Modern RNNs

测验, 4 个问题

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1。
Choose correct statements about the exploding gradient problem:

- [x] Exploding gradient problem is easy to detect.

- [ ] ReLU nonlinearity helps with the exploding gradient problem.

- [ ] The reason of the exploding gradient problem in the simple RNN is the recurrent weight matrix W. Nonlinearities sigmoid, tanh, and ReLU does not cause the problem.

- [x] The threshold for gradient clipping should be as low as possible to make the training more efficient.

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2。
Choose correct statements about the vanishing gradient problem:

- [ ] Vanishing gradient problem is easy to detect.

- [x] Both nonlinearity and the recurrent weight matrix W cause the vanishing gradient problem.

- [x] Orthogonal initialization of the recurrent weight matrix helps with the vanishing gradient problem.
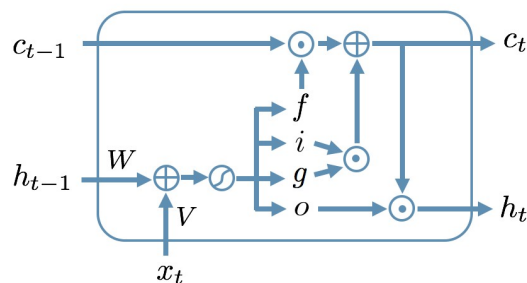
- [ ] Truncated BPTT helps with the vanishing gradient problem.

3。

Consider the LSTM architecture:

$$\begin{pmatrix} g_t \\ i_t \\ o_t \\ f_t \end{pmatrix} = \begin{pmatrix} \tilde{f} \\ \sigma \\ \sigma \\ \sigma \end{pmatrix} (Vx_t + Wh_{t-1} + b)$$

$$c_t = f_t \cdot c_{t-1} + i_t \cdot g_t, \quad h_t = o_t \cdot \tilde{f}(c_t)$$

Choose correct statements about this architecture:

- [x] The LSTM needs four times more parameters than the simple RNN.

- [ ] Gradients do not vanish on the way through memory cells c in the LSTM with forget gate.

- [x] There is a combination of the gates values which makes the LSTM completely equivalent to the simple RNN.

- [x] The exploding gradient problem is still possible in LSTM on the way between h_{t-1} and h_t .
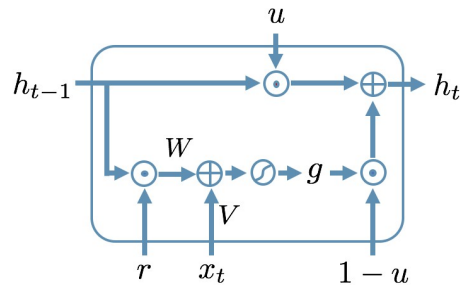
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4。

Consider the GRU architecture:

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$$g_t = \tilde{f}\left(V_g x_t + W_g(h_{t-1} \cdot r_t) + b_g\right)$$

$$h_t = (1 - u_t) \cdot g_t + u_t \cdot h_{t-1}$$

Which combination of the gate values makes this model equivalent to the simple RNN? Here value zero corresponds to a closed gate and value one corresponds to an open gate.

- ◯ Both reset and update gates are open.

- ◯ Both reset and update gates are closed.

- ● Reset gate is open and update gate is closed.

- ◯ Update gate is open and reset gate is closed.

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