

# 递归神经网络

时间之箭

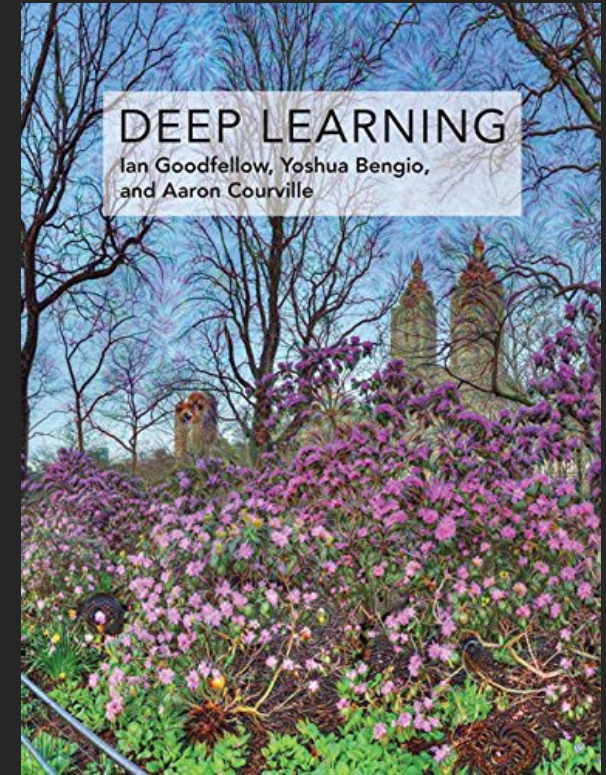
# 预备知识

## 参考教材

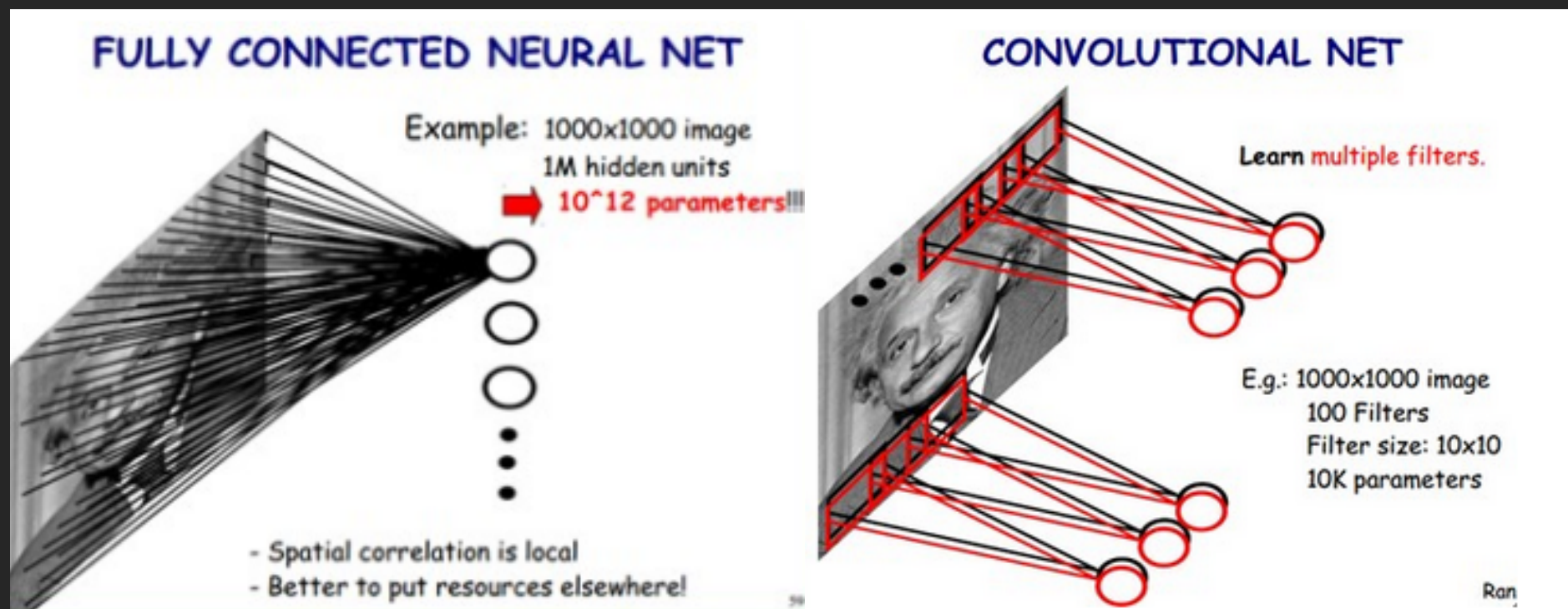
