410255: LP-V. DL 2.B 22-23 (2nd Sem)					
Student Name :					
BE Computer Division		Roll No		Batch	
Experiment No: 2B	Classification using Deep neural network – **Binary Classification**				

Aim : Classification using Deep neural network : (Any One from the following)

1. Multiclass classification using Deep Neural Networks: Example: Use the OCR letter recognition dataset https://archive.ics.uci.edu/ml/datasets/letter+recognition
2. Binary classification using Deep Neural Networks Example: Classify movie reviews into positive" reviews and "negative" reviews, just based on the text content of the reviews. Use IMDB dataset

2. Binary Classification using Deep Learning

Objective of the Assignment: Students should be able to Classify movie reviews into positive reviews
and "negative reviews on IMDB Dataset.

Prerequisite:

1. Basic of programming language
2. Concept of Classification
3. Concept of Deep Neural Network

Contents for Theory:

1. What is Classification
2. Example of Classification
3. How Deep Neural Network Work on Classification
4. Code Explanation with Output

What is Classification?

Classification is a type of supervised learning in machine learning that involves categorizing data into predefined classes or categories based on a set of features or characteristics. It is used to predict the class of new, unseen data based on the patterns learned from the labeled training data.

In classification, a model is trained on a labeled dataset, where each data point has a known class label. The model learns to associate the input features with the corresponding class labels and can then be used to classify new, unseen data.

For example, we can use classification to identify whether an email is spam or not based on its content and metadata, to predict whether a patient has a disease

based on their medical records and symptoms, or to classify images into different categories based on their visual features.
Classification algorithms can vary in complexity, ranging from simple models such as decision trees and k-nearest neighbours to more complex models such as support vector machines and neural networks. The choice of algorithm depends on the nature of the data, the size of the dataset, and the desired level of accuracy and interpretability.

Classification is a common task in deep neural networks, where the goal is to predict the class of an input based on its features. Here's an example of how classification can be performed in a deep neural network using the popular MNIST dataset of handwritten digits.
The MNIST dataset contains 60,000 training images and 10,000 testing images of handwritten digits from 0 to 9. Each image is a grayscale 28x28 pixel image, and the task is to classify each image into one of the 10 classes corresponding to the 10 digits. We can use a convolutional neural network (CNN) to classify the MNIST dataset. A CNN is a type of
deep neural network that is commonly used for image classification tasks.

How Deep Neural Network Work on Classification-
Deep neural networks are commonly used for classification tasks because they can automatically learn to extract relevant features from raw input data and map them to the correct output class.
The basic architecture of a deep neural network for classification consists of three main parts: an input layer, one or more hidden layers, and an output layer. The input layer receives the raw input data, which is usually prepossessed to a fixed size and format. The hidden layers are composed of neurons that apply linear transformations and nonlinear activations to the input features to extract relevant patterns and representations. Finally, the output layer produces the predicted class labels, usually as a probability distribution over the possible classes.
During training, the deep neural network learns to adjust its weights and biases in each layer to minimize the difference between the predicted output and the true labels. This is typically done by optimizing a loss function that measures the discrepancy between the predicted and true labels, using techniques such as gradient descent or stochastic gradient descent. One of the key advantages of deep neural networks for classification is their ability to learn hierarchical
representations of the input data. In a deep neural network with multiple hidden layers, each layer learns to capture more complex and abstract features than the previous layer, by building on the representations learned by the earlier layers. This hierarchical structure allows deep neural networks to learn highly discriminative features that can separate different classes of input data, even when the data is highly complex or noisy.
Overall, the effectiveness of deep neural networks for classification depends on the choice of
architecture, hyperparameters, and training procedure, as well as the quality and quantity of the training data. When trained properly, deep neural networks can achieve state-of-the-art performance on a wide range of classification tasks, from image recognition to natural language processing.
IMDB Dataset-The IMDB dataset is a large collection of movie reviews collected from

the IMDB website, which is a popular source of user-generated movie ratings and reviews. The dataset consists of 50,000 movie reviews, split into 25,000 reviews for training and 25,000 reviews for testing.
Each review is represented as a sequence of words, where each word is represented by an integer index based on its frequency in the dataset. The labels for each review are binary, with 0 indicating a negative review and 1 indicating a positive review.
The IMDB dataset is commonly used as a benchmark for sentiment analysis and text classification tasks, where the goal is to classify the movie reviews as either positive or negative based on their text content. The dataset is challenging because the reviews are often highly subjective and can contain complex language and nuances of meaning, making it difficult for traditional machine learning approaches to accurately classify them.
Deep learning approaches, such as deep neural networks, have achieved state-of-the-art performance on the IMDB dataset by automatically learning to extract relevant features from the raw text data and map them to the correct output class. The IMDB dataset is widely used in research and education for natural language processing and machine learning, as it provides a rich source of labeled text data for training and testing deep learning models.
Conclusion- In this way we can Classify the Movie Reviews by using DNN.

Assignment Question on Binary classification

1. What is Binary Classification?
2. What is binary Cross Entropy?
3. What is Validation Split?
4. What is the Epoch Cycle?
5. What is Adam Optimizer?

Attendance (5 Marks)	Conduction (5 Marks)	Oral (5 Marks)	Total (15 Marks)	Sign of Teacher