2023

LOW LEVEL DESIGN(LLD)

DATA VISUALIZATION OF BIRD STRIKES BETWEEN 2000 – 2011

MD SAHIL

iNeuron

DOCUMENT VERSION CONTROL:

Version	Date	Author	Comments
1.0	14-April-2023	Md Sahil	First Version of complete Low-Level Design

Contents:

1. Introduction

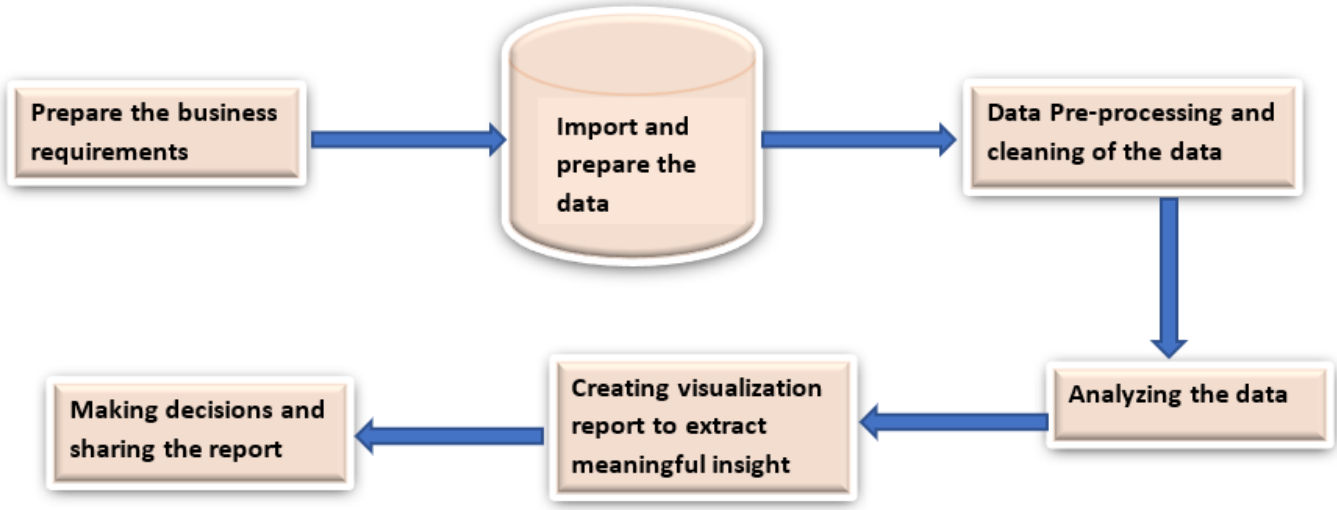
1.1 What is Low-Level design document?

The goal of the LDD or Low-level design document (LLDD) is to give the internal logic design of the actual program code for the House Price Prediction dashboard. LDD describes the class diagrams with the methods and relations between classes and programs specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 Scope

Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. The process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data design work.

2. Architecture



1. Prepare the business requirements:

In this phase we did the following things:

- Define the problem we are trying to solve
- Make sure we fully understand the stakeholder's expectations
- Focus on the actual problem and avoid any distractions
- Collaborate with stakeholders and keep an open line of communication
- Take a step back and see the whole situation in context

2. Import and prepare the data:

The Dataset was taken from iNeuron's Provided dataset link given below:

https://drive.google.com/drive/folders/1hLkL5HO4xG9rIjL8XeS6q-uAjwbTDSX6?usp=sharing

Then we did the following things:

- Create a data frame using python and import the data into data frame.
- Identify the required metrics to measure
- Create security measures to protect that data

3. Data Pre-processing and cleaning of the data

The following measures were taken to clean the data:

- Identify the missing data using python
- Remove records where the key metrics values are missing
- Using python to find incorrectly entered data
- Remove duplicate data
- Checked for extra spaces
- Checking as much as possible for bias in the data

4. Analyzing the data

In this phase we did the following things:

- Perform calculations.

- investigations on data to discover patterns, spot anomalies, test hypothesized check assumptions with the help of summary statistics and graphical representations.

5. Creating visualization report to extract meaningful insight

Creating a visualization report is an essential part of your analysis, in other terms, we can say that it is the end result of our analysis which is to be shared with stakeholders. On the basis of the visualization report, we make our business decision. So a good visualization report must show meaningful insight.

