HIGH LEVEL DESIGN (HLD)

Scania Truck Failures Prediction

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DOCUMENT VERSION CONTROL

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| --- | --- | --- | --- |
| Date Issue | Version | Description | Author |
| 02/03/2022 | 1 | Initial HLD – V 1.0 | Ankit Sharma |
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ABSTRACT

Air Pressure System (APS) in trucks generates pressurized air that is used for various functions of trucks such as braking and gear changes. Lot of money is spent on un-necessary checks done by service person on APS system in trucks, which can be prevented by developing a machine learning model that can predict the failure of component in APS. In this way, service can be restricted to the trucks whose APS component is predicted to be failed by the model.

1. INTRODUCTION

* 1. WHY THIS HIGH LEVEL DESIGN DOCUMENT?

The purpose of this High Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a high level.

THE HLD WILL:

* PRESENT ALL THE DESGIN ASEPCTS AND DEFINE THEM IN DETAIL
* DESCRIBE THE USER INTERFACE BIENG IMPLEMENTED
* DESCRIBE THE HARDWARE AND SOFTWARE INTERFACE
* DESCRIBE THE PERFORMANCE REQUIREMENT
* INCLUDE DEFINE FEATURE AND ARCHITECHTURE OF THE PROJECT
* LIST AND DESCRIBE THE NON FUNCTIONAL ATTRIBUTES
* SECURITY
* RELIABLILTY
* MAINTAINABILITY
* PORTIBILITY
* REUSEABILITY
* APPLICATION COMPATIBILTY
* RESOURCE UTILIZATION
* SERVICEABILITY

1.2 SCOPE

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to the administrators of the system.

1.3 OBJECTIVE

Our goal is to minimize the costs associated with:

1. Unnecessary checks done by a mechanic.
2. Missing a faulty truck, which may cause a breakdown in the future. However the main objective will be to predict and minimize the cost of failures associated with these combinations of readings.
   1. DEFINATION

|  |  |
| --- | --- |
| TERM | DESCRIPTION |
| DATABASE | Collection of Information Monitored by the System |
| IDE | Integrated Development Environment |
| AWS | Amazon Web Services |

2. GENERAL DISCRIPTION

2.1 PRODUCT PERSPECTIVE

Scania Truck Failures Prediction is UI based application which will be used for predicting whether the failure is due to Air pressure System or not.

2.2 PROBLEM STATEMENT

To create an UI application which can be used to detect failure in trucks.

2.3 PROPOSED SOLUTION

The solution to the above stated problem is creating a UI application. The UI will enable the user to predict whether the failure is due to Air pressure System or not.

The goal is to minimize maintenance costs of the air pressure system (APS) of Scania trucks. Therefore, failures should be predicted before they occur.

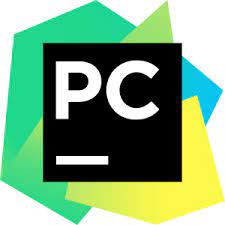
2.4 FURTHER IMPROVEMENTS

More advancement can be done for better results.

2.5 TECHINICAL REQUIREMENTS

No hardware tool is required but services like cloud services are required to host the website and database is required to store the data.

2.6 TOOLS USED



2.7 Data Requirements

In this model we are using dataset taken from UCI Repository.

2.8 CONSTRAINTS

Available dataset is too huge for training. So training will be done on a sample of data.

2.9 ASSUMPTIONS

The application will assume data to be in .csv format which comma ( , ) as a separator.

3. DESIGN DETAIL

3.1 PROCESS FLOW

3.1.1 Proposed methodology

ML model for prediction

Validation from the dataset

Data

Prediction

3.1.2 Model training and evaluation

Feature Engineering

Testing Set

Training Set

Result for Evaluation

Model

Prediction

3.1.3 Deployment Process

Enter Input

Load Model

Prediction Result

Make Predictions

3.2 EVENT LOG

The system is going to log everything so that the user gets to know which process is running internally.

3.3 ERROR HANDLING

Should errors be encountered, an explanation will be displayed as to what went wrong? An error will be defined as anything that falls outside the normal and intended usage.

4. PERFORMANCE

The hosted website will be used by many daily professionals so coding will be done in a proper modular fashion to reduce the run time and for faster execution.

4.1 REUSABLILITY

The code written should have the ability to be reused with no problems.

4.2 APPLICATION COMPATIBILTY

The different components for this project will be using Python as an interface between them. Each component will have its own task to perform, and it is the job of the Python to ensure proper transfer of information.

4.3 RESOUCE UTILIZATION

When any task is performed, it will likely use all the process power available until that function is finished.

4.4 DEPLOYMENT



5. KEY PERFORMANCE INDICATOR

The only indicator in our application will be the accuracy of the application. This means that whether the application is able to predict correct output for a given input.

6. CONCLUSION

The application will be providing the Truck Manufacturers Facilities such as Lot of money is spent on un-necessary checks done by service person on APS system in trucks, which can be prevented by developing a machine learning model that can predict the failure of component in APS. In this way, service can be restricted to the trucks whose APS component is predicted to be failed by the model.