Intrusion detection system

Problem statement:

Wireless sensor networks (WSN) have become more popular in wide variety of application. Such systems need to be protected from various security threats. To achieve this goal an Intrusion Detection System (IDS) should be in place.

Dataset:

* classification problem
* the dataset is from Kaggle. [WSN-DS](https://www.kaggle.com/datasets/bassamkasasbeh1/wsnds)
* it contains 19 columns
* number of records: ~375,000
* fields:
  + node id: a unique id identifying each node
  + time: The current simulation time of the node
  + Is\_CH: A flag to distinguish whether the node is CH with value 1 or normal node with value 0
  + Who CH: The ID of the CH in the current round.
  + Dist\_To\_CH: The distance between the node and its CH in the current round
  + ADV\_S: The number of advertise CH’s broadcast messages sent to the nodes
  + ADV\_R: The number of advertise CH messages received from CHs
  + JOIN\_S: The number of join request messages sent by the nodes to the CH
  + JOIN\_R: The number of join request messages received by the CH from the nodes
  + SCH\_S: The number of advertise TDMA schedule broadcast messages sent to the nodes
  + SCH\_R: The number of TDMA schedule messages received from CHs
  + Rank: The order of this node within the TDMA schedule
  + DATA\_S: The number of data packets sent from a sensor to its CH
  + DATA\_R: The number of data packets received from CH.
  + Data\_Send\_To\_BS: The number of data packets sent to the BS
  + dist\_CH\_To\_BS: The distance between the CH and the BS
  + send\_code: The cluster sending code
  + Expanded Energy: The amount of energy consumed in the previous round
  + Target field:
    - Attack Type: Attack Type: It is a class of five possible values, namely, Blackhole, Grayhole, Flooding, and TDMA (Scheduling), in addition to normal, if the node is not an attacker

List of people worked on the dataset:

* [WSN‐DS: A Dataset for Intrusion Detection Systems in Wireless Sensor Networks - Almomani - 2016 - Journal of Sensors - Wiley Online Library](https://onlinelibrary.wiley.com/doi/full/10.1155/2016/4731953)
* [A Fuzzy Logic-Based Method to Avert Intrusions in Wireless Sensor Networks Using WSN-DS Dataset | International Journal of Computational Intelligence and Applications](https://www.worldscientific.com/doi/abs/10.1142/S1469026820500182)

Plan to work on the dataset:

We are going to apply many different methods and models to get the best intrusion detection system so it can classify the action correctly. One of the approaches is to get the importances of the fields and based on that train the models. And we can engineer the features to come up with new features that are more relevant.