COMPARITIVE ANALYSIS OF DIMENSIONALITY REDUCTION TECHNIQUES FOR COMPRESSION OF REAL-WORLD SENSOR DATA

Problem to be solved:

Wireless sensor networks are comprised of a variety of sensor nodes and relays that can wirelessly compute, sense, and communicate. They do, however, have restricted resources, such as a limited power supply, communication bandwidth, CPU speed, and memory. Base stations (edge devices) these nodes are connected to, are usually more capable. However due to enormous influx of data from sensors the data footprint becomes high. In this scenario, data compression is instrumental in reducing memory consumption and communication bandwidth as far as transmission between edge and cloud is concerned.

Solution idea:

Advances in machine learning (ML) algorithms have paved the way for intelligent compression. Dimensionality reduction (DR) techniques are pivotal in this regard. They transform data from a higher-dimensional space into a lower-dimensional space while retaining meaningful properties of the original data. Additionally, it aids in the elimination of noise and redundant features seen in sensor data.

In this project, we will present a comparative assessment of various dimensionality reduction approaches that are well-known in machine learning and deep learning research communities. The dimensionality reduction algorithms will be applied to real-world sensor data while transmitting it from edge to cloud. We will demonstrate feature selection and feature extraction (both linear and non-linear) DR techniques to evaluate compression effectiveness. Furthermore, we will highlight open research concerns, obstacles, and future research opportunities.

Brief solution plan:

Figure 1 below depicts the workflow that we will be using for the above-mentioned solution.

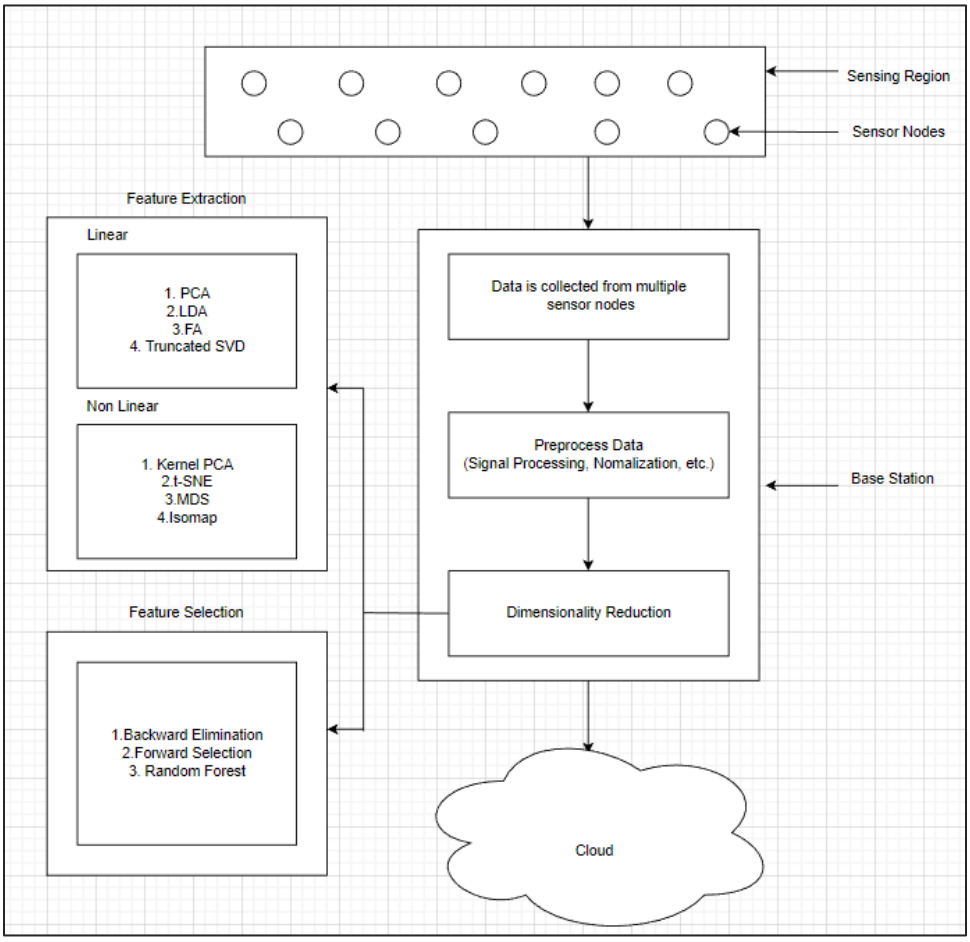

Figure 1.