**Experiment No. 05**

**Aim**: To implement backpropagation using the Keras library.

**Objectives**:

1. Understand the concept of backpropagation.
2. Learn to build a neural network model using Keras.
3. Implement the backpropagation algorithm for training the neural network.
4. Evaluate the performance of the trained model.

**Theory**:

**Backpropagation:**

Backpropagation is a supervised learning algorithm used for training artificial neural networks. It involves updating the weights of the network based on the error between the predicted output and the actual output. The process consists of two main steps: forward propagation and backward propagation.

**Forward Propagation:**

* The input data is passed through the network, and the weighted sum of inputs is calculated at each neuron.
* Activation functions are applied to the weighted sums to introduce non-linearity.
* The output of the network is computed and compared with the actual output to calculate the loss.

**Backward Propagation:**

* The gradients of the loss function with respect to the weights are computed using the chain rule.
* The weights are updated in the opposite direction of the gradient to minimize the loss.
* This process is repeated iteratively for multiple epochs until the model converges.

**Implementation:**

1. Prepare the dataset: Load the dataset and preprocess it as required.
2. Build the neural network model: Define the architecture of the neural network using Keras.
3. Compile the model: Specify the loss function, optimizer, and metrics for training.
4. Train the model: Fit the model to the training data using the fit method.
5. Evaluate the model: Evaluate the performance of the trained model on test data using appropriate metrics.

**Conclusion**:

Implementing backpropagation using Keras allows for efficient training of neural network models. By understanding the concepts of forward and backward propagation, along with practical implementation using Keras, one can gain insights into the training process and effectively utilize neural networks for various machine learning tasks.