CECS 551
Assignment 4
Total: 51 Points

General Instruction

- Submit uncompressed file(s) in the Dropbox folder via BeachBoard (Not email).

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1. Implement multi-layer neural network **WITHOUT** using external deep learning libraries such as `Keras, Caffe, Theano, TensorFlow, ...`
   (a) (1 point) Complete `Assignment_4_keras.ipynb` to train a model that approximates XOR function.
      - The width of the layer 1 is 2, and the width of the layer 2 is 1.
      - The activation functions of the layer 1 are the hyperbolic tangent.
      - The activation function of the layer 2 is the sigmoid.
      - The loss function is the binary cross entropy.

   (b) (25 points) Calculate $\frac{\partial L}{\partial \vec{W}^{(1)}}$, $\frac{\partial L}{\partial \vec{w}^{(2)}}$, $\frac{\partial L}{\partial \vec{b}^{(1)}}$, and $\frac{\partial L}{\partial b^{(2)}}$. Please include the answers in the Jupyter notebook. Notice that you can use LaTeX equation in the Jupyter notebook.

   (c) (25 points) Implement `Assignment_4_scratch.ipynb` **without** using any external deep learning libraries. However, you **can** use auxiliary libraries such as `numpy`.

   (d) Submit both `Assignment_4_scratch.ipynb` and `Assignment_4_scratch.html` (or `Assignment_4_scratch.pdf`).

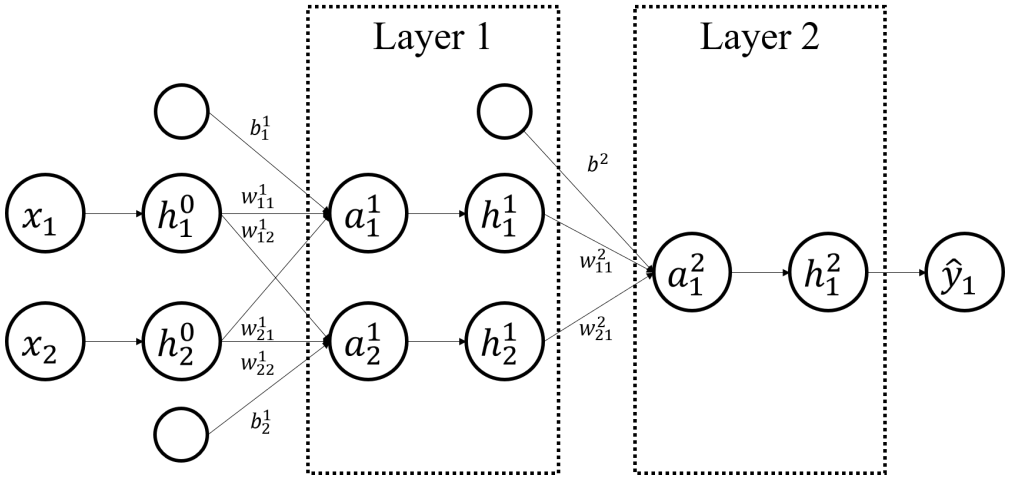

Figure 1: network design