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DL ALM-2

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1. Data Preprocessing:

- Ensure that all input features are normalized as given
- Split the dataset into training and testing sets

→ Initialize the Network:

- Use the provided initial weights $W^{(1)}$, $W^{(2)}$ and biases $b^{(1)}$, $b^{(2)}$.

→ Forward Propagation:

- Calculate the output of the hidden layer using the sigmoid activation function:

$$Z^{(1)} = W^{(1)} \cdot X + b^{(1)}$$

- Calculate the output of the output layer using the sigmoid activation function:

$$Z^{(2)} = W^{(2)} \cdot A^{(1)} + b^{(2)}$$

- Here, $\sigma(x) = \frac{1}{1+e^{-x}}$ is the Sigmoid function.

→ Compute Loss:

- Use binary cross-entropy as the loss function:

$$\text{Loss} = -\frac{1}{m} \sum_{i=1}^m [y_i \log(A_i^{(2)}) + (1-y_i) \log(1-A_i^{(2)})]$$

- Here, m is the number of samples.

→ Back propagation:

- compute the gradients of the loss with respect to weights and biases.
- Update the weights and biases using gradient descent with the given learning rate $\alpha = 0.01$.

→ Training the Model:

- Iterate through the training process over multiple epochs, updating weights and biases at each steps.
- Monitor the loss on the training & test sets.

→ Evaluation:

- Evaluate the model's performance on the validation set using metrics such as accuracy, precision, recall, and F1-score.