ABOUT REPUBLIC AIRWAYS

- Indiana-based regional airline serving many passengers and major commercial airline companies.

- Currently has 6000 employees with 1400 in Indiana.

- Operates Embraer 170/175 aircraft with over 1,000 daily flights to 100 cities in 40 U.S. states, Canada, the Caribbean and Central America.

GENERAL PURPOSE

- Bleed Air failures often cause unintentional grounding

- Our primary goal is to predict failures in their aircrafts' bleed air system based on past flight data and machine learning models.
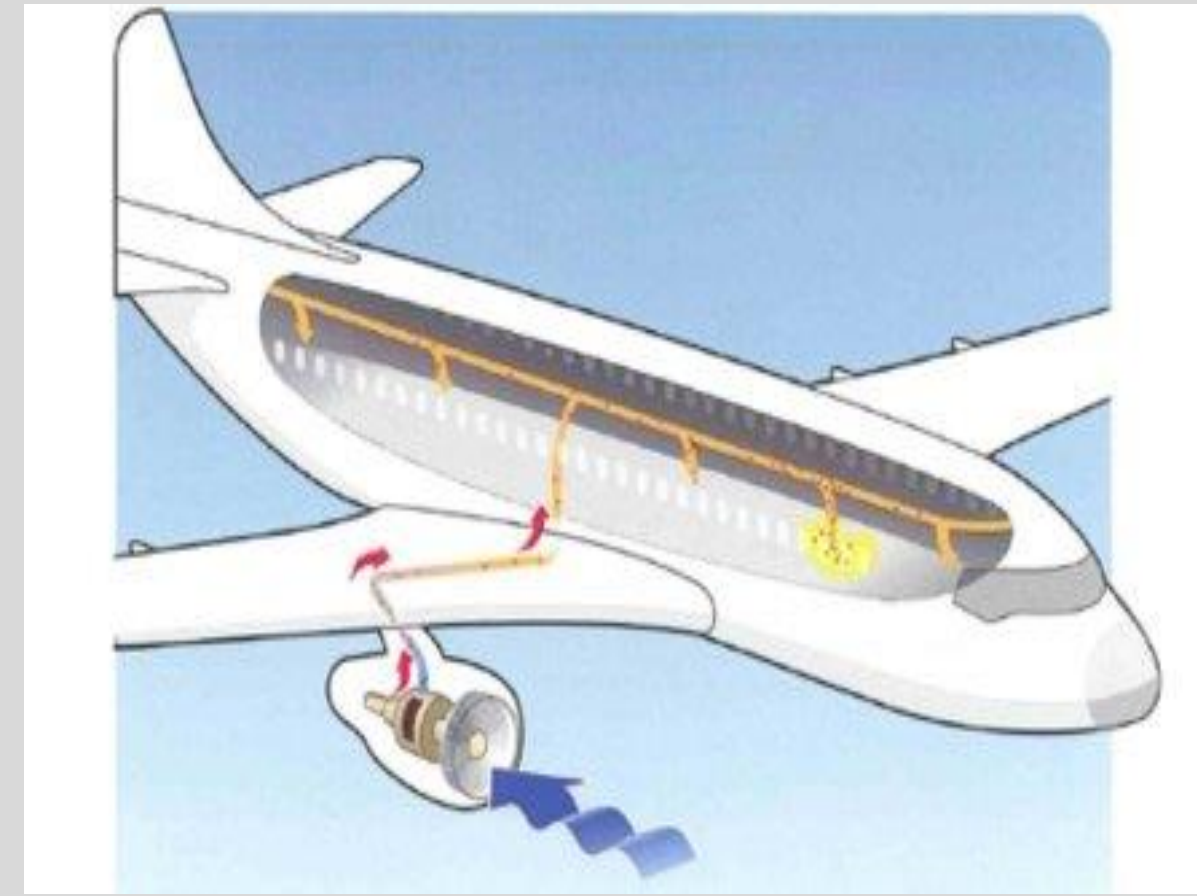
BLEED AIR SYSTEM

