

# Anomaly Detection Report: Industrial Temperature Monitoring

## 1. Introduction

In industrial environments, maintaining optimal ambient temperature is critical for equipment performance and safety. Anomalies in temperature readings can indicate potential system failures, leading to costly downtime and maintenance. This report analyzes anomalies detected in ambient temperature data using Z-Score and IsolationForest methods.

## 2. Anomaly Detection Methodology

Two anomaly detection techniques were applied:

- Z-Score: Identifies anomalies by measuring the deviation from the mean. Data points with  $Z > 3$  or  $Z < -3$  are flagged.
- IsolationForest: An unsupervised machine learning method that isolates anomalies based on how easily they can be separated.

These methods helped detect significant fluctuations in temperature data.

## 3. Business Impact of Anomalies

Detected temperature anomalies can indicate:

- Potential equipment overheating, leading to failures.
- Environmental control issues, affecting product quality.
- Inefficiencies in cooling/heating systems, increasing operational costs.

Early detection of anomalies allows industries to prevent equipment failures, improve predictive maintenance, and reduce operational risks.

## 4. Actionable Insights

Based on the detected anomalies, the following actions are recommended:

- Immediate inspection of flagged temperature spikes to prevent potential overheating.
- Optimize cooling/heating systems based on anomaly trends.
- Integrate predictive maintenance systems using real-time monitoring to reduce failures.

By implementing these measures, industries can enhance reliability, reduce costs, and improve safety.