1. What dataset is being used in this code, and what is its structure?

 Sonar dataset is being used in here and it is basically predicting whether the particular object is a mine or a rock. There are 60 features in the dataset

2. How is the target variable (Y\_label) being preprocessed before it is used to train the model?

 We are just encoding the Y first and then we are reshaping it to a 1-D array.

3. What is the architecture of the neural network model in this code?

There are a total of 4 layers in our neural network and first 3 layers are using relu as an activation function and the last one is using Sigmoid.

4. What activation function is used in the output layer, and why?

 We are using “Sigmoid” as a final output activation feature, and we are using this because there are only two classes.

5. What loss function and optimizer are used in this model?

 Loss function is 'binary\_crossentropy’ and the optimizer is ‘adam’

6. How many epochs is the model trained for, and what does the epochs parameter represent?

 There is a total of 30 epochs, The epoch means the total iterations a model is going to do while training.

7. How is the performance of the model evaluated?

 The performance of the model the good with the accuracy 97-100% and the loss is nearly 1-9%.

8. What metric is used to assess the model’s performance during training?

We are using metrics like Accuracy and loss.

9. Why is LabelEncoder used on the target labels in this code?

Just to convert the classes in numbers because in older times algorithms can only give output numerically and can be trained using numbers only.

10. How many layers does the model have, and what is the purpose of each layer?

The model have 4 layers, The first one have 300 neurons and is using the activation function as relu and have an Input dimension of 60 as there are 60 features and the next 2 hidden layers are being used to make our model accurate as if we drop those there is a drop in the accuracy itself and the last one is using sigmoid and have only one neuron which will be giving us answers in 0 and 1.

11. How would changing the number of neurons in the hidden layers affect the model’s performance?

It will affect the model negatively and will decrease the accuracy and will increase the loss.

12. What would happen if we increased or decreased the number of layers in this model?

If we increase the layers it will only increase the accuracy if we have more number of neurons.if we add a new layer with very few neurons there is not much change in the model’s performance.

13. How does the choice of the ReLU activation function in the hidden layers impact the learning process?

The RelU function makes the computation really fast as it converts any negative number to zero and will not change any positive value.

14. What could be the effect of changing the activation function in the hidden layers from ReLU to another function like tanh or leaky ReLU?

How would changing the activation function in the output layer from sigmoid to softmax affect the model, and would it be appropriate for binary classification?

What would be the impact of increasing the epochs to 100? How could this affect overfitting or underfitting?

How would altering the optimizer from adam to another optimizer like SGD or RMSprop impact model training?

How would adjusting the batch size (not specified in this code) affect the model’s training speed and performance?

What could be the result of modifying the learning rate in the Adam optimizer? How could this impact convergence?

How could adding dropout layers between the dense layers help prevent overfitting in this model?