

### Introduction

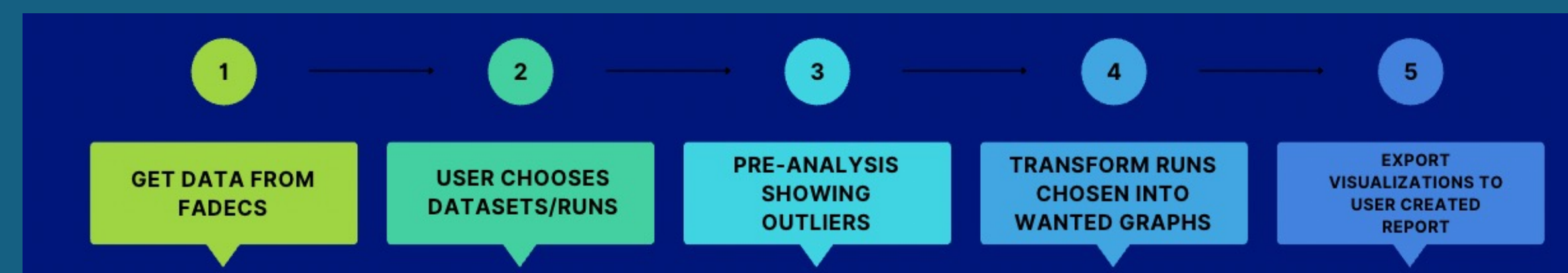
Given information of an engine's state during EMC (Electromagnetic compatibility) testing can any insights be found beyond just telling if the engine passed/failed testing.

Engines fail the test if certain conditions are met such as: Engine temperature exceeds set value, Health Score Rises too high, etc.

Finding undiscovered information could lead to crucial discoveries in that could increase the understanding of the engineers and the teams responsible for keeping Rolls-Royce engines safe and reliable.

### Proposal

Develop an interactive data analysis application that can select many runs from each FADEC to gain insights. Each submission would create a report from the selected files. Reports have insights about data such as summary, outliers, plots, and events. This tool would allow for a rapid collection and analysis of many different tests from multiple runs throughout a large span automating a large chunk of the analysis part of testing reducing time spent for more time in the lab while helping to find anomalies data in testing.