Deep Learning

<http://www.deeplearningbook.org/>

<https://github.com/HFTrader/DeepLearningBook>

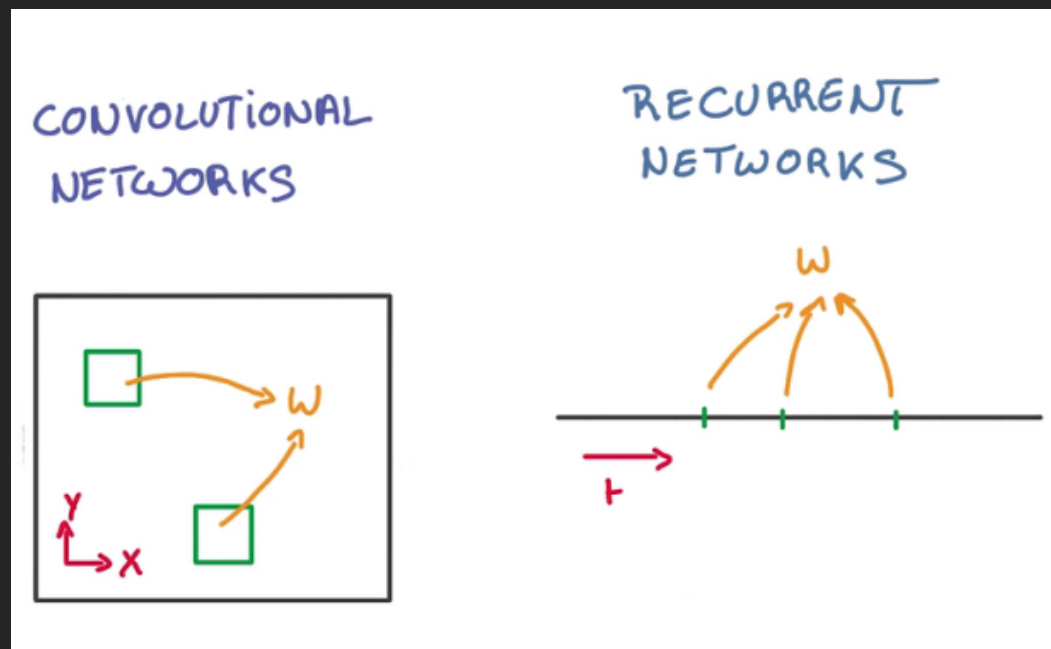


# 参数共享



# RNN与CNN

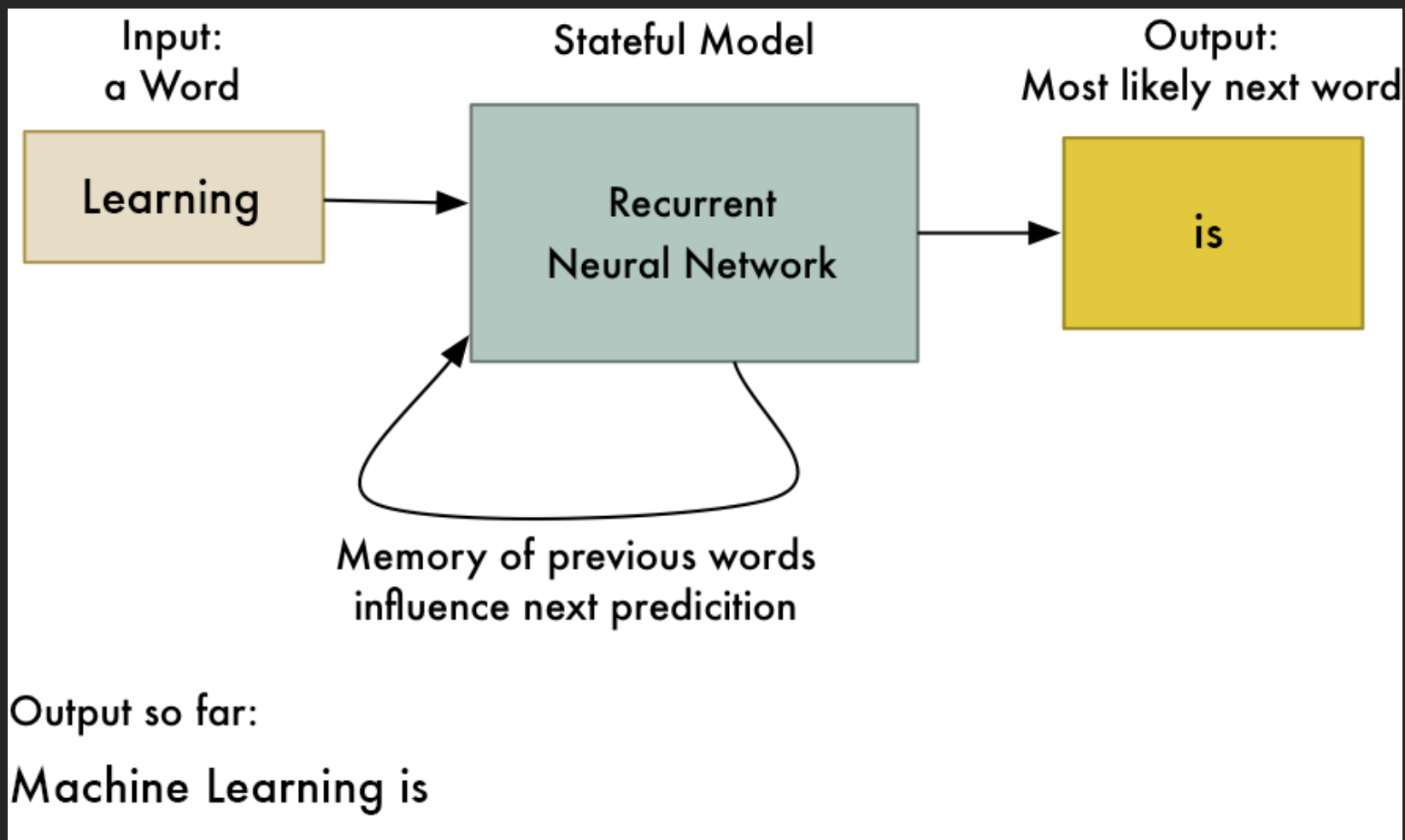
