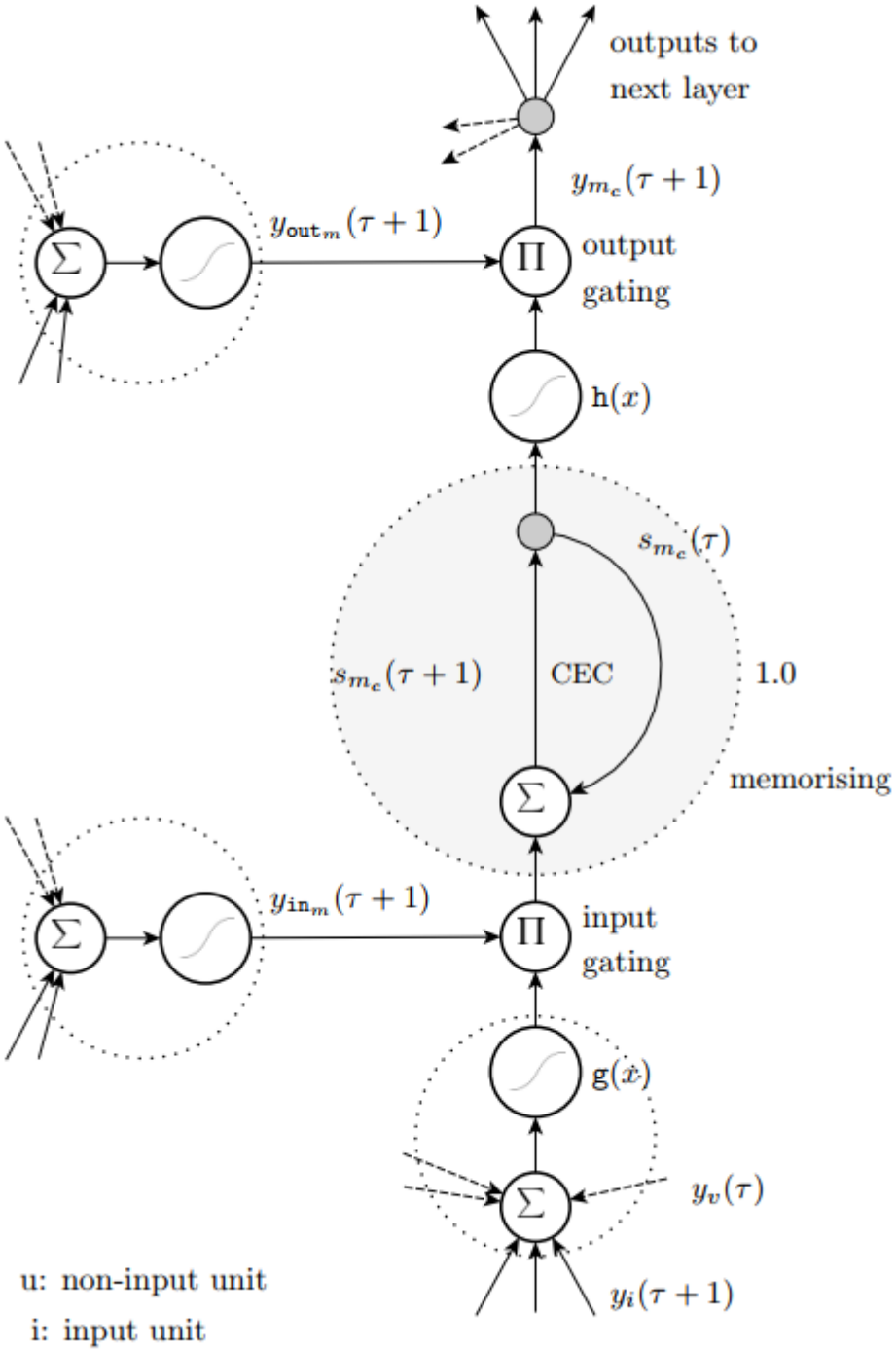
Technical Definition Assignment

Please paste the technical diagram that you plan to use for your MDE. Alternatively, paste in a diagram from previous research, or simply a key figure that is important to your field. DO NOT forget to cite it. If you created the visual, cite yourself.



Source: Staudemeyer, Ralf C., and Eric Rothstein Morris. "Understanding LSTM – a tutorial into Long Short-Term Memory Recurrent Neural Networks." arXiv preprint arXiv:1909.09586 (2019).

Please write a basic technical definition of the object represented in the diagram. The definition should contain (a) the term being defined, (b) the category to which it belongs, and (c) what separates this particular object from others in the same category.

Overall, it should have a singular focus on (a) process, (b) components, (c) function/purpose, (d) physical appearance, or (e) history, as we discussed in class.

Term: LSTM Memory Block

Category: Neural Network Architecture

Distinct Features: The Long Short-Term Memory (LSTM) memory block is a specialized component within the category of neural network architectures. It is designed to address the vanishing gradient problem commonly encountered in standard Recurrent Neural Networks (RNNs). What sets the LSTM memory block apart from other neural network components is its unique internal structure comprising several critical elements:

1. **Input Gate**: Regulates the flow of new information into the cell state.
2. **Forget Gate**: Controls the extent to which information in the cell state is retained or discarded.
3. **Output Gate**: Manages the output of information from the cell state to the next layer.

These gates allow the LSTM memory block to maintain and update information over long sequences, which is essential for tasks involving long-term dependencies, such as language modeling and time series prediction.

Focus: Component Parts

The focus of this definition is on the component parts of the LSTM memory block. Each component serves a specific function that collectively enables the LSTM to effectively handle sequences of data over extended periods. The input gate filters incoming information, the forget gate selectively forgets irrelevant information, and the output gate controls the transmission of information to subsequent layers. This combination of gates and memory cells distinguishes the LSTM memory block from other types of neural network units.