**Databoard IoT Telemetry Data Analysis Report**

**1. Introduction** This report presents an analysis of IoT telemetry data focusing on temperature trends, predicted temperature values, and associated environmental parameters. The data is derived from the iot\_telemetry\_data\_with\_predictions.csv dataset and analyzed in Tableau.

**2. Data Overview**

* **Source:** IoT telemetry data
* **File Type:** .hyper
* **Time Frame:** July 12, 2020 – July 20, 2020
* **Attributes:**
  + Temperature (Temp)
  + Predicted Temperature (Predicted Temp)
  + CO, LPG, Humidity, Smoke (as environmental attributes)
  + Timestamped records at second, minute, hour, and day levels

**3. Temperature Analysis**

* **Trends of Temp & Predicted Temp**
  + Data broken down by year (2020), month (July), hour, and second.
  + Temp ranges from 0.00 to 30.60°C.
  + Predicted Temp ranges from 16.70 to 32.64°C.
  + Line plots illustrate temperature variations over time.
  + Count of Temp ranges from 1 to 4, indicating multiple readings per second.
  + Sum of Temp and Sum of Predicted Temp provide cumulative insights.

**4. Comparative Analysis: Actual vs. Predicted Temperature**

* Visualization tracks the difference between actual temperature (Temp) and model-predicted values (Predicted Temp).
* Data is broken down by second-level timestamps across July 2020.
* Month-wise color-coding helps in trend analysis.

**5. Summation and Forecasting**

* **Sum of Temp and Predicted Temp** over seconds and minutes provides cumulative heat trends.
* **Forecasting Limitations:** Due to high data volume, precise forecasting was not computed.

**6. Environmental Factors and Feature Analysis**

* **Count-based analysis:**
  + Number of readings per minute for CO, LPG, Humidity, Smoke, and Temperature.
  + Stacked line charts showing count trends over time.
* **Feature Attributes Analysis:**
  + CO ranges from 0.00117 to 0.01350 ppm.
  + LPG ranges from 0.00269 to 0.01580 ppm.
  + Humidity ranges from 1.10% to 99.90%.
  + Smoke ranges from 0.00669 to 0.04429 ppm.
  + Predicted Temp follows expected variations correlating with other environmental parameters.

**7. Conclusion & Insights**

* **Temperature Trends:** Predicted temperature closely follows actual temperature patterns, but discrepancies exist.
* **Environmental Influence:** Factors like humidity and air pollutants (CO, LPG, Smoke) likely impact temperature trends.
* **Future Work:**
  + Further forecasting techniques need to be explored with optimized datasets.
  + Anomaly detection could enhance insights into sudden temperature spikes.
  + Model refinement for more accurate Predicted Temp calculations.

**8. Recommendations**

* **Improve Data Processing:** Optimize handling of high-frequency data to enable forecasting.
* **Explore AI-based Predictions:** Utilize advanced ML models to refine Predicted Temp accuracy.
* **Real-time Monitoring:** Implement alert mechanisms for temperature anomalies based on IoT telemetry data.