二者都是参数共享的手段



CNN – 空间维度

RNN – 时间维度

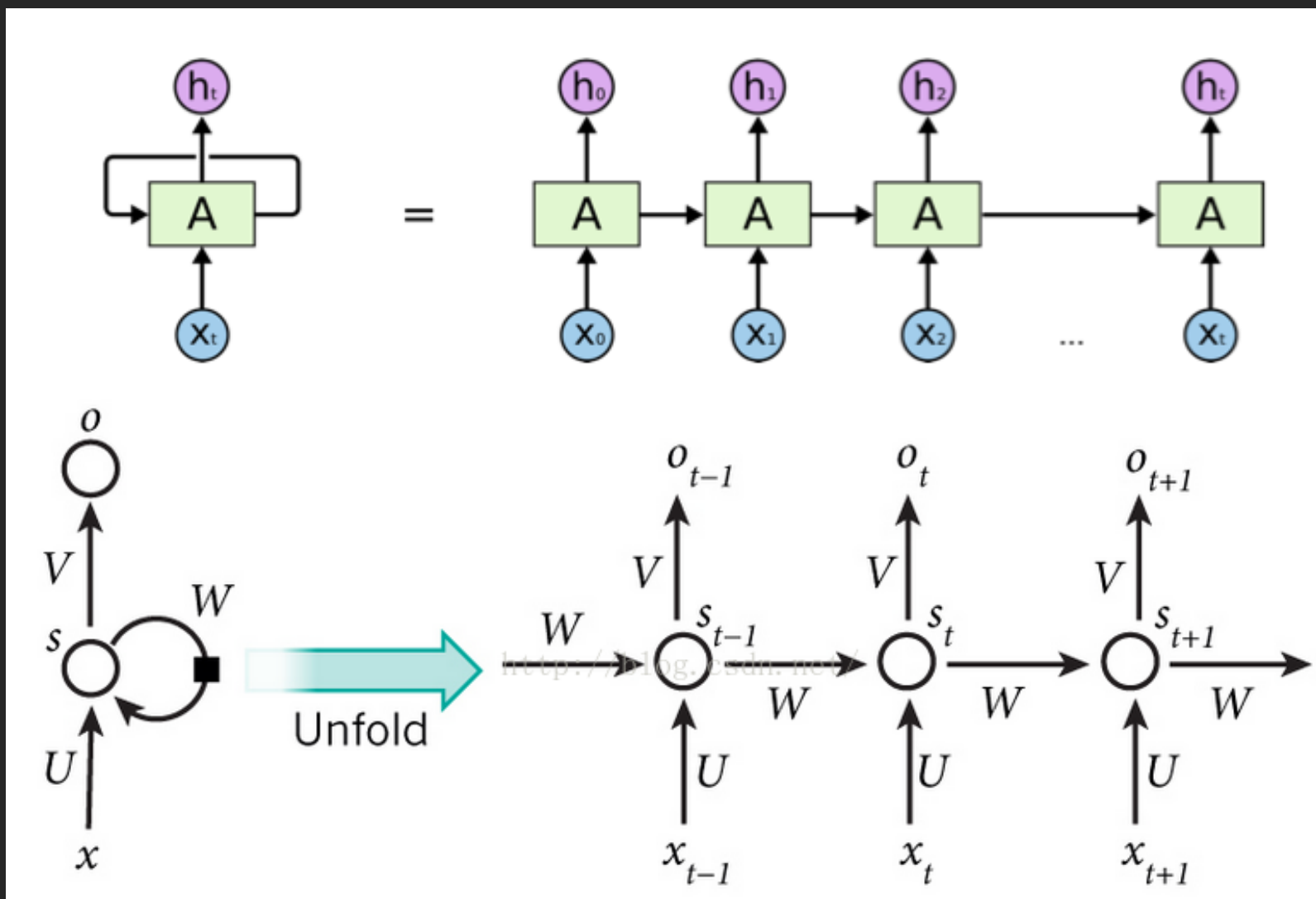
# 递归神经网络 ( RNN )



