# AIRBUS MACHINE LEARNING CANVAS Designed for: AIRBUS Designed by: Capstone Group Date: March 2, 2024

| PREDICTION TASKType of task? Entity on which predictions are made? Possible outcomes? Wait time before observation? During flight actively assess fuel consumption patterns.  Goal: with model, reduce unscheduled maintenance. | DECISIONSHow are predictions turned into proposed value for the end-user? Mention parameters of the process / application that does that. If fuel leakage is detected, the algorithm will signal the instance to the pilot..  Return the degree of severity of the leakage / Return the estimated quantity of the leakage for the pilot to make a decision. | VALUE PROPOSITIONWho is the end-user? What are their objectives? How will they benefit from the ML system? Mention workflow/interfaces. The end-user of the model is Airbus.  Airbus will provide another level of safety measure making their planes superior to competitors.  The ML system will inform the pilot on the status of the leakage. | DATA COLLECTIONStrategy for initial train set & continuous update. Mention collection rate, holdout on production entities, cost/constraints to observe outcomes. Data will be collected from the second the plane is activated. It will be using data on fuel consumption and FOB to determine the rate at which the fuel is being used.  Data collection rate will occur every second to ensure there is no delay in data and decision making. | DATA SOURCESWhere can we get (raw) information on entities and observed outcomes? Mention database tables, API methods, websites to scrape, etc. The data is being collected live from the plane's fuel tank. |
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| IMPACT SIMULATIONCan models be deployed? Which test data to assess performance? Cost/gain values for (in)correct decisions? [Fairness constraint](https://developers.google.com/machine-learning/glossary#fairness-constraint)? Model used:   * Supervised multivariate time-series recurrent Neural Networks * LSTM (long short-term memory) | MAKING PREDICTIONSWhen do we make real-time / batch pred.? Time available for this + featurization + post-processing? Compute target? The idea is to make real-time predictions during the flight with the use of this model. | The information about the leakage will benefit pilots and airlines to safely conduct the flight.  As for Airbus the information will be crucial to improve on any potential weaknesses identified within the fuel system. | BUILDING MODELSHow many prod models are needed? When would we update? Time available for this (including featurization and analysis)? Ideally 3 models would be necessary.  First model was completed within 2 months.  Second model will be the most time consuming as it will take 6 months. During this time corrections will be done to the current model and featurization.  Third model will take 3 months. Here we ensure the full functionality of the model | FEATURESInput representations available at prediction time, extracted from raw data sources.LEAKAGE\_change\_cumulative  * TIME\_ELAPSED * VALUE\_FOB\_SG * FUEL\_USED\_TOTAL\_cumulative\_gaussian |
|  | MONITORINGMetrics to quantify value creation and measure the ML system’s impact in production (on end-users and business)? | The key metrics used in valuation of the system will be estimations in terms of cost savings of a grounded plane..  Time saved on inspection and leakage detection. | In case of in flight significant leakage estimations on savings in regards to plane crashes. Cost of plane, cost of cargo, victim reimbursement etc. |  |

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## PREDICTION TASK

## Type of task? Entity on which predictions are made? Possible outcomes? Wait time before observation?

## During flight actively assess fuel consumption patterns.

## Goal: with model, reduce unscheduled maintenance.

## DECISIONS

### How are predictions turned into proposed value for the end-user? Mention parameters of the process / application that does that.

* + 1. If fuel leakage is detected, signal the instance to the cockpit.
    2. Return the degree of severity of the leakage / Return the estimated quantity of the leakage for the pilot to make a decision.

## VALUE PROPOSITION

### Who is the end-user? What are their objectives? How will they benefit from the ML system? Mention workflow/interfaces.

* + 1. The end-user of the model is Airbus.
    2. Airbus will provide another level of safety measure making their planes superior to competitors.
    3. The ML system will inform the pilot on the status of the leakage.
    4. The information about the leakage will benefit pilots and airlines to safely conduct the flight.
    5. As for Airbus the information will be crucial to improve on any potential weaknesses identified within the fuel system.

## DATA COLLECTION

### Strategy for initial train set & continuous update. Mention collection rate, holdout on production entities, cost/constraints to observe outcomes.

* + 1. Data will be collected from the second the plane is activated. It will be using data on fuel consumption and FOB to determine the rate at which the fuel is being used.
    2. Data collection rate will occur every second to ensure there is no delay in data and decision making.

## DATA SOURCES

### Where can we get (raw) information on entities and observed outcomes? Mention database tables, API methods, websites to scrape, etc.

* + 1. The data is being collected live from the plane's fuel tank.

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## IMPACT SIMULATION

## Can models be deployed? Which test data to assess performance? Cost/gain values for (in)correct decisions? [Fairness constraint](https://developers.google.com/machine-learning/glossary#fairness-constraint)?

## Model used:

## Supervised multivariate time-series recurrent Neural Networks

## LSTM (long short-term memory)

## MAKING PREDICTIONS

### When do we make real-time / batch pred.? Time available for this + featurization + post-processing? Compute target?

* + 1. The idea is to make real-time predictions during the flight with the use of this model.

## BUILDING MODELS

### How many prod models are needed? When would we update? Time available for this (including featurization and analysis)?

* + 1. Ideally 3 models would be necessary.
    2. First model was completed within 2 months.
    3. Second model will be the most time consuming as it will take 6 months. During this time corrections will be done to the current model and featurization.
    4. Third model will take 3 months. Here we ensure the full functionality of the model

## FEATURES

## Input representations available at prediction time, extracted from raw data sources.

## LEAKAGE\_change\_cumulative

## TIME\_ELAPSED

## VALUE\_FOB\_SG

## FUEL\_USED\_TOTAL\_cumulative\_gaussian

## MONITORING

### Metrics to quantify value creation and measure the ML system’s impact in production (on end-users and business)?

* + 1. The key metrics used in valuation of the system will be estimations in terms of cost savings of a grounded plane..
    2. Time saved on inspection and leakage detection.
    3. In case of in flight significant leakage estimations on savings in regards to plane crashes. Cost of plane, cost of cargo, victim reimbursement etc.