

# Machine Learning 2

DS 4420 - Spring 2020

Sequence-2-sequence models

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# Today

- Learning to map between sequences

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Input

$\mathbf{x}_1$

$\mathbf{x}_2$

...

$\mathbf{x}_{T-1}$

$\mathbf{x}_T$

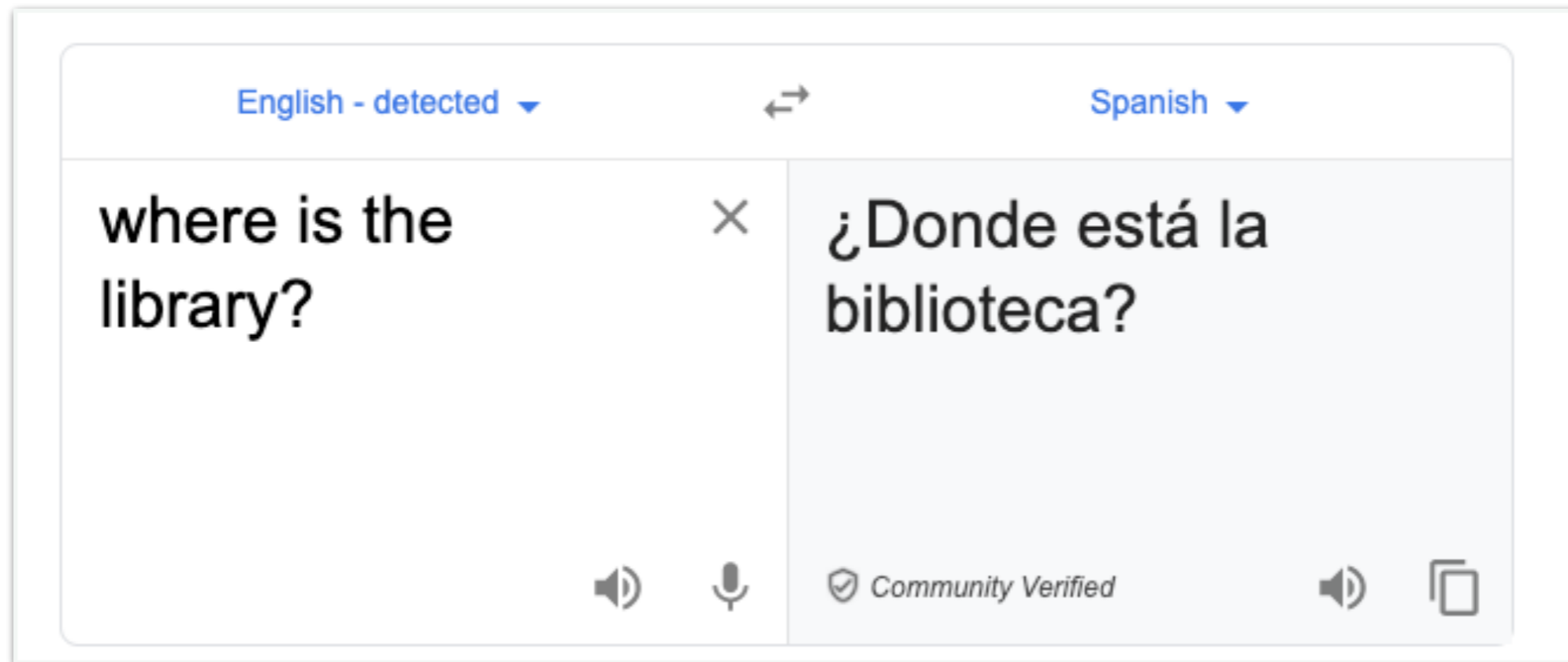
Output



Input



# Motivating Example: Translation



Spanish

*donde*      *esta*      ...      *la*      *bibliotheque?*  
 $y_1$        $y_2$       ...       $y_{T-1}$        $y_T$



English

$x_1$        $x_2$       ...       $x_{T-1}$        $x_T$   
*where*      *is*      ...      *the*      *library?*

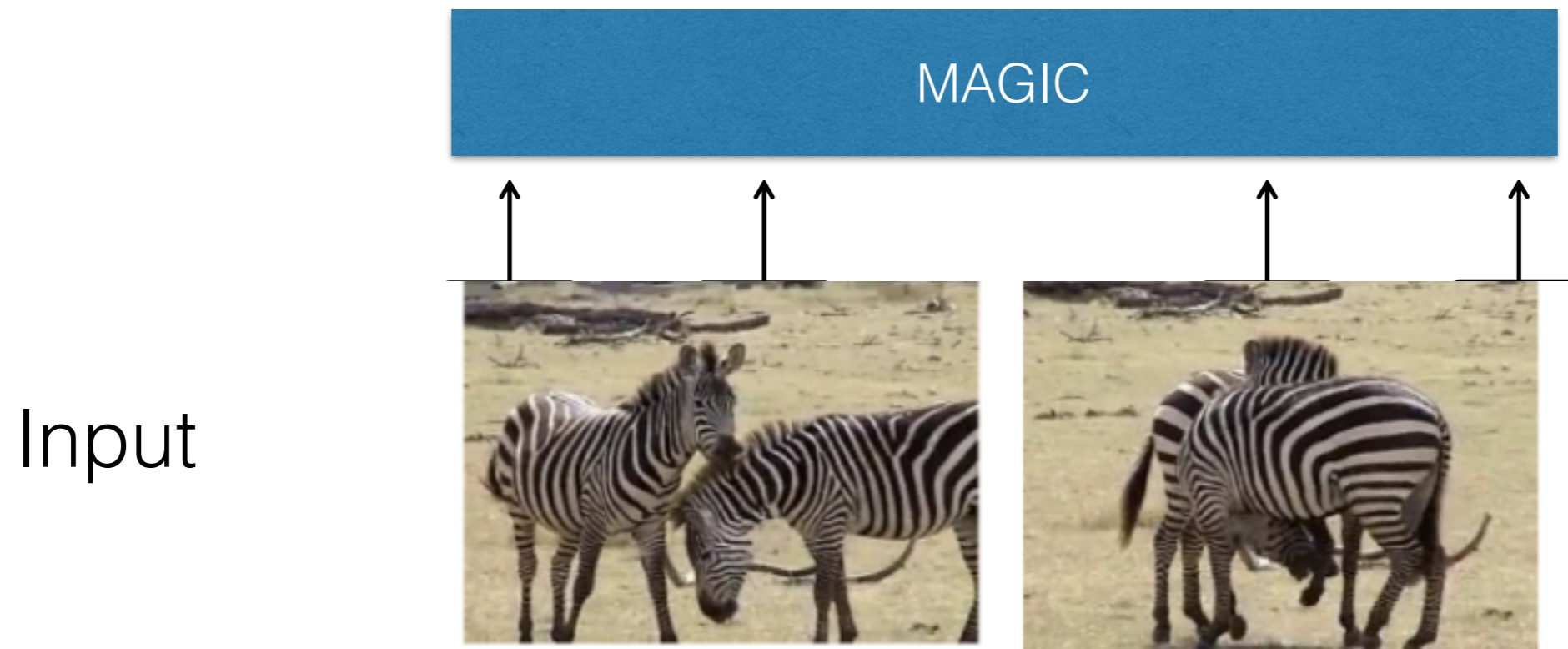
# Motivating Example: Sequence Captioning

Input





# Motivating Example: Sequence Captioning

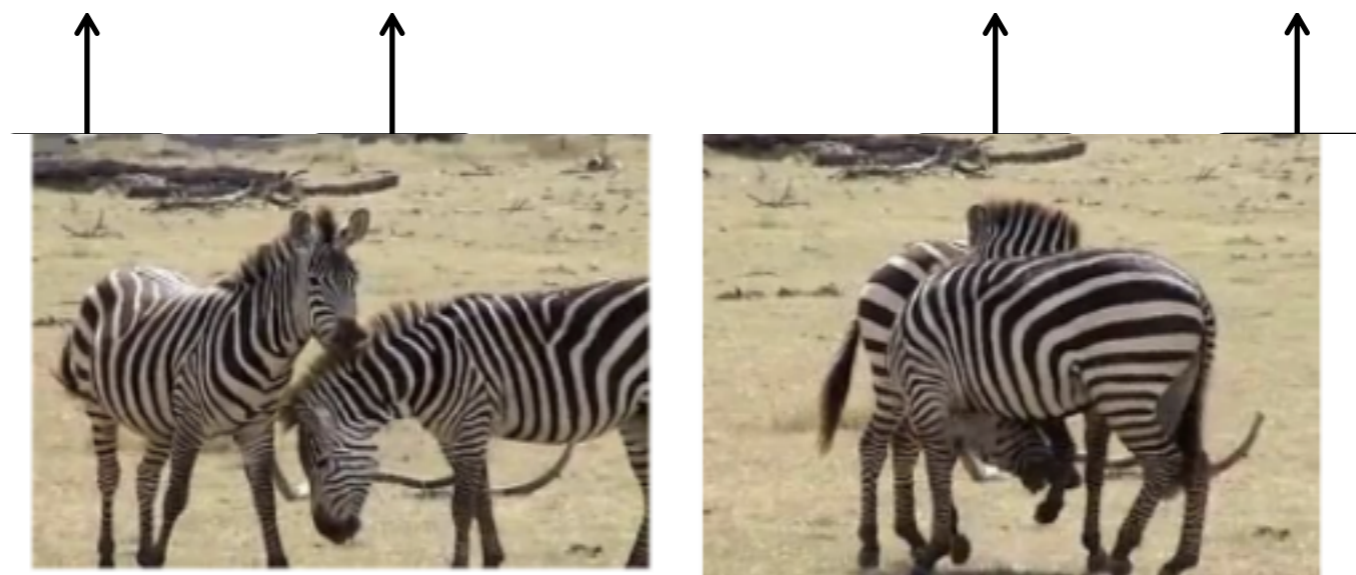


# Motivating Example: Sequence Captioning

Output S2VT: A herd of zebras are walking in a field.



Input

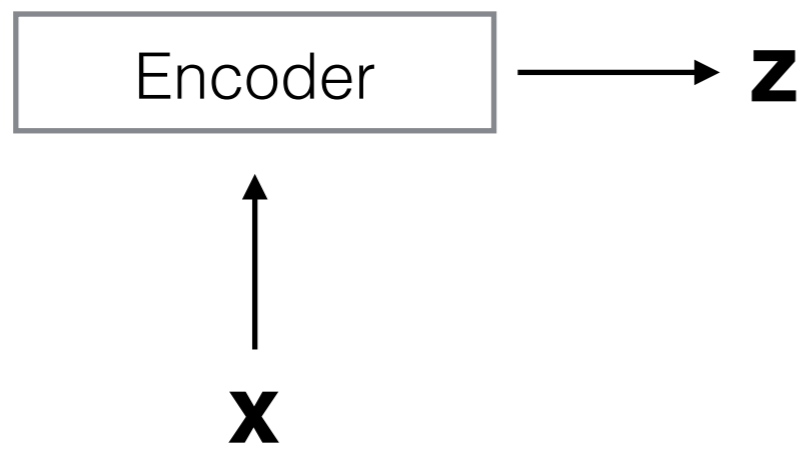


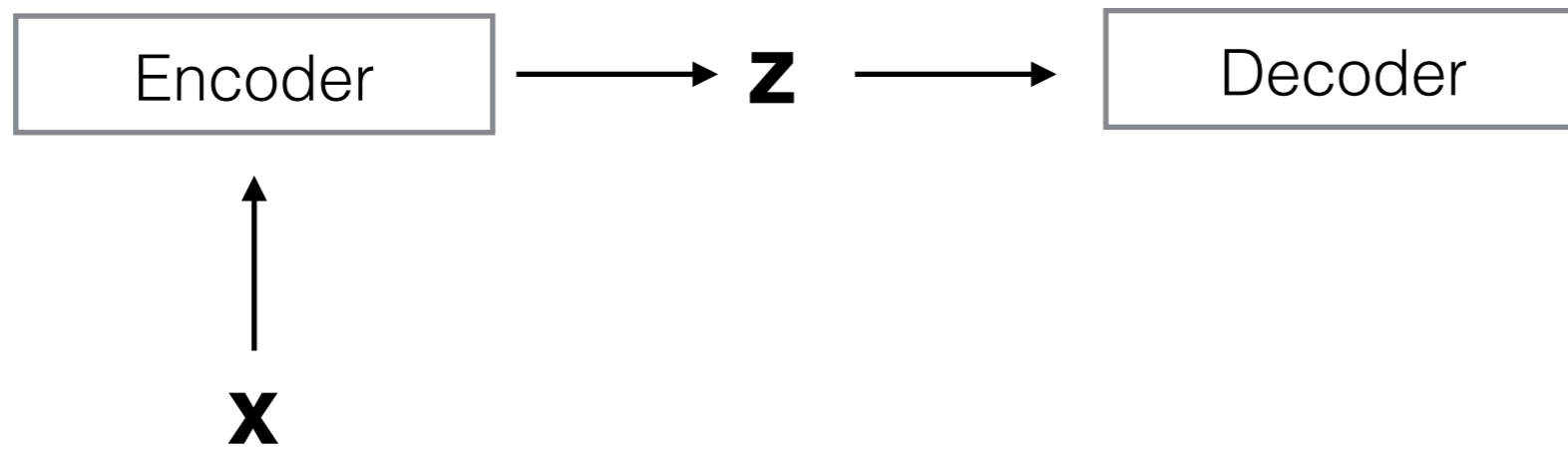
MAGIC

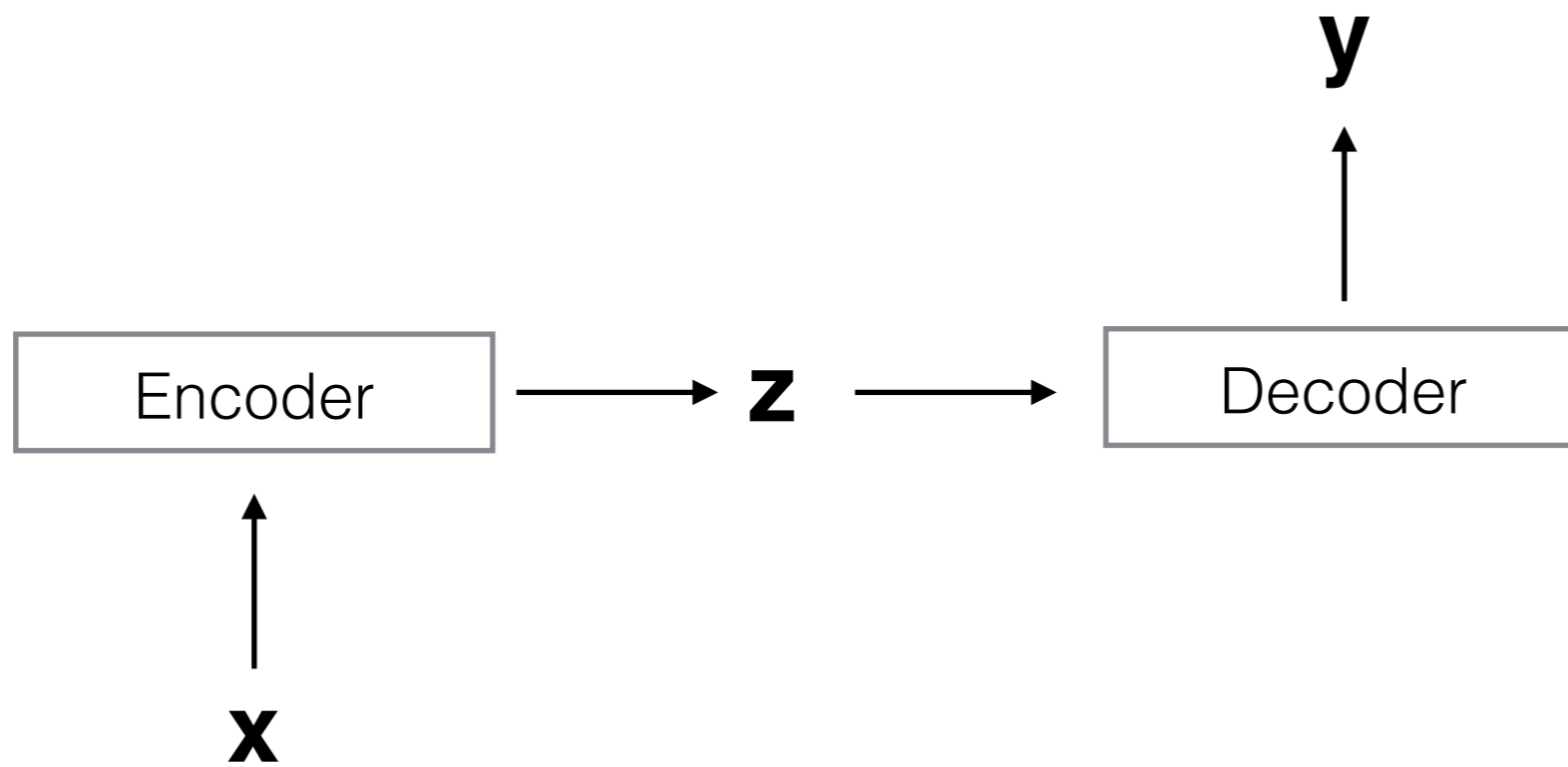
# *Encoder-Decoder* Models

Encoder



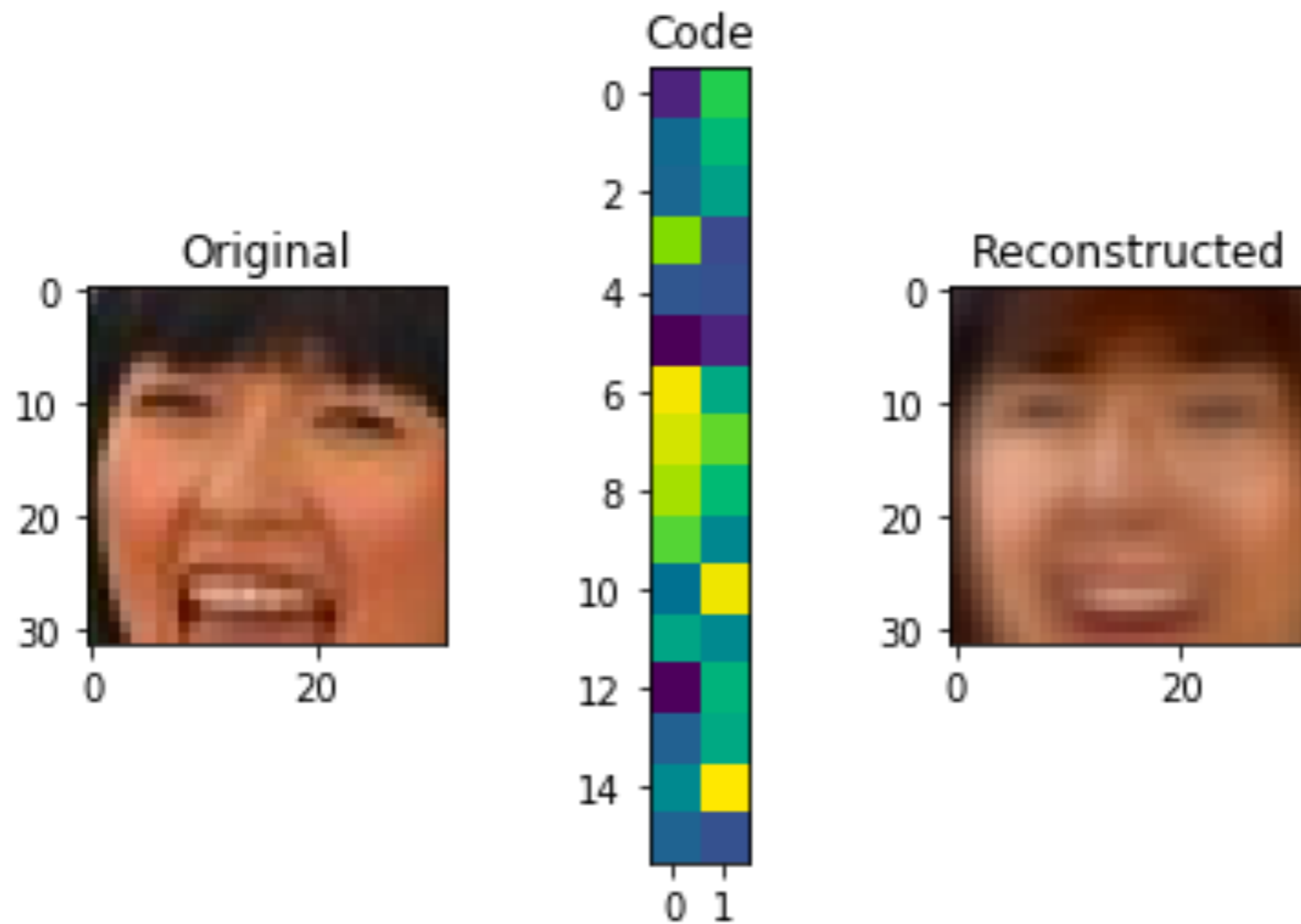






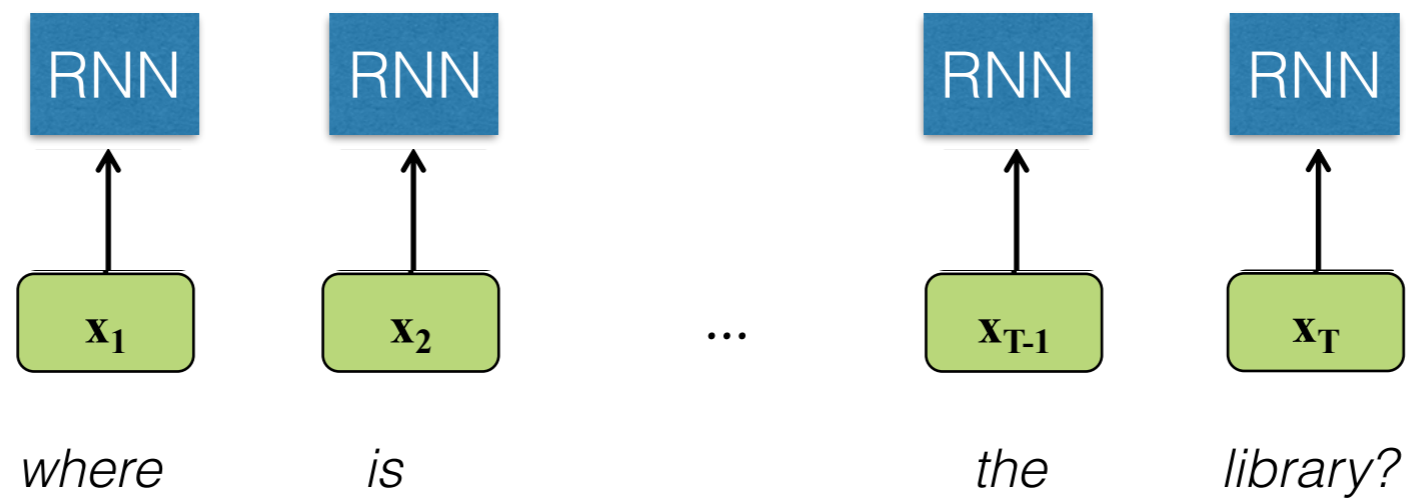


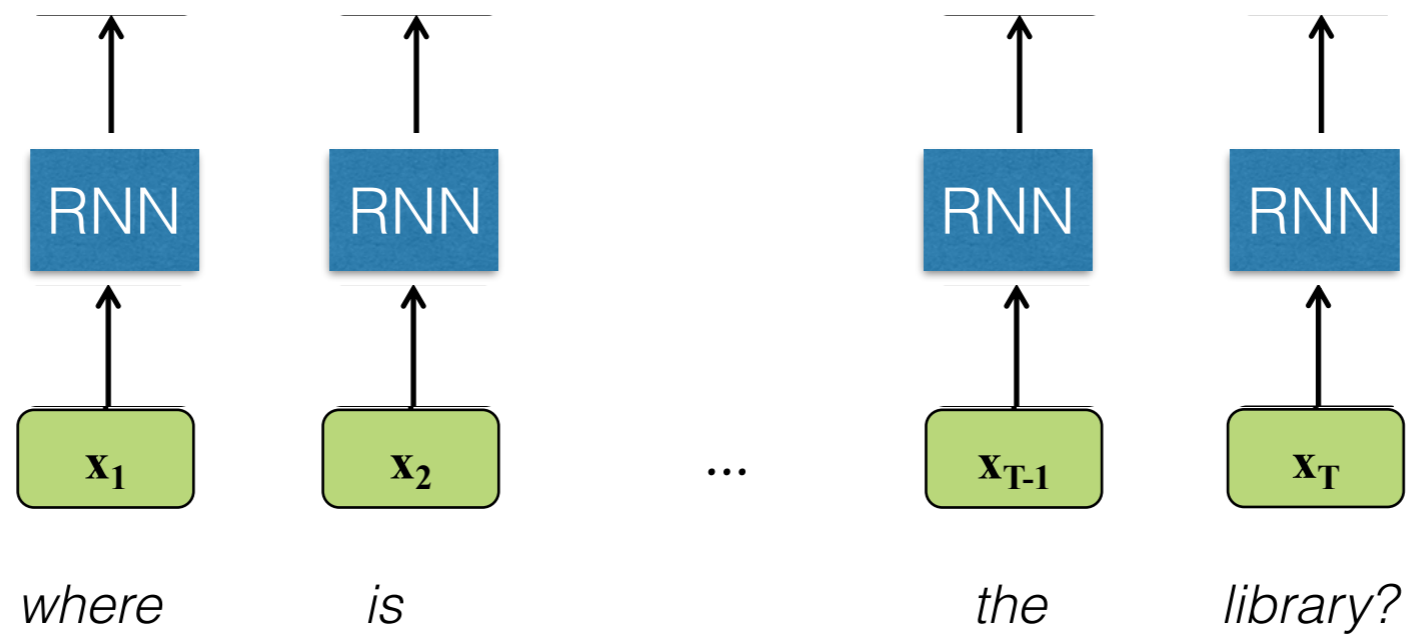
# Recall: Auto-Encoders



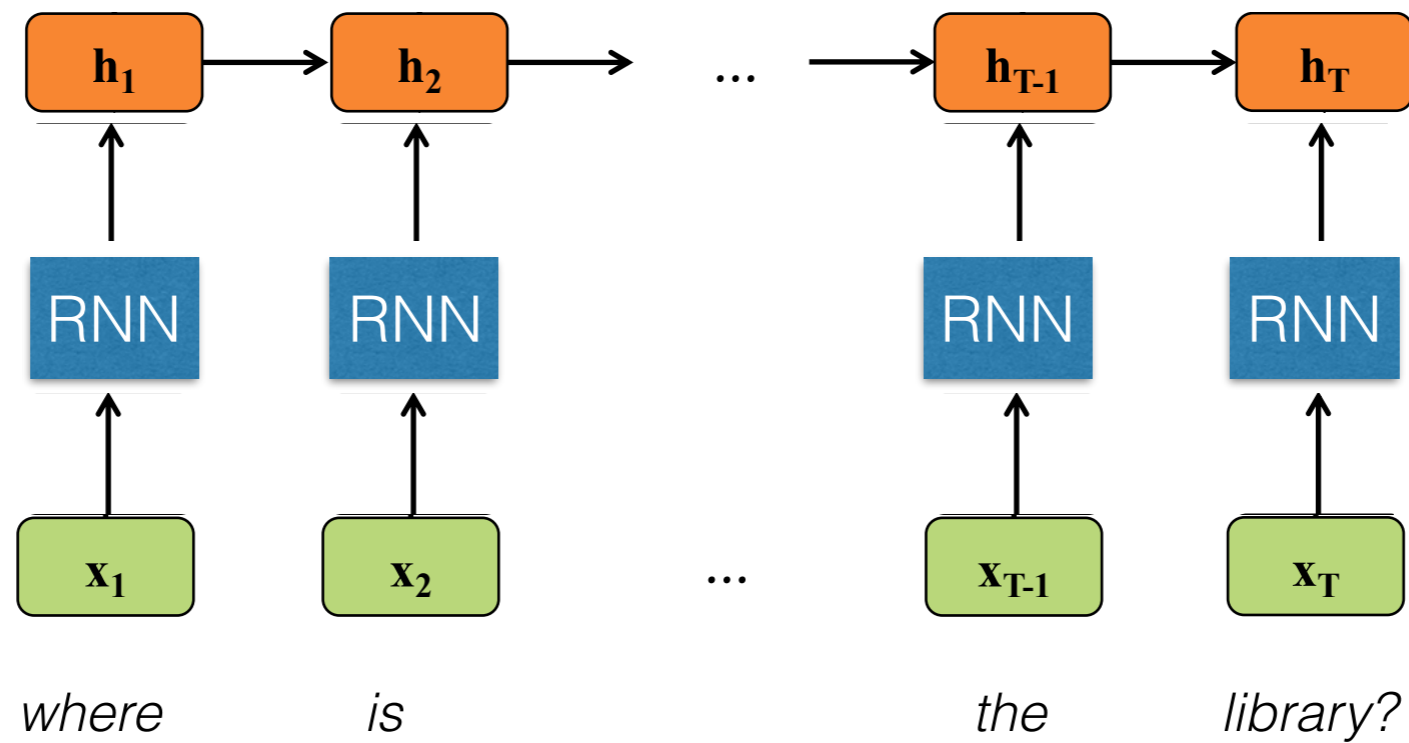
# RNN encoder



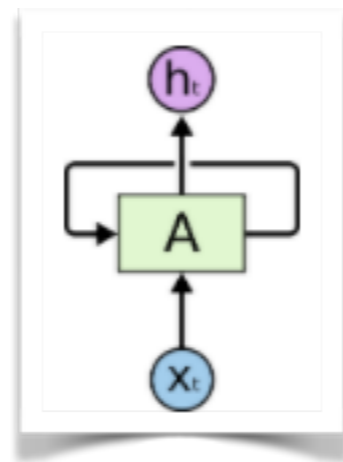




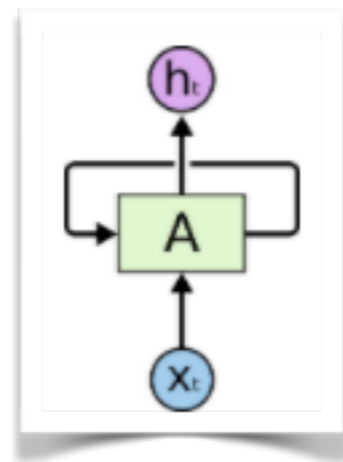
*Encoder*



# RNN refresher

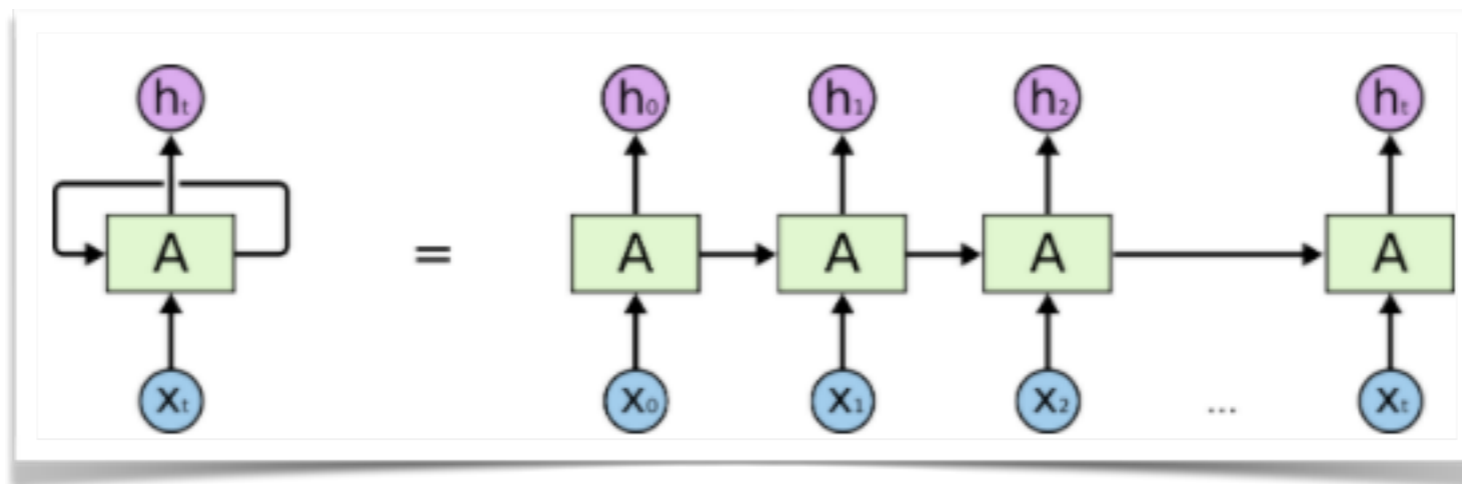


# RNN refresher



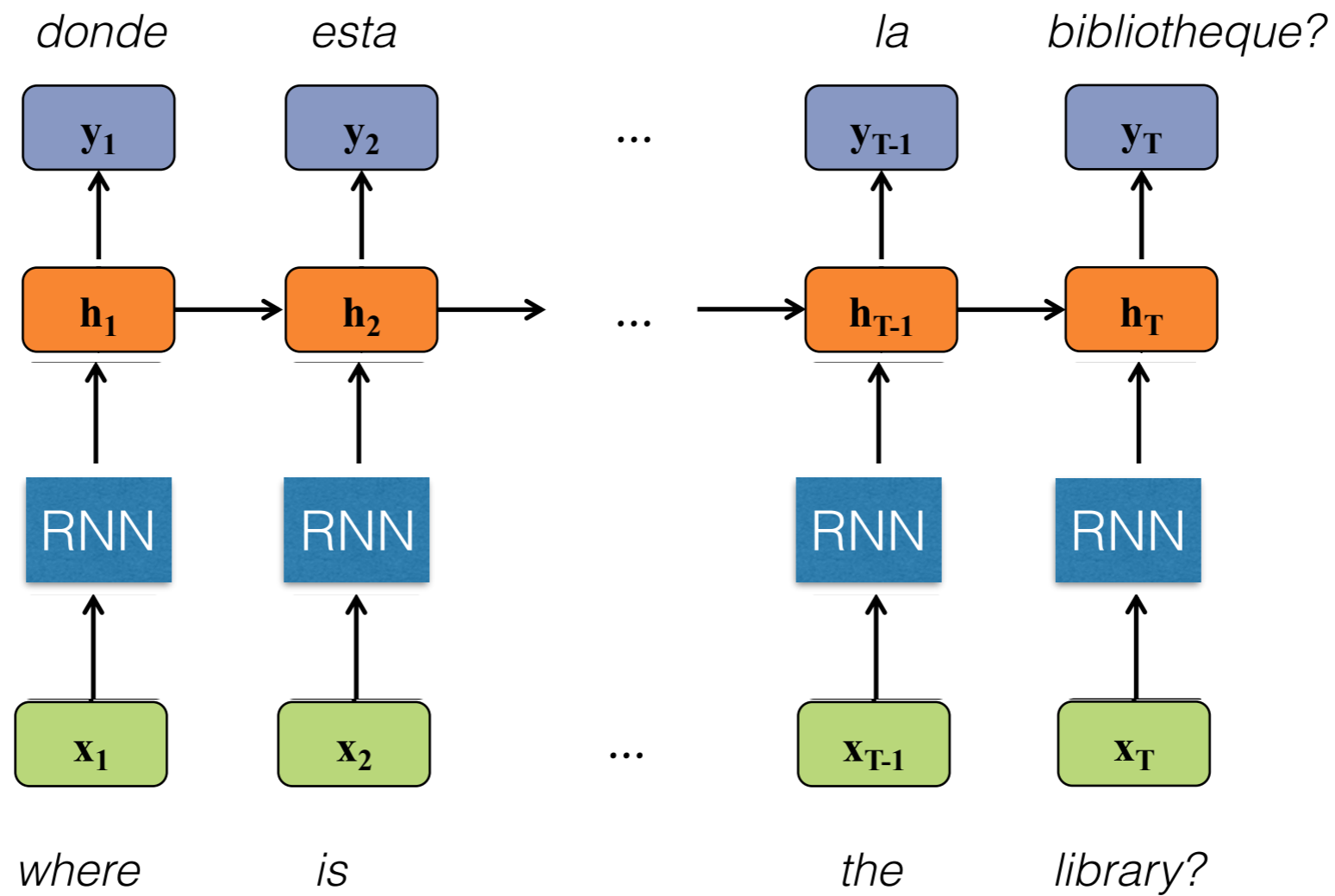
$$h_t = f_{\theta}(x_t, h_{t-1})$$

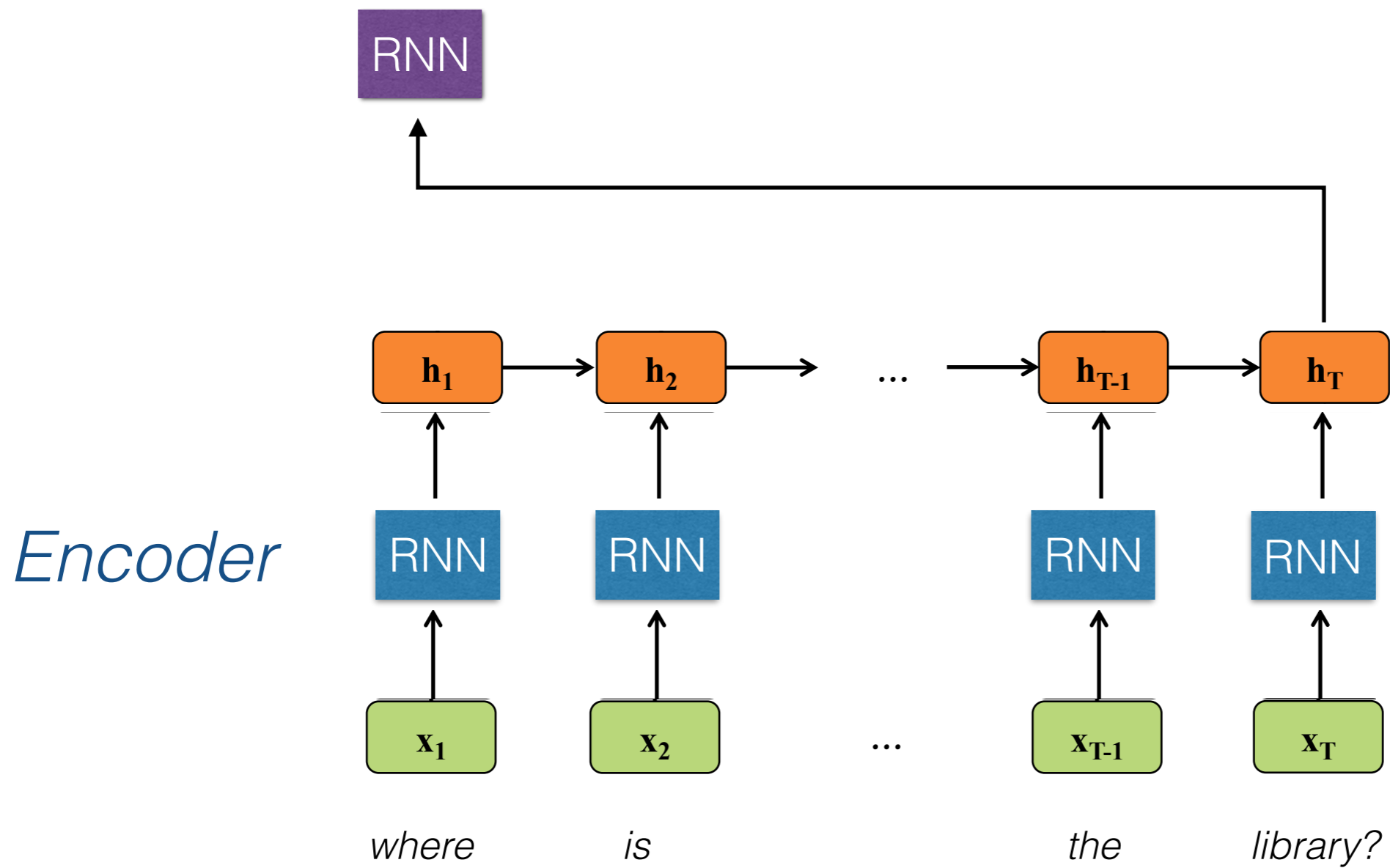
# RNN refresher

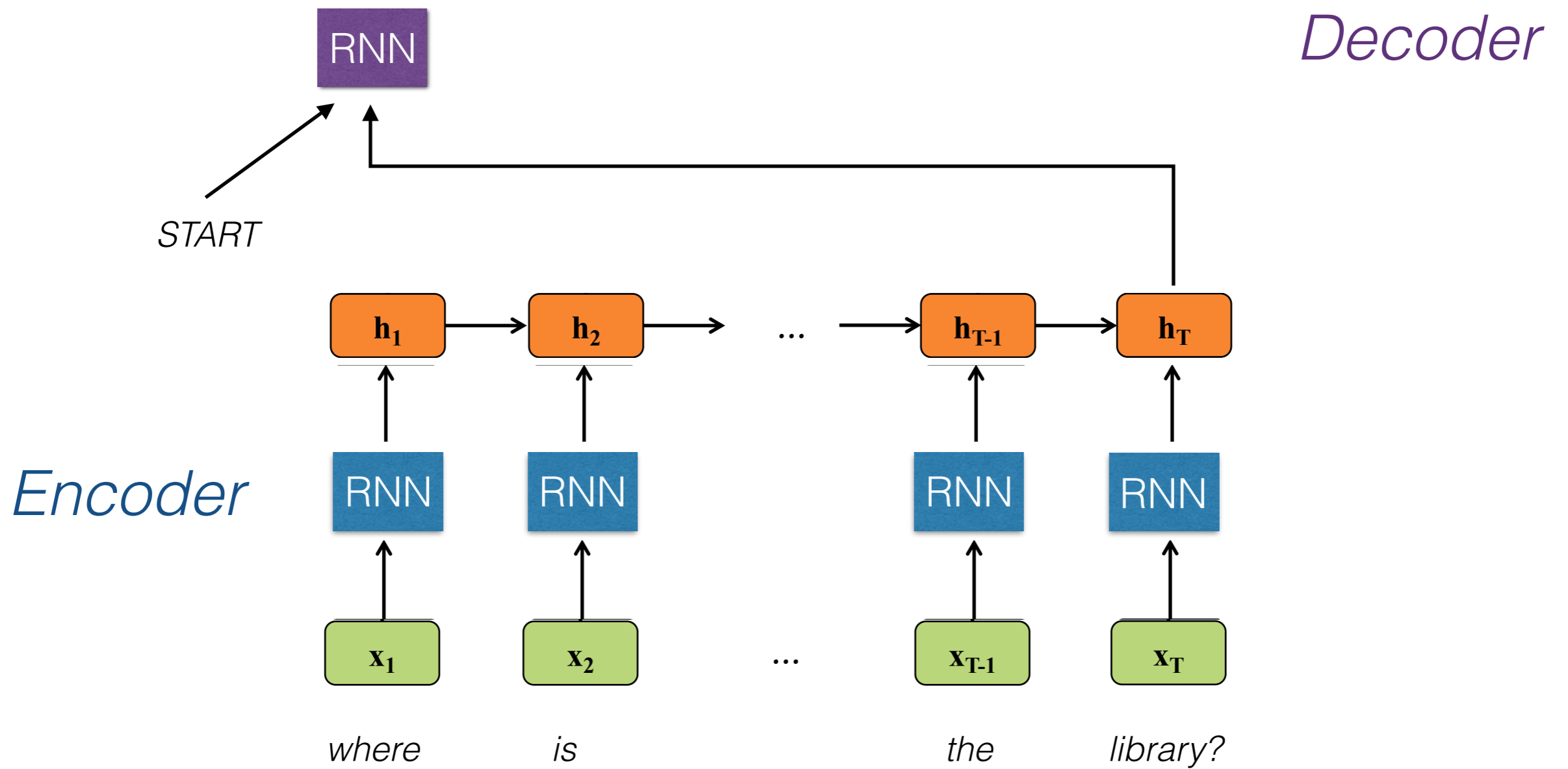


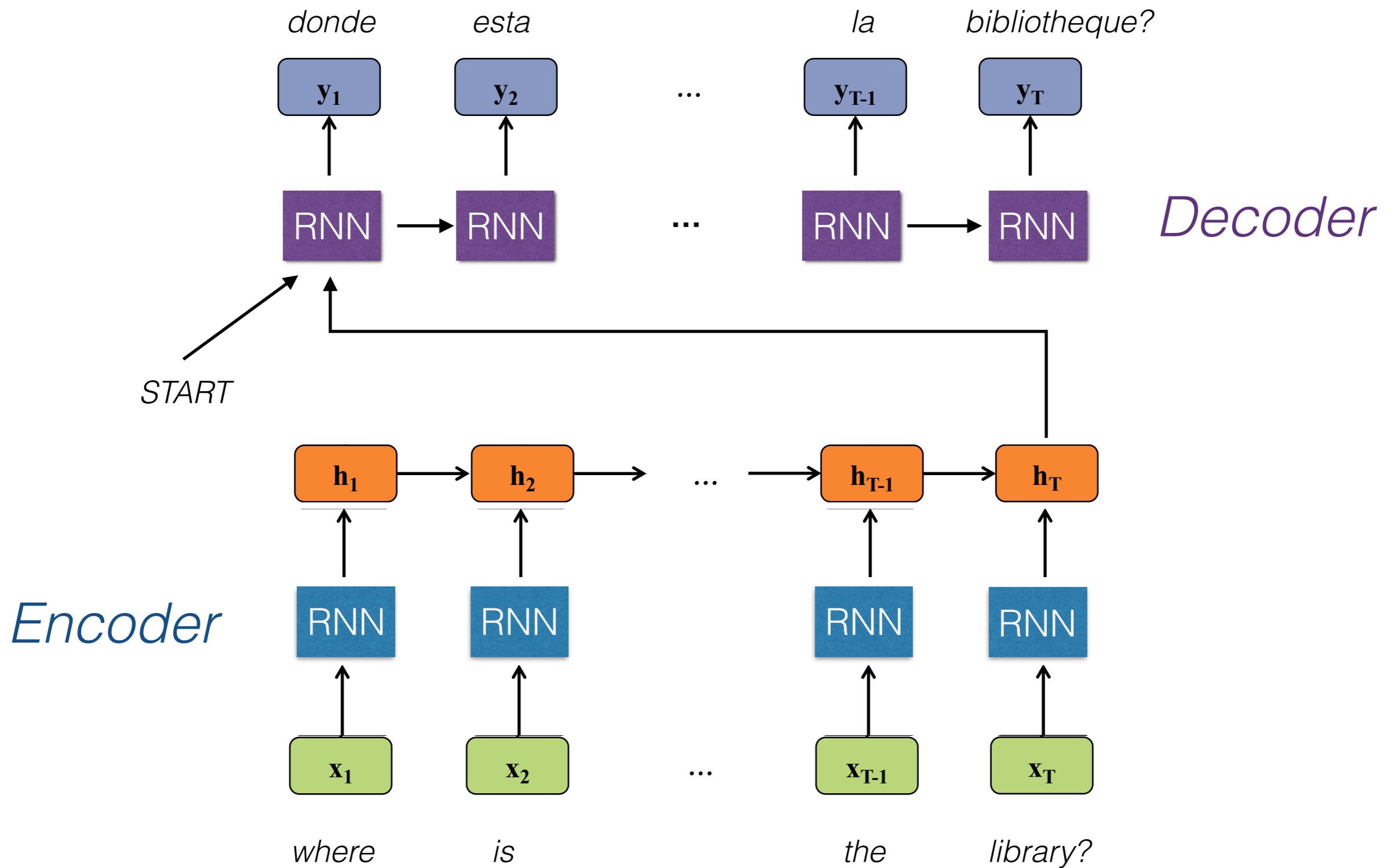


*Encoder*









Let's think about a concrete example...

[https://colab.research.google.com/drive/1z\\_uyUjmXjpqbPwE7JWxYX116O0229aVK](https://colab.research.google.com/drive/1z_uyUjmXjpqbPwE7JWxYX116O0229aVK)