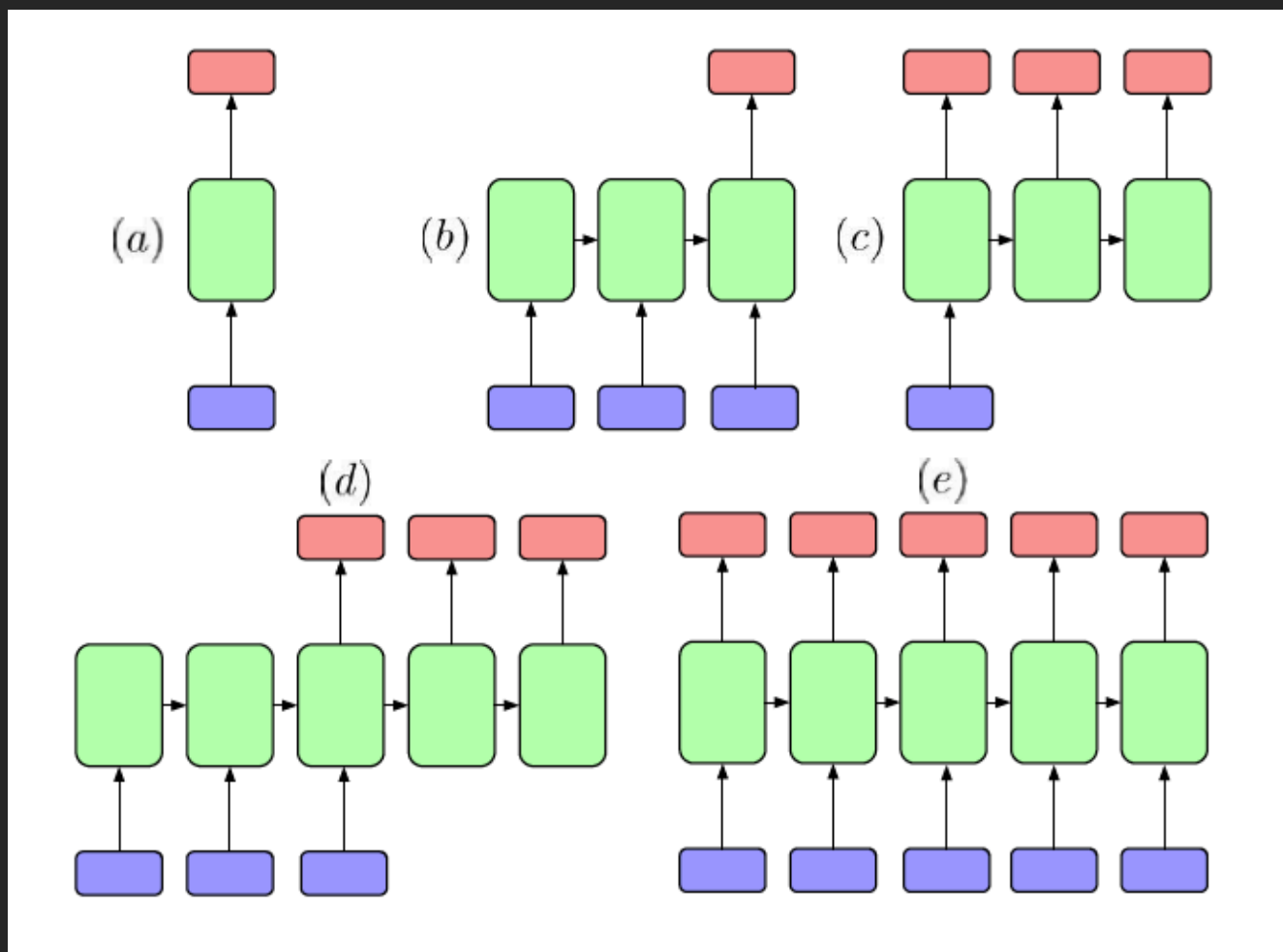
# 时间维度的重要性

$$\begin{array}{rcl} & \overset{1}{11111111} & = -1 \\ + & 11111110 & = -2 \\ \hline = & 11111101 & = -3 \end{array}$$

