The notion of deep learning has recently revolutionized a variety of machine learning applications, including video processing, speech and handwriting recognition, image processing, and natural language processing. As we all know, processing a lot of data is necessary for these duties. Most of this data is composed of Euclidean space, which is a two- or three-dimensional space where points are identified by coordinates and have a certain distance between them. Nonetheless, there has been a rise in the use of deep learning for non-Euclidean domain data. This kind of data is displayed as graphs with intricate relationships and object interdependence. The complexity of the graphs has posed serious difficulties for the machine learning methods that are now in use. To solve these challenges, researchers are investigating multiple potential learning strategies for graph data. One of the approaches which are becoming popular and have promising results is Graph Neural Networks (GNNs).

Graph Neural Networks belong to a class of deep learning techniques where they conclude from data represented as graphs. GNNs are neural networks that can easily perform node-level, edge-level, and graph-level prediction tasks since they can be applied directly to graphs. This thesis work performs a detailed research study on the developments of Graph Neural Networks over the years, their applications in real-world scenarios, and their limitations observed. Further we will examine different GNN-based approaches in the field of Distributed Systems, their comparisons to the conventional methods, followed by its various applications.

Anomaly Detection is a key problem in several fields, including fraud detection, medical diagnosis, manufacturing, etc. To avoid or reduce potential risks and harm, it is essential to notice anomalous behavior or events in these fields. Further, in this thesis work, we have explored some of the Graph Neural Network based methods and approaches in the field of Anomaly Detection, their limitations, and
the type of applications, especially in real-world problems. We conclude the thesis work with a theoretical research study on a GNN-based Anomaly Detection application. The complete development methodology of Deep Learning is discussed along with the pertaining evaluation metrics.