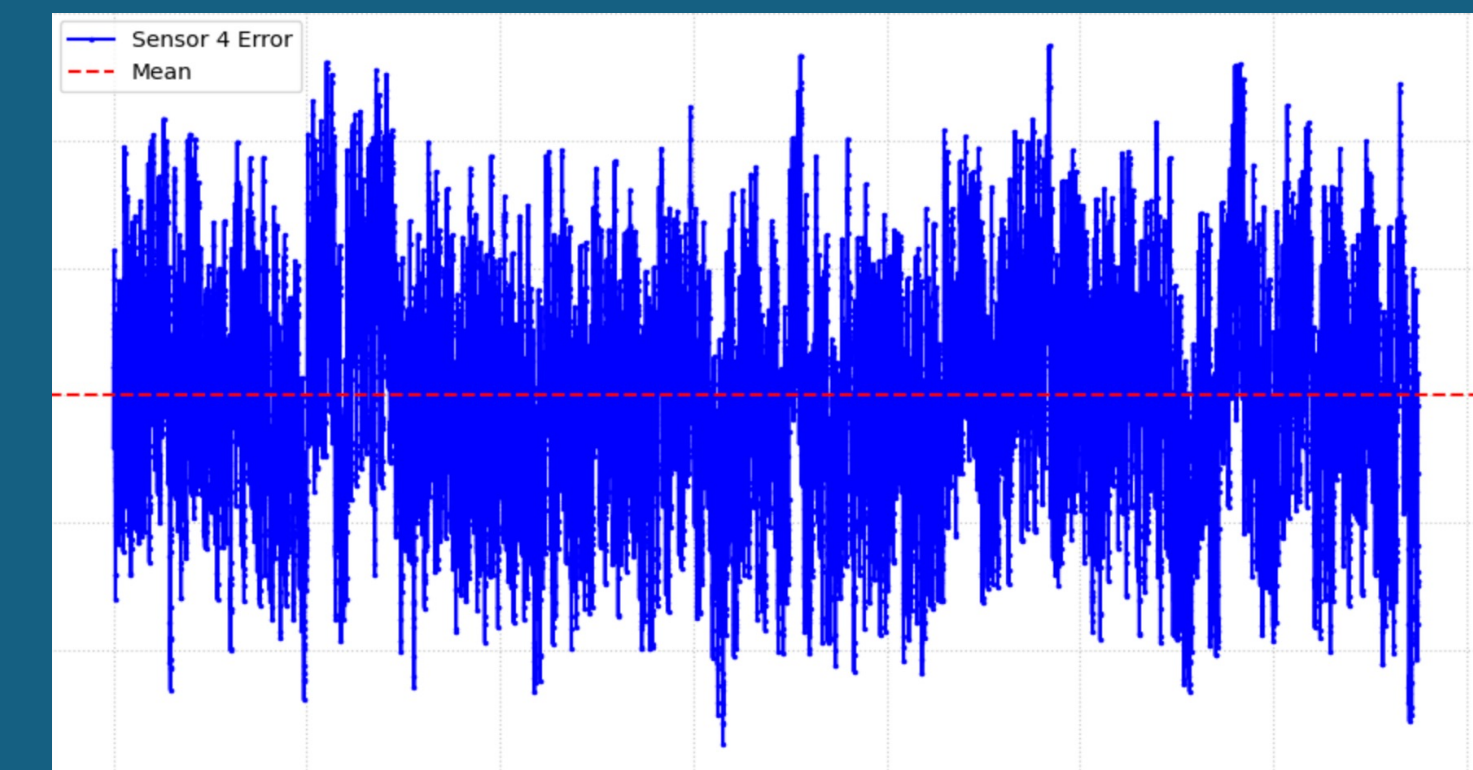


### Challenges

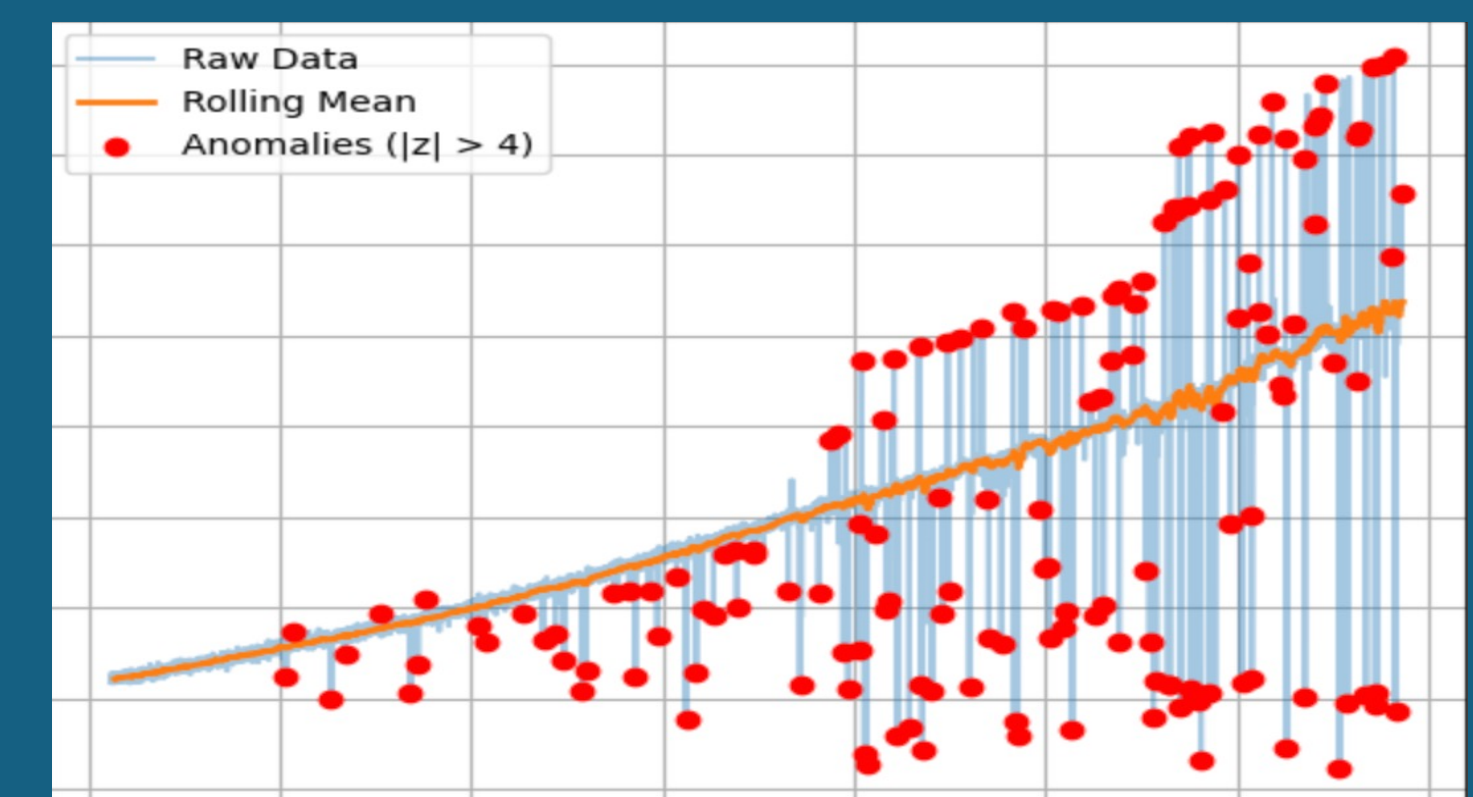
- Finding unique insights from large, complex datasets
- Knowing what to search for in the data
- Creating a dashboard from scratch
- Finding new methods to interpret the data that offers meaningful insight