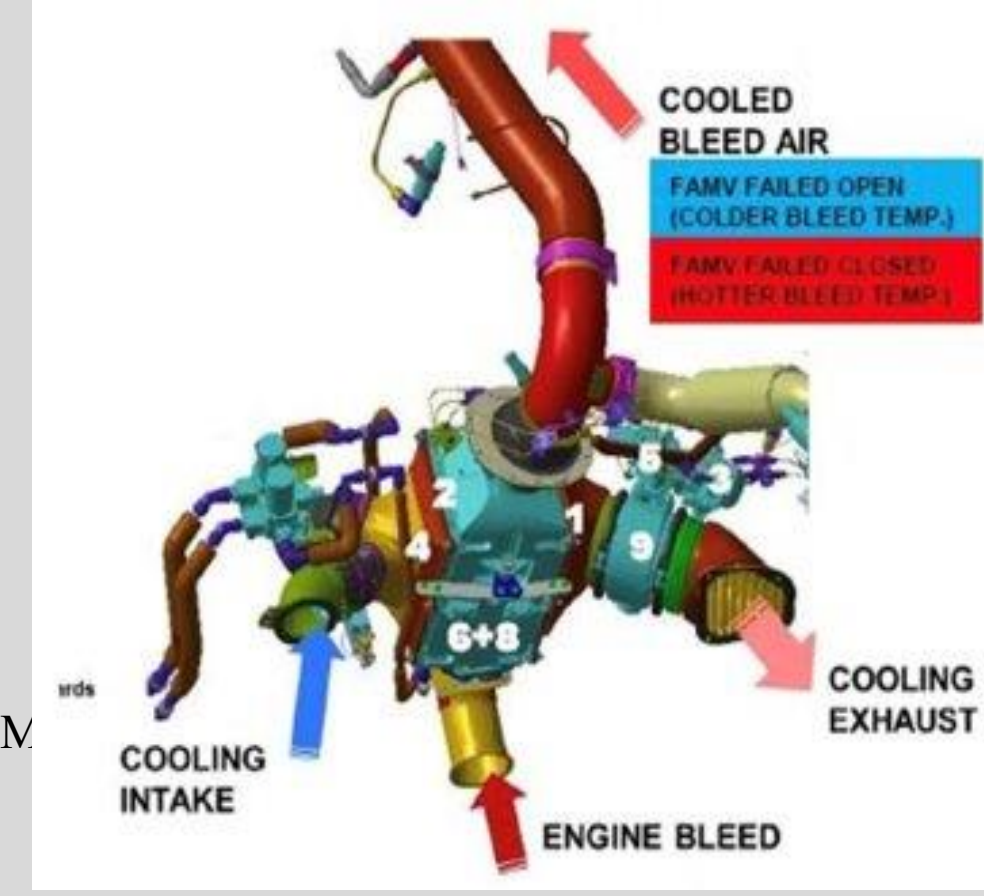Figure 1: General view of a bleed air system.

Figure 2: An engine diagram of how a bleed air system operates.

A bleed air system is a series of valves, ducts, computers, and connections that utilizes bleed air to perform air related aircraft functions including cabin pressurization, air-conditioning, anti-ice systems, etc.
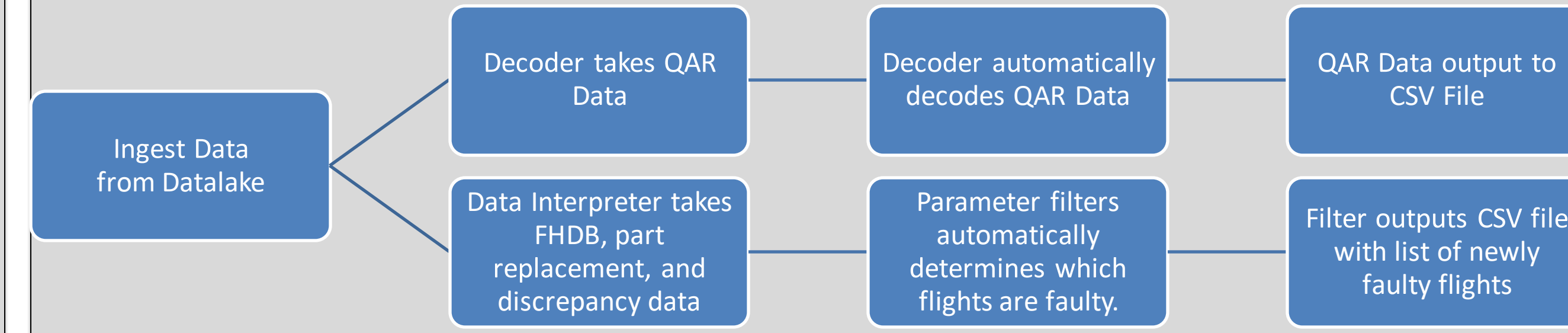
DECODER

Figure 3: A chart of the decoder and the process of how files are filtered and interpreted for finding faulty flights.

UNSUPERVISED MACHINE LEARNING

PROS

- Faster.

- Does not require target column.

- Recognize clusters that we have not spotted

- Less required complexity.

CONS

- Might find clusters where we do not want them.

- Less accurate.

- Heavily dependent on amount of data input.

- Requires a wide variety of data to cluster correctly.

Use:
Discover patterns within the data that were not recognized during the visualization shown in the bottom left of this poster. Add information that is found to the supervised algorithm such as patterns in differences.

SUPERVISED MACHINE LEARNING

PROS

- More accurate.

- Will cluster around the information you want.

- Can define the clustering parameters.

- Easier to apply weights to parameters

CONS

- Slower.

- Requires knowing health of teaching set.

- Requires a lot of data to yield accurate results.

