Review - 1 Report
Group - 14

A general anomaly detection framework for fleet-based condition monitoring of machines

1. What is the need for edge?

Factories need real time monitoring for anomaly detection, which is an essential task as a lot of lives and money is involved in the workflow. So bringing the processing to the edge solves the above mentioned problem. Edge computing provides real time processing without the network latency, hence decreasing the effective processing time.

Another problem in many factories is the frequent network outage. To solve this problem, all the processing and actions are done in the edge and fog layer itself. The cloud is used only as a permanent storage medium and for visualization of the received data.

2. What happens if an edge node for a specific cluster fails?

Each edge node has a heartbeat system, where it sends a signal to the fog in a certain time interval indicating its status.

The fog continuously checks the vitals of nodes and keeps track of the status of each and every edge node. If an edge node misses a heartbeat, the fog layer tries to find another edge node which has enough computing capacity to hold the load of the failed edge and reroutes the data from all the sensors of a failed edge cluster to the newly selected node.

And the fog layer will also run a load balancing program at all time, so once the node is repaired and sends its heartbeat signal, the fog will allocate a cluster to that node.

3. How is the clustering of machines done using the comparison data from individual pair of machines?

To cluster the machines, we need the following data:

I. Number of total machines
II. Comparison data
III. Number of edge node available

In an ideal situation, each node is allocated a cluster. So the number of cluster equals the number of edge nodes available. Once the number of cluster is determined:

- Consider each machine as its own cluster.
- Iteratively combine two cluster, till only one cluster remains. The combining is done on basis of a simple euclidian distance from the comparison data.
- This will result in a hierarchical structure resembling a tree structure.
- Based on the number of clusters wanted draw a horizontal line in the tree. All the nodes in one subtree formed will belong to the same cluster.