# RNN的结构

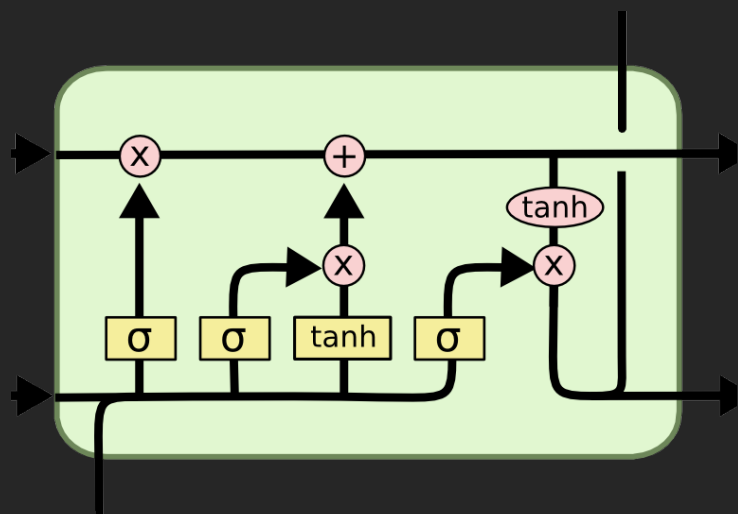


# 其他的RNN结构

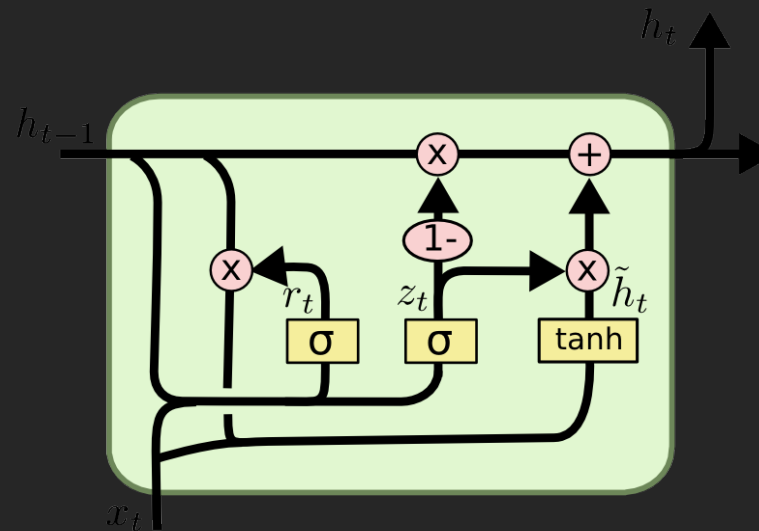




# 隐藏层的类型



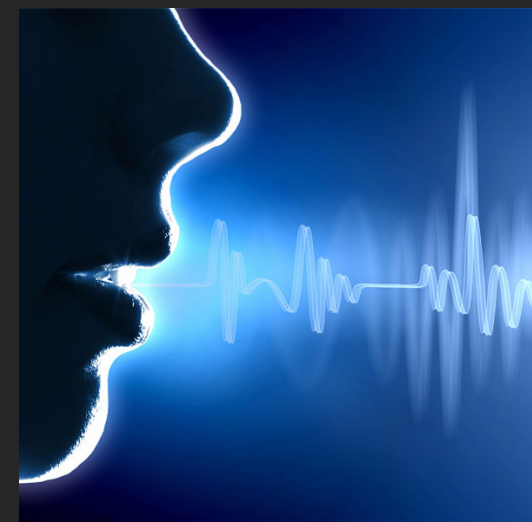
