

Temperature-Sensing-Anomaly-Detection

ALGORITHM:

step-1: Fetch the latest sensor value from the Bolt device.

step-2: Store the sensor value in a list that will be used for computing z-score.

step-3: Compute the z-score and upper and lower threshold bounds for normal and anomalous readings.

step-4: Check if the sensor reading is within the range for normal readings.

step-5: If it is not in range, send the SMS.

step-6: Wait for 8 seconds.

step-7: Repeat from step 1.

Z-SCORE ANALYSIS:

Z-score analysis is used for anomaly detection. Anomaly here means a variable's value (light intensity of the surroundings) going beyond a certain range of values. The range of values is called bounds (upper bound and lower bound). These bounds are calculated using the input values, frame size and multiplication factor. The frame size is the minimum number of input values needed for Z-score analysis and the multiplication factor determines the closeness of the bounds to the input values curve.

$$Mn = \frac{\sum_{i=1}^r Vi}{r}$$

$$Zn = C * \sqrt{\frac{\sum_{i=1}^r (Vi - Mn)^2}{r}}$$

$$Tn = Vi \pm Zn$$

r = Frame Size

C = Multiplication Factor

Given above is the formula to calculate the bounds. Here the input is represented as 'Vi', 'r' denotes the frame size and 'C' is the multiplication factor. Firstly we calculate the mean (Mn) of the input values (for every new input, the mean is calculated again). The variation of each input value (from the mean) is given as (Vi - Mn)². The Z-score (Zn) is calculated as shown above (square root of the mean of the variation of each input value multiplied by the multiplication factor). The bounds are represented as 'Tn' and the upper bound is calculated as (Vi + Zn) and the lower bound is calculated as (Vi - Zn).

The frame size and multiplication factor are determined using trial-and-error methods.

