**Practical - 4**

**Aim:** To implement TensorFlow versions of standard regression, k-means clustering, and k-nearest neighbors (k-NN) algorithms using structured data from a CSV file, and compare these implementations with previous non-TensorFlow code.

**Problem Statement:** Download labeled and unlabeled datasets, and use TensorFlow to implement regression, k-means clustering, and k-NN algorithms. Compare the TensorFlow implementations with non-TensorFlow code for performance and accuracy.

**Theory:**

* **Regression with TensorFlow:** In this practical, linear regression is implemented using TensorFlow. A linear regression model is created, and the loss function is defined as mean squared error. The model is optimized using the Adam optimizer over 100 epochs. The TensorFlow implementation is compared with a scikit-learn implementation for regression.
* **K-Means Clustering with TensorFlow:** K-means clustering is implemented using TensorFlow. A K-means clustering model is created with a specified number of clusters (in this case, 5). The TensorFlow K-means model is used for clustering the data points.
* **K-Nearest Neighbors (K-NN) Regression with scikit-learn:** K-NN regression is implemented using scikit-learn. A K-NN regression model is created with a specified number of neighbors (in this case, 5). The scikit-learn K-NN model is used for regression.

**Result Analysis:** The TensorFlow implementations are compared with their scikit-learn counterparts, and the evaluation metrics are as follows:

1. **TF Regression Loss:** The loss of the TensorFlow regression model when evaluated on the test data.
2. **Scikit-learn Regression Loss:** The loss of the scikit-learn regression model when evaluated on the test data.
3. **TF K-Means Loss:** The score of the TensorFlow K-means clustering model when evaluated on the test data.
4. **K-NN Loss:** The score of the scikit-learn K-NN regression model when evaluated on the test data.

**Conclusion:** This practical demonstrates how to implement regression, k-means clustering, and k-NN algorithms using TensorFlow for structured data. Comparing TensorFlow implementations with scikit-learn provides insights into the performance and accuracy of these machine learning models. The choice between TensorFlow and scikit-learn may depend on the specific requirements of the machine learning task and the ease of implementation.