Use:
Determine the specific factors and patterns that represent a bleed air failure.
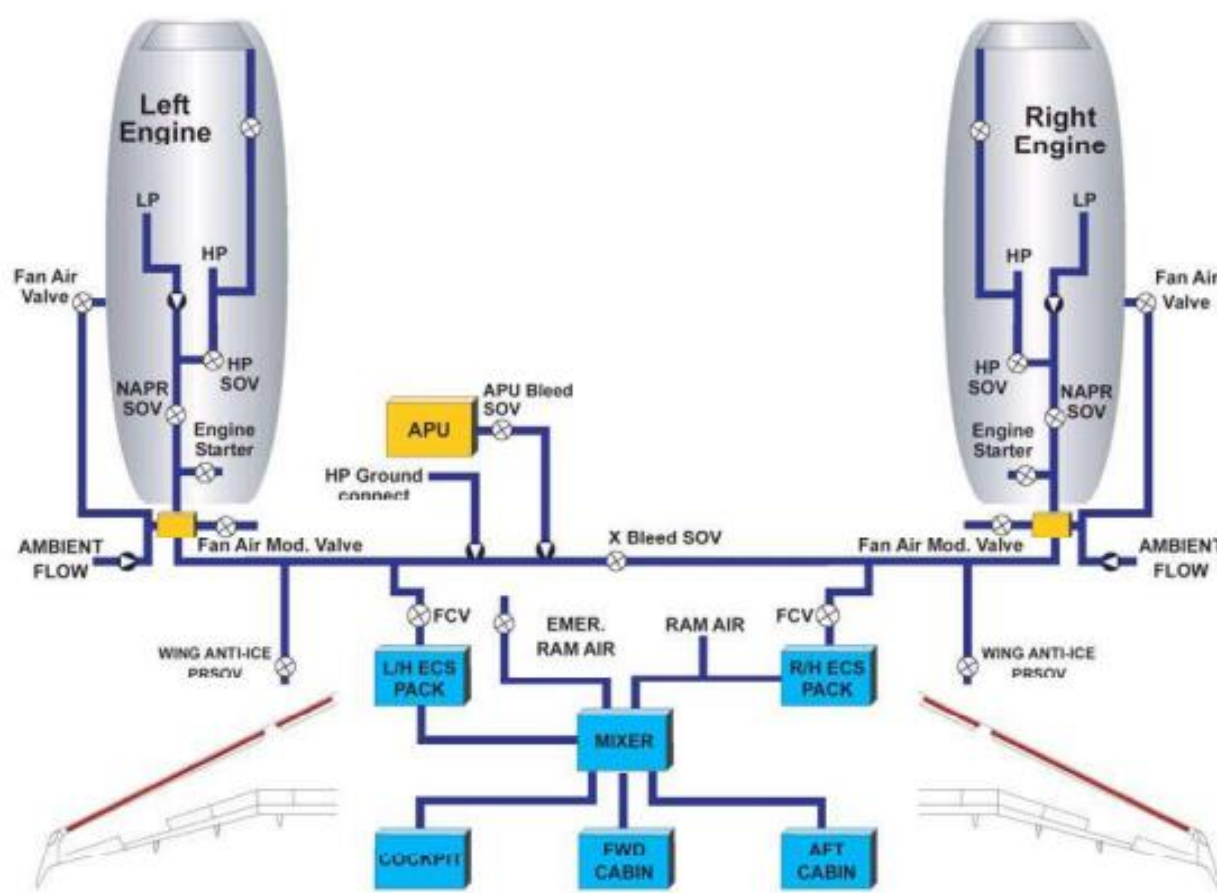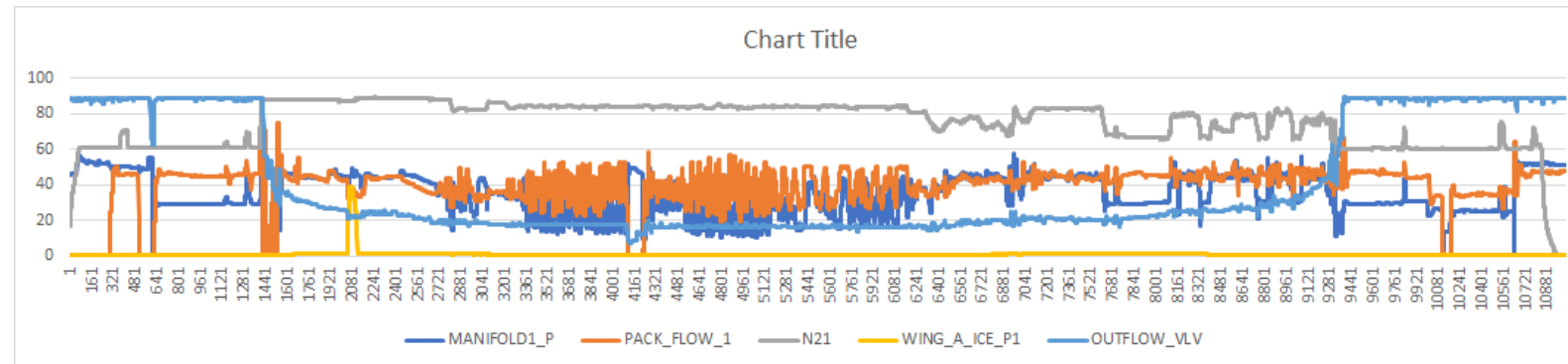Predict failure based on the appearance of these factors.