

Design and Implementation of a Fully Connected Feedforward Neural Network (FCFNN)

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1. Model Diagram

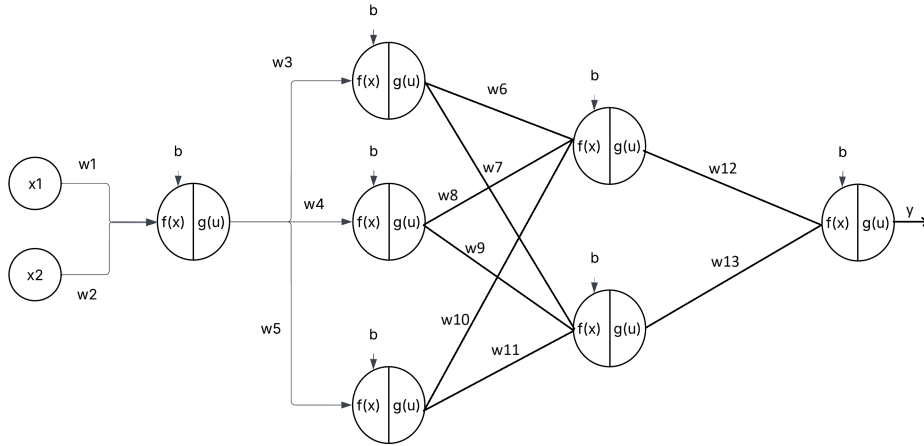


Figure 1: Architecture of the Fully Connected Feedforward Neural Network (FCFNN)

2. Model Explanation

The Fully Connected Feedforward Neural Network (FCFNN) implemented in this project consists of multiple dense layers arranged in a sequential manner.

- **Input Layer:** Accepts a 2-dimensional feature vector.
- **Hidden Layer 1:** 1 neuron with ReLU activation.
- **Hidden Layer 2:** 3 neurons with ReLU activation.
- **Hidden Layer 3:** 2 neurons with ReLU activation.

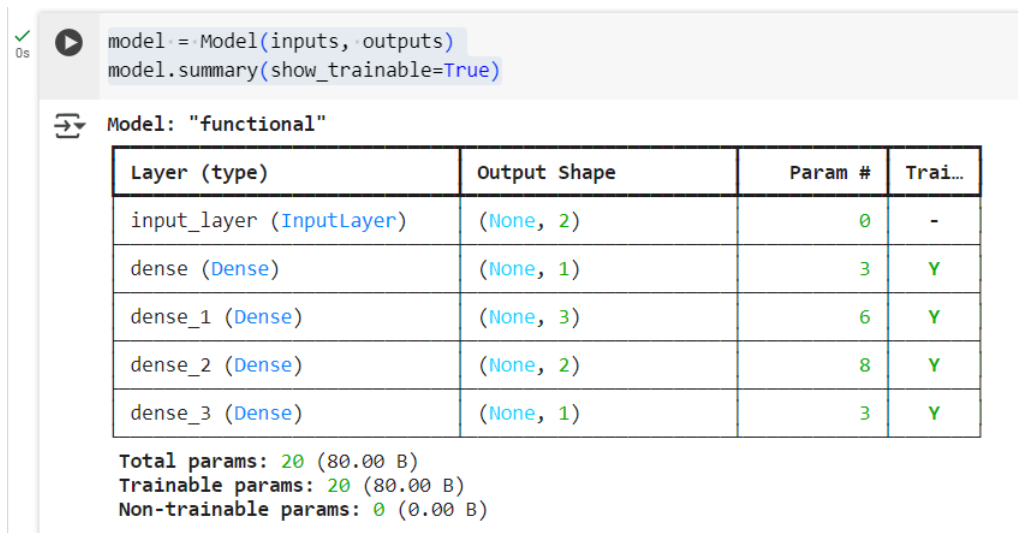
- **Output Layer:** 1 neuron with softmax activation for classification.

The model uses ReLU activations to introduce non-linearity and a sigmoid at the output to produce probabilities between 0 and 1. The design is simple yet effective for demonstrating the core structure of feedforward networks.

3. Code Repository

- **Google Colab Link:** [Click here](#)
- **GitHub Link:** [Click here](#)

4. Model Output



The screenshot shows a Jupyter Notebook cell with the following code:

```
model = Model(inputs, outputs)
model.summary(show_trainable=True)
```

Below the code, the output displays the model summary for a model named "functional". The summary is presented as a table with four columns: Layer (type), Output Shape, Param #, and Trainable. The table lists five layers: input_layer (InputLayer), dense (Dense), dense_1 (Dense), dense_2 (Dense), and dense_3 (Dense). The output shapes are (None, 2), (None, 1), (None, 3), (None, 2), and (None, 1) respectively. The number of parameters for each layer are 0, 3, 6, 8, and 3. The trainable status for each layer is -, Y, Y, Y, and Y. Below the table, the total parameters are 20 (80.00 B), trainable parameters are 20 (80.00 B), and non-trainable parameters are 0 (0.00 B).

Layer (type)	Output Shape	Param #	Trainable
input_layer (InputLayer)	(None, 2)	0	-
dense (Dense)	(None, 1)	3	Y
dense_1 (Dense)	(None, 3)	6	Y
dense_2 (Dense)	(None, 2)	8	Y
dense_3 (Dense)	(None, 1)	3	Y

Total params: 20 (80.00 B)
Trainable params: 20 (80.00 B)
Non-trainable params: 0 (0.00 B)

Figure 2: Output screenshot showing model summary