Recurrent Neural Nets

(unfolded model)

repeating the same task

\[ \overrightarrow{y} \]
\[ \overleftarrow{s} \]
\[ \overrightarrow{s} \]
\[ \overleftarrow{s} \]
\[ input \]
\[ memory \]

RNN illustrated differently:

Simple (Elman) RNN
RNN as State Machine

\[
\overline{s}_t = \phi (\overline{x}_t \cdot W_x + \overline{s}_{t-1} \cdot W_s)
\]

\[
\overline{y}_t = \overline{s}_t \cdot W_y
\]
Unfolded representation is cleaner and easier to understand.

RNNs can handle varying lengths of inputs.