Steps to plan a data visualization:

- Explore the data for patterns
- Plan all required visuals
- Create visuals

6. Making decisions and sharing the report

In this phase we did the following things:

- Successfully communicate our findings.
- Make more informed decisions.
  Revealing gaps and opportunities.
- Sharing the report with stakeholders.

3. Architecture Description

3.1 Data Description

The Dataset containing the following fields:

1) **Record ID** – Unique ID of each strike case record
2) **Aircraft: Type** – Type of the Aircraft
3) **Airport: Name** – Name of the Airport
4) **Altitude bin** – Contain Altitude values in respect of 2 bins which are < *1000 ft* and > *1000 ft*
5) **Aircraft: Make/Model** – Contain the model of Aircraft
6) **Wildlife: Number struck** – Contain number of wildlife struck in terms of 4 groups which are *1, 2-10, 11-100, over 100*
7) **Wildlife: Number Struck Actual** – Contain Actual number of wildlife struck

8) **Effect: Impact to flight** – Contain categorical value about impact in flight due to bird strike
9) **FlightDate** – Date of the flight
10) **Effect: Indicated Damage** – Contained categorical value about whether damage happened or not.
11) **Aircraft: Number of engines?** – Contained the number of engines present in aircraft
12) **Aircraft: Airline/Operator** – Contain the name of airlines
13) **Origin State** – Contain the name of origin state
14) **When: Phase of flight** – Contain categorical value about the phase of flight when strike occurs
15) **Conditions: Precipitation** – Contain categorical value about the Precipitation conditions during strikes
16) **Remains of wildlife collected?** – Contain Boolean value about whether remains of wildlife collected or not
17) **Remains of wildlife sent to Smithsonian** – Contain Boolean value about whether remains of wildlife sent to Smithsonian or not
18) **Remarks** – Contain remarks about strikes
19) **Wildlife: Size** – Contain categorical value about the size of wildlife
20) **Conditions: Sky** – Contain categorical value about the Sky conditions during strikes
21) **Wildlife: Species** – Contain wildlife species name
22) **Pilot warned of birds or wildlife?** – Contain Yes(Y)/No(N) value about whether Pilot warned of birds or wildlife before strike or not
23) **Cost: Total $** - Total incurred cost due to bird strikes in dollar
24) **Feet above ground** – Contain numeric value about Feet above ground of aircraft during strike
25) **Number of people injured** – Number of people injured due to bird strike
26) **Is Aircraft Large?** – Contain Yes/No value about whether Is Aircraft Large or not

3.2 Data Transformation

In the Transformation Process, we will convert our original datasets with other necessary attributes format and data cleaning in python using jupyter notebook. After transforming data exported as a CSV file.

3.3 Data Loading in Power BI Query Editor

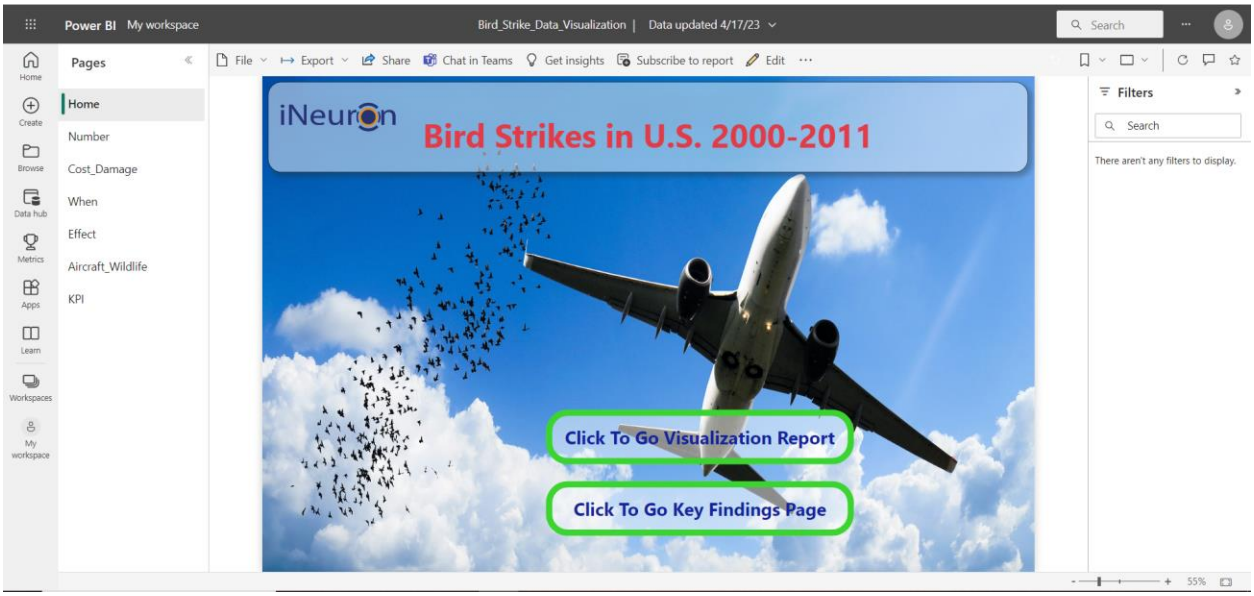
Power BI Power Query is an ETL tool that enables end users to seamlessly import and reshape data from various source either in excel or csv format or from database. After importing the