### Example Plots

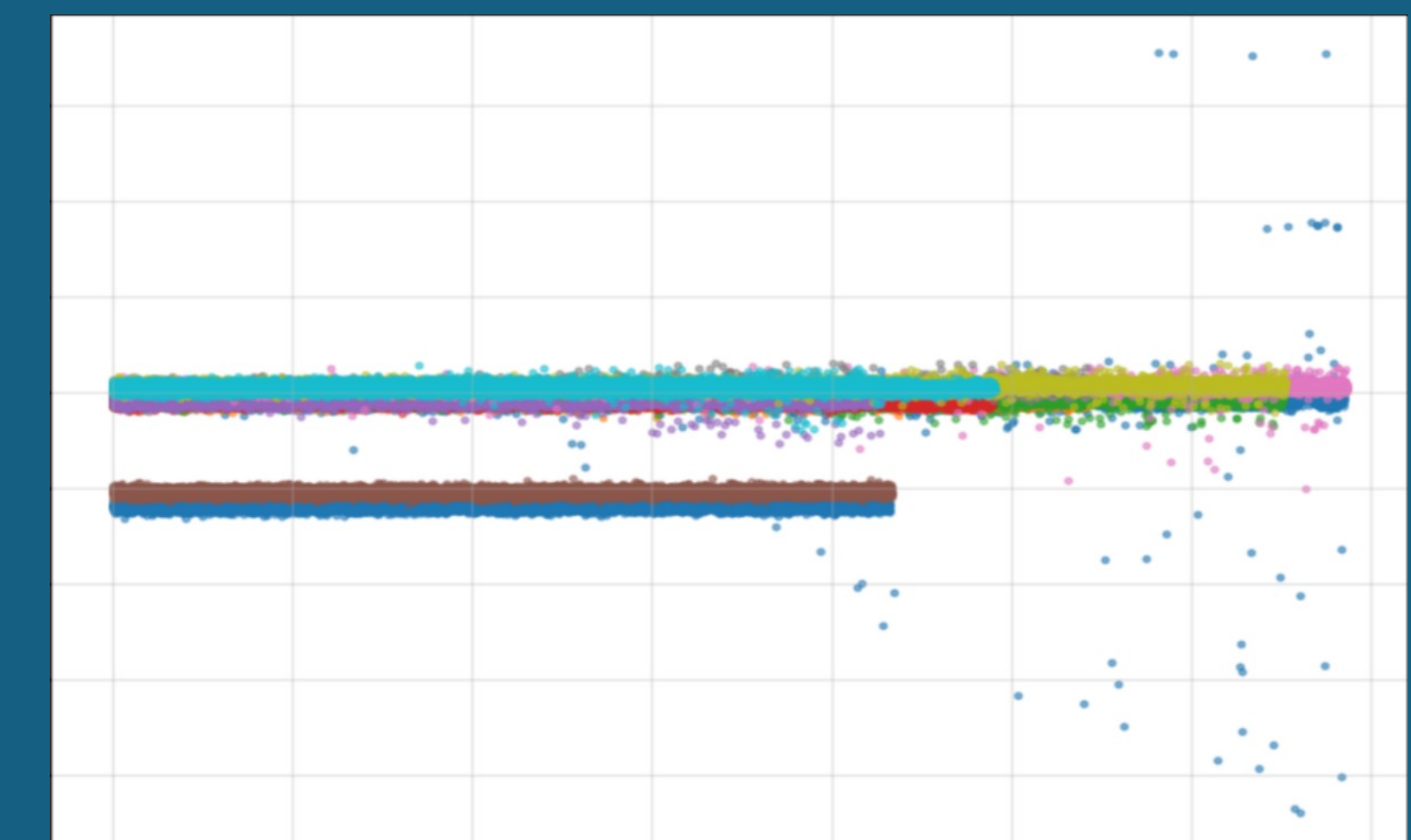
Percent Error Graph :



Anomaly Detection Graph:



Sensor Over Time:



### Data Analysis Application

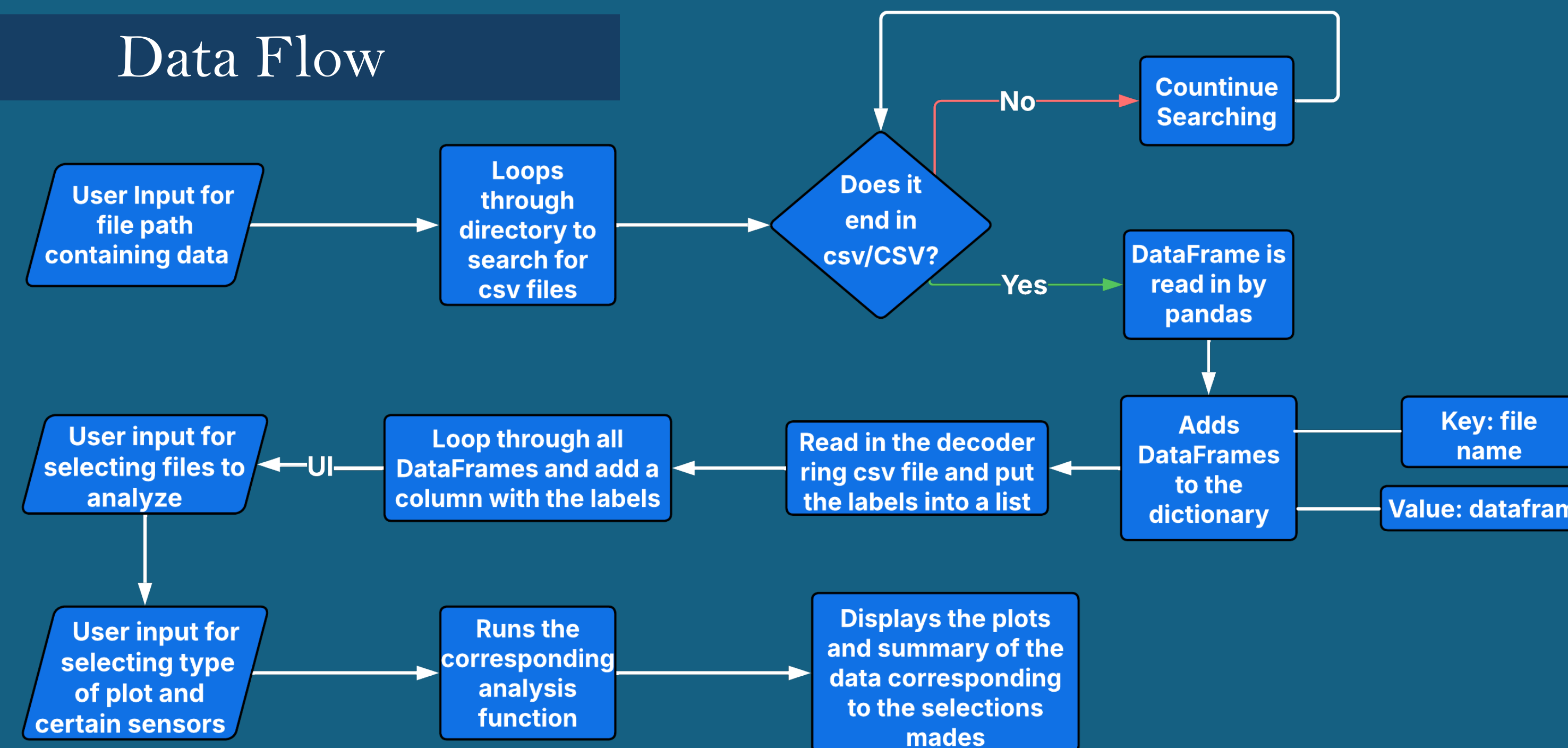
What we made:

Our team created a data analysis application that allows the user to enter in datasets having testing information.

From there, the user can create a report with the ability to input plots into their report that generate on the selected information. They also have access to common formatting tools such as font size, bolding and italics.

The user can choose to also look at individual plots if they are looking for specific information. They have access to the various plot formats with the ability to create normalized tests to all run on the same counter and to create visuals that plot multiple tests all on the same plot for quick comparison.

### Data Flow



### Tools Utilized



### Findings

- Inconsistencies/missed data during testing that could imply a negative incident during operation
- Large variation during different tests providing evidence that the change in conditions could lead to significant difference in several variables
- Potential for harmonic or destructive noise in data causing false positives or negative information to be concluded during data analysis

### Future Goals

- Create an AI/ML learning pipeline to find insights in new data before human analysis
- Link tool to database storage allowing for more data access and increased processing power
- Add more statistical methods to the tool to allow for further insights to be found
- Increased automatic anomaly detection in data
- Automatic report generation in multiple different formats with picked plots and traceability information

### Acknowledgements

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