All the dataframes designed for the data analysis platform are presented here. Every dataframe has a short description and the aggregation level is stated. For every dtaframe there is a table of all the attributes of the dataframe. For every attribute the following description is provided: the name (as is used in the code), a short description, the input (how the value of that attribute is computed or from where it is extracted|), the output (where that attribute will be used).

For all the dataframes scenario\_name is defined as : scenario\_name=concept+"\_"+density+"\_"+distribution+"\_"+repetition+"\_"+uncertainty

# Loslog\_dataframe

The loslog\_datframe contains data concerning the losses of separation. It is aggregated per LOS for all the simulated scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Description | Input | Output |
| LOS\_id | An auto-increment identification number. | Automatically computed for every los in the dataframe | - |
| scenario\_name | The simulated scenario in which the corresponding LOS occurred. | LOSLOG file name + folder to indicate the concept | It is used to filter the LOS events per scenario |
| LAT1 | The latitude (deg) of the first aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| LON1 | The longitude (deg) of the first aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| ALT1 | The altitude (ft) of the first aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| LAT2 | The latitude (deg) of the second aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| LON2 | The longitude (deg) of the second aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| ALT2 | The altitude (ft) of the second aircraft during the LOS , at the time of min distance. | LOSLOG file |  |
| DIST | The minimum horizontal distance (m) between the two aircraft during the LOS event | LOSLOG file |  |
| crash | Boolean to indicate if the LOS leaded to a crash between the two aircraft. | It is true if the DIST is smaller than twice the radius of the aircraft and the altitude difference is smaller than the height of the drones. |  |
| LOS\_exit\_time |  |  |  |
| LOS\_start\_time |  |  |  |
| LOS\_duration\_time |  | LOS\_exit\_time- LOS\_start\_time |  |

# Conflog\_dataframe

The conflog\_datframe contains data concerning the conflicts. It is aggregated per conflict for all the simulated scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Description | Input | Output |
| CONF\_id | An auto-increment identification number. | Automatically computed for every conflict in the dataframe | - |
| scenario\_name | The simulated scenario in which the corresponding LOS occurred. | CONFLOG file name + folder to indicate the concept | It is used to filter the conflict events per scenario |
| CPALAT | The lattitude of the closest point of approach. | CONFLOG file | No use for it now, but it could be used to create heatmaps of the conflicts. |
| CPALON | The longitude of the closest point of approach. | CONFLOG file | No use for it now, but it could be used to create heatmaps of the conflicts. |
| simt | Simulation time at which the conflict was detected. | CONFLOG file | No use for it now, but it could be used to create heatmaps of the conflicts per time durations. |

# Geolog\_dataframe

The geolog\_datframe contains data concerning the geofence violations. It is aggregated per violation for all the simulated scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Description | Input | Output |
| GEO\_id | An auto-increment identification number. | Automatically computed for every conflict in the dataframe | - |
| scenario\_name | The simulated scenario in which the corresponding LOS occurred. | GEOLOG file name + folder to indicate the concept | It is used to filter the violation events per scenario |
| MAX\_intrusion | The maximum distance (m) to the closest edge of the geofence. | GEOLOG file | It si used to filter out very small violations. |
| GEOF\_NAME | Geofence ID given within the gpkg. IDs with G are in open airspace. | GEOLOG file | No use for it now, but it could be used to separate violations between open and constrained. |
| Violation\_severity | Boolean to indicate if the violation is severe or not. | It is true if the violation was for more than 1 meter, based on the MAX\_intrusion value. | It is used to filter out very small violations. |
| Open\_airspace | Boolean to indicate if the violation was in open airspace | True if it was in open, that is determine from the GEOF\_NAME. |  |
| Loitering\_nfz | Boolean to indicate if the violation was in a loitering nfz | True if it was in loitering nfz, that is determine from the GEOF\_NAME. |  |

# Flstlog\_datframe

The flstlog\_datframe contains data concerning all the flights of all the scenarios simulated. It is aggregated per flight for all the simulated scenarios.

|  |  |  |
| --- | --- | --- |
| Attribute name | Description | Input |
| Flight\_id | An auto-increment identification number. | Automatically computed for every flight in the dataframe , in the flight intentions |
| scenario\_name | The simulated scenario in which the corresponding flight occurred. | FLSTLOG file name + folder to indicate the concept |
| ACID | The acid number of the aircraft | Flight intentions |
| Dest\_LAT | The latitude of the destination. | Flight intentions |
| Dest\_LON | The longitude of the destination. | Flight intentions |
| Origin\_LAT | The latitude of the origin. | Flight intentions |
| Origin\_LON | The longitude of the origin. | Flight intentions |
| loitering | Boolean to indicate if the flight is a loitering flight | Flight intentions |
| Priority | The priority level of the flight. | Flight intentions |
| Cruising\_speed | The crusing\_speed (m/s) of the aircraft | Depending on the aircraft type from the Flight intentions. |
| Spawned | Boolean to indicate if the aircraft spawned | It is true if the aircraft appears in the flst log. |
| Mission\_completed | Boolean to indicate if the aircraft completed their mission. | It is true if the aircraft was deleted in a distance smaller than (10 meters? ) from its destination point. |
| DEL\_LAT | The latitude coordinate that the aircraft was deleted. | FLST\_LOG |
| DEL\_LON | The longitude coordinate that the aircraft was deleted. | FLST\_LOG |
| DEL\_ALT | The altitude coordinate that the aircraft was deleted. | FLST\_LOG |
| FLIGHT\_time | The time duration of the actual flight | FLST\_LOG |
| DEL\_time | The time when the aircraft was deleted. | FLST\_LOG |
| Spawn\_time | The time when the aircraft was spawned | FLST\_LOG |
| Baseline\_arrival\_time | The time when the aircraft should have been deleted. | Baseline\_deparure\_time+ Baseline\_flight\_time |
| Baseline\_deparure\_time | The time when the aircraft should have been spawned. | Flight intentions |
| Baseline\_flight\_time | The time duration of the ideal flight | Baseline\_2D\_distance / cruising speed + Baseline\_vertical\_distance/vertical\_speed |
| Baseline\_2D\_distance | The baseline horizontal distance. | Computed from the intention origin to the detstiantion point. |
| Baseline\_vertical\_distance | The baseline vertical distance. | It is 0 for all flights except loitering. |
| Baseline\_ascending\_distance | The baseline ascending distance. | It is 0 for all flights except loitering. |
| Baseline\_3D\_distance | The baseline distance. |  |
| Arrival\_delay | The delay of landing in sec. | DEL\_time- Baseline\_arrival\_time |
| Departure\_delay | EFF6, Time duration from the planned departure time until the actual departure time of the aircraft. | Baseline\_deparure\_time and Spawn\_time |
| 2D\_dist |  | FLST\_LOG |
| 3D\_dist |  | FLST\_LOG |
| ALT\_dist |  | FLST\_LOG |
| Ascending dist |  |  |
| Work\_done |  | Computed from ascending\_dist and flight\_time |