transformed data in power query do some minimal change and then apply the changes and return to power bi report view.

3.4 Deployment

Once we have completed our visualization report preparation we have save the file with .pbix extension also published the report in power bi service. To save the report in power bi service you need to sign in with the organization email id.

Here in the below screenshot, we can see that out report has been published to power bi service.



4. Unit Test Cases

TEST CASE DESCRIPTION	EXPECTED RESULTS
Yearly Strike Analysis	Year wise data shown with the help of line chart.
Total number of actual bird strikes	The total number of actual strikes have shown with the help of a text card
Top 10 US Airlines in terms of having encountered bird strikes	Airlines wise data shown with the help of Clustered Bar Chart.

Top 50 Airports with most encountered of bird strikes	Airport wise data shown with the help of Clustered Bar Chart.
Origin states with total encountered of bird strikes	Origin state wise data shown with the help of Clustered Bar Chart.
Yearly Cost Incurred due to Bird Strikes	Yearly cost incurred due to bird strikes shown with the help of line chart.
Total Cost Incurred due to Bird Strikes	The total cost due to strike have shown with the help of a text card
Top 10 US Airlines in terms of having total cost	Airlines wise data shown with the help of Clustered Bar Chart.
Yearly Total damage count due to Bird Strikes	Yearly damage count due to bird strikes shown with the help of line chart.
Top 10 US Airlines in terms of having total damage count	Airlines wise data shown with the help of Clustered Bar Chart.
Total damage count % due to Bird Strikes	The total damage count % due to strike have shown with the help of a text card
Total people injured due to Bird Strikes	The total people injured due to strike have shown with the help of a text card
Altitude of airplanes at the time of strike	Altitude of airplanes at the time of strike shown with the help of donut chart
Phase of flight at the time of strike	Phase of flight at the time of strike shown with the help of Clustered Bar Chart.
Sky condition at the time of strike	Sky condition at the time of strike shown with the help of Clustered Bar Chart.
Precipitation at the time of strike	Precipitation at the time of strike shown with the help of Clustered Bar Chart.
Impact on Flight	Impact on Flight shown with the help of Clustered Bar Chart
Were Pilots Informed?	Were Pilots Informed shown with the help of donut chart
Prior Warning and Effect of Strike Relation	Prior Warning and Effect of Strike Relation shown with the help of Clustered Column Chart.
Effect of Strike at Different Altitude by Number of Bird Strikes	Effect of Strike at Different Altitude by Number of Bird Strikes shown with the help of Clustered Column Chart.
Top 10 most strike wildlife species	wildlife species wise data shown with the help of Clustered Bar Chart.

Wildlife Size with Total Number of Bird Strikes	Wildlife Size shown with the help of donut chart
Aircraft Size with Total Number of Bird Strikes	Aircraft Size shown with the help of donut chart
Number Of Engines with Number of Bird Strikes	Number Of Engines wise data shown with the help of Clustered Bar Chart.
Top 10 Aircraft Model with Number of Bird Strikes	Aircraft Model wise data shown with the help of Clustered Bar Chart.