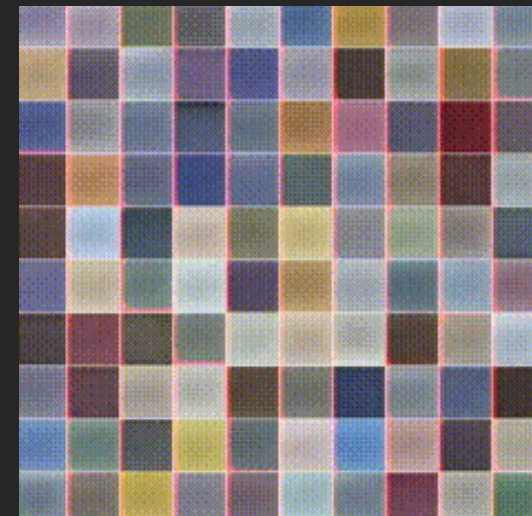
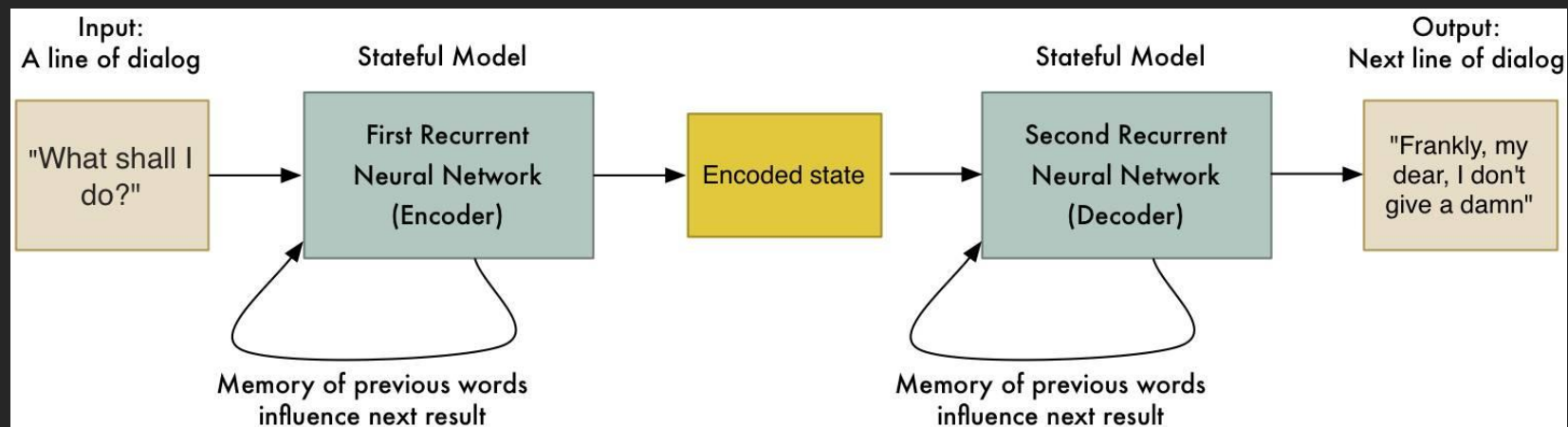
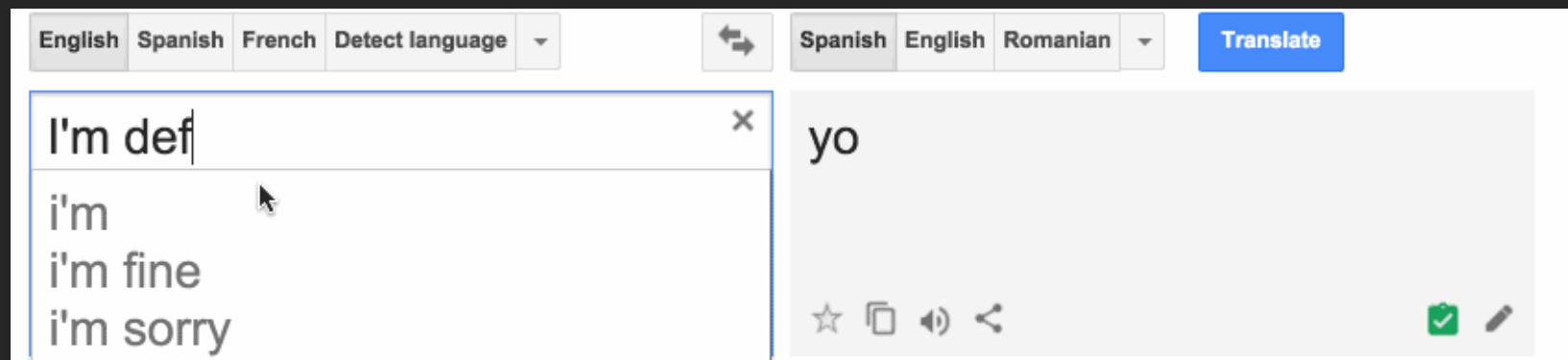
LSTM



