RNN循环神经网络

The output of hidden layer are stored in the memory.

store

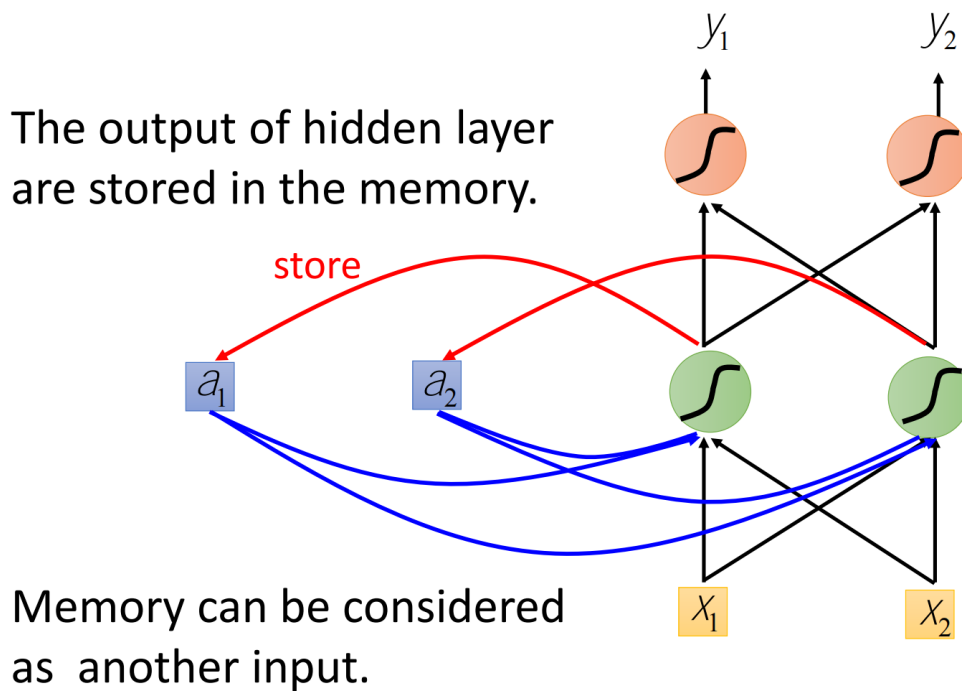a_1 a_2

y_1 y_2

Memory can be considered as another input.

X_1 X_2

Input sequence: $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ ……

output sequence: $\begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 12 \\ 12 \end{bmatrix} \begin{bmatrix} 32 \\ 32 \end{bmatrix}$

p.s. X_1, X_2 为同一个样本的不同特征

RNN

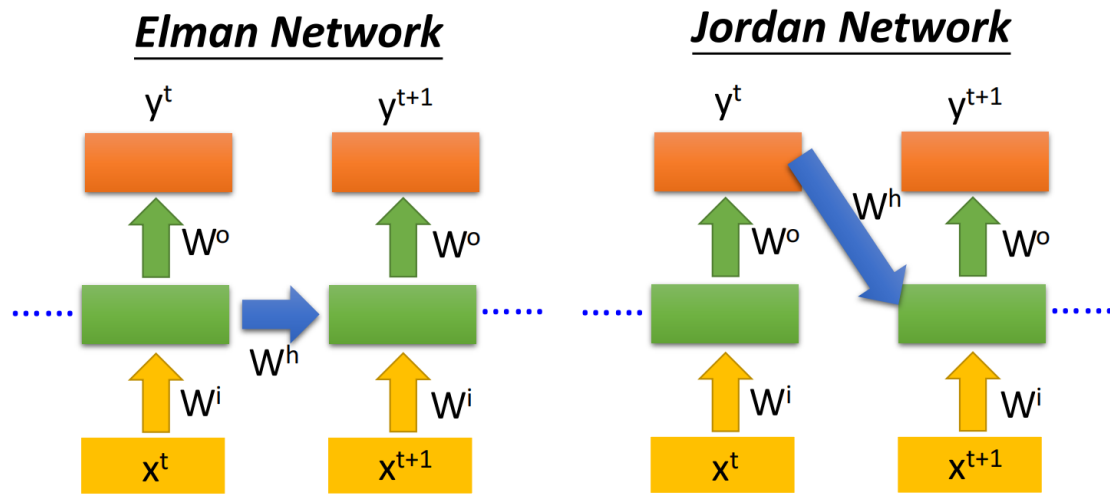The same network is used again and again.

Probability of "arrive" in each slot

Probability of "Taipei" in each slot

Probability of "on" in each slot

RNN

Different

Prob of "leave" in each slot

Prob of "Taipei" in each slot

Prob of "arrive" in each slot

Prob of "Taipei" in each slot

The values stored in the memory is different.

Elman Network & Jordan Network

Elman Network

y^t y^{t+1}

W^o W^o

W^h

W^i W^i

x^t x^{t+1}

Jordan Network

y^t y^{t+1}

W^o W^h W^o

W^i W^i

x^t x^{t+1}

Bidirectional RNN

x^t x^{t+1} x^{t+2}

y^t y^{t+1} y^{t+2}

x^t x^{t+1} x^{t+2}