search is at fault.

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

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

Conclusion: RNN model is at fault.

Error analysis process

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

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