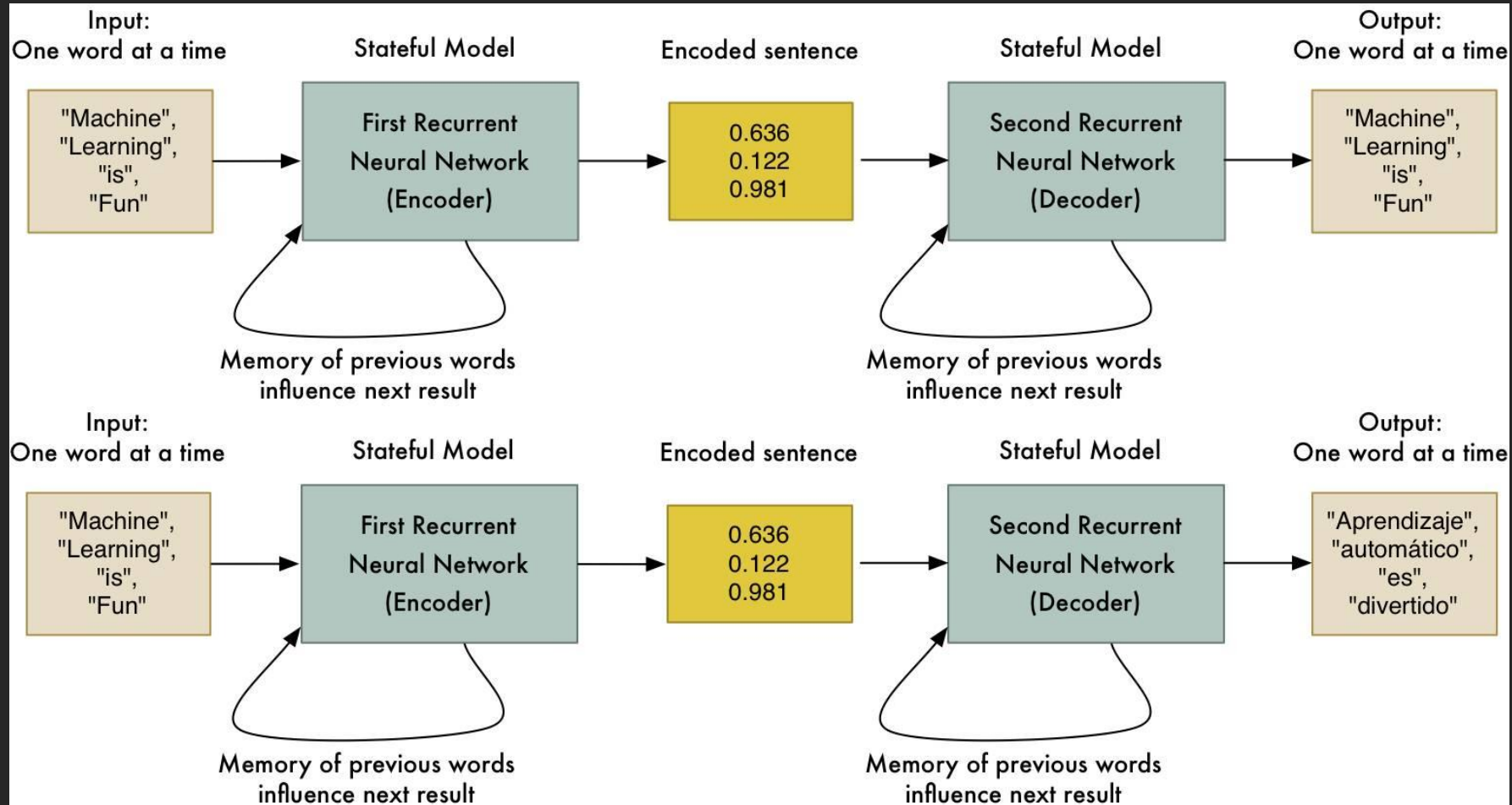
GRU

- 原始的RNN结构会出现**梯度弥散**和**梯度爆炸**的问题
- 使用**LSTM**和**GRU**可以避免这个问题

# RNN的应用



# 机器翻译



真枪实弹



GitHub - AICourse

<https://github.com/physics0/AICourse>