# Reglog\_dataframe

The reglog\_datframe contains position data for all the aircraft flying in all the time steps of all the scenarios simulated. It is aggregated per time\_step and per flying aircraft during each time step for all the simulated scenarios.

|  |  |  |
| --- | --- | --- |
| Attribute name | Description | Input |
| REG\_id | An auto-increment identification number. |  |
| scenario\_name | The simulated scenario. |  |
| Time\_stamp |  | REG\_LOG |
| ACID | The aircraft id | REG\_LOG |
| ALT | The altitude of the aircraft . | REG\_LOG |
| LAT | The latitude of the aircraft . | REG\_LOG |
| LON | The longitude of the aircraft . | REG\_LOG |

# Time\_object\_dataframe

The time\_object\_datframe contains data for all the time steps of all the scenarios simulated. It is aggregated per time\_step for all the simulated scenarios

|  |  |  |
| --- | --- | --- |
| Attribute name | Description | Input |
| Time\_object\_id | An auto-increment identification number. |  |
| scenario\_name | The simulated scenario. |  |
| Time\_stamp |  | REG\_LOG |
| #Aircaft\_Alive |  | REG\_LOG |
| Sound\_exposure\_p1 (ENV3) |  | Computed from reglog\_dataframe |
| Sound\_exposure\_p2(ENV3) |  | Computed from reglog\_dataframe |
| Sound\_exposure\_p3(ENV3) |  | Computed from reglog\_dataframe |

# Metrics\_dataframe

The metrics\_datframe contains the computed values for the metrics. It is aggregated per scenario for all the simulated scenarios.

|  |  |  |
| --- | --- | --- |
| Attribute name | Description | Input |
| scenario\_name | The simulated scenario. |  |
| #Aircraft\_number | The number of the aircraft that should have been spawned for that scenario. | Flight intention file. |
| #Succeful\_aircraft\_number | The number of the aircraft that completed their mission per scenario. | FLST\_dataframe |
| #Spawned\_aircraft\_number | The number of the aircraft that spawned per scenario. | FLST\_dataframe |
| AEQ1 | AEQ-1: Number of cancelled demands  per simulated scenario | arrival\_delay from FLST\_dataframe |
| AEQ1\_1 | AEQ-1.1 Percentage of cancelled demands | AEQ1 and #Aircraft\_number from metrics\_dataframe |
| AEQ2 | AEQ-2: Number of inoperative trajectories | FLIGHT\_time from FLST\_dataframe |
| AEQ2\_1 | AEQ-2.1: Percentage of inoperative trajectories | AEQ2 and #Aircraft\_number from metrics\_dataframe |
| AEQ3 | AEQ-3: The demand delay dispersion | arrival\_delay from FLST\_dataframe |
| AEQ4 | AEQ-4: The worst demand delay | arrival\_delay from FLST\_dataframe |
| AEQ5 | AEQ-5: Number of inequitable delayed demands | arrival\_delay from FLST\_dataframe |
| AEQ5\_1 | AEQ-5-1: Percentage of inequitable delayed demands | AEQ5 and #Aircraft\_number from metrics\_dataframe |
| CAP1 | CAP-1: Average demand delay | arrival\_delay from FLST\_dataframe |
| CAP2 | CAP-2: Average number of intrusions | SAF2 and #Aircraft\_number from metrics\_dataframe |
| CAP3 | CAP-3: Additional demand delay . It is only computed for scenarios with rogues. | CAP1 from metrics\_dataframe for the regarding scenario and the same one without uncertainties |
| CAP4 | CAP-4: Additional number of intrusions . It is only computed for scenarios with rogues. | CAP2 from metrics\_dataframe for the regarding scenario and the same one without uncertainties |
| EFF1 | **EFF-1: Horizontal distance route efficiency** | Ratio of the sum of Baseline\_2D\_distance of all flight in the scenario to the sum of 2D\_dist of all flight in the scenario. |
| EFF2 | **EFF-2: Vertical distance route efficiency** | Ratio of the sum of Baseline\_vertical\_distance of all flight in the scenario to the sum of ALT\_dist of all flight in the scenario. |
| EFF3 | **EFF-3: Ascending route efficