



deeplearning.ai

# Recurrent Neural Networks

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Language model and  
sequence generation

# What is language modelling?

## Speech recognition

The apple and pair salad.

→ The apple and pear salad.

$$P(\text{The apple and pair salad}) = 3.2 \times 10^{-13}$$

$$P(\text{The apple and pear salad}) = 5.7 \times 10^{-10}$$

$$P(\text{Sentence}) = ?$$

$$P(y^{(1)}, y^{(2)}, \dots, y^{(T)})$$

# Language modelling with an RNN

Training set: large corpus of english text.

Tokenize

Cats average 15 hours of sleep a day.  $\downarrow$   $\langle \text{EOS} \rangle$

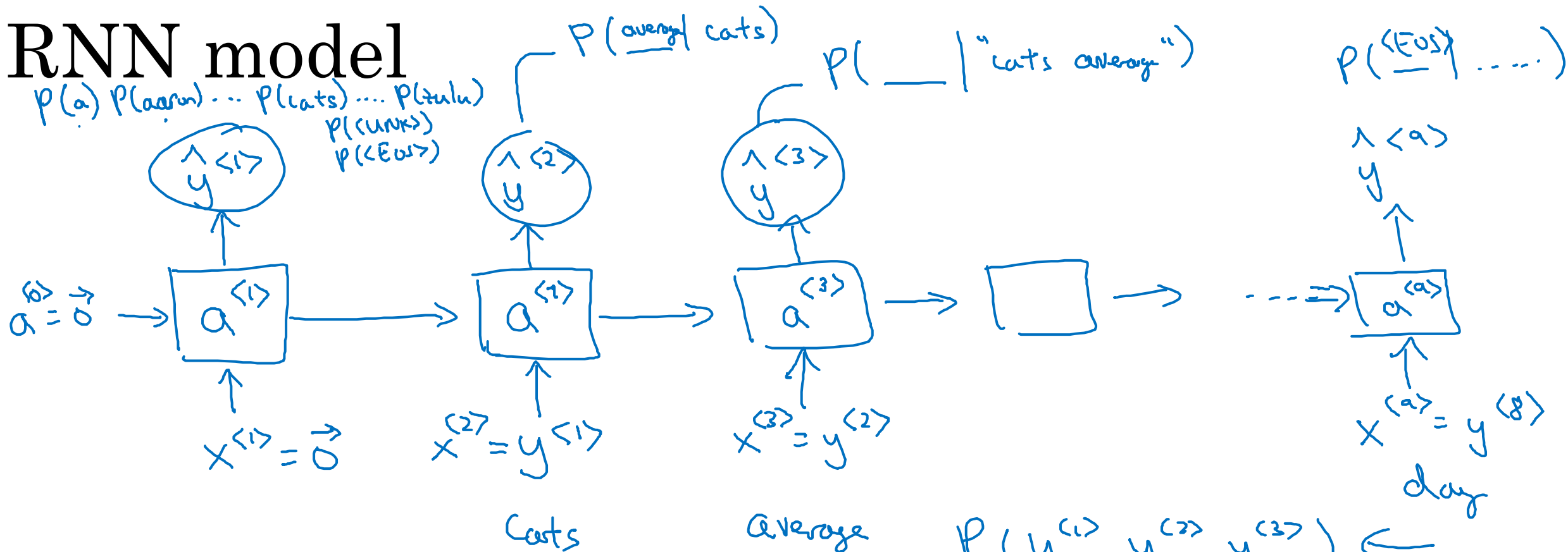
$y^{(1)}$     $y^{(2)}$     $y^{(3)}$    ...    $y^{(8)}$     $y^{(9)}$   
 $x^{(t)} = y^{(t-1)}$

The Egyptian ~~Mau~~ is a breed of cat.  $\langle \text{EOS} \rangle$

$\langle \text{UNK} \rangle$

10,000

# RNN model



→ Cats average 15 hours of sleep a day. <EOS>

$$\mathcal{L}(\hat{y}^{<t>}, y^{<t>}) = - \sum_i y_i^{<t>} \log \hat{y}_i^{<t>}$$

$$\mathcal{L} = \sum_t \mathcal{L}^{<t>}(\hat{y}^{<t>}, y^{<t>})$$

$$p(y^{(1)}, y^{(2)}, y^{(3)}) \leftarrow$$

$$= \frac{p(y^{(1)}) p(y^{(2)} | y^{(1)})}{p(y^{(3)} | y^{(1)}, y^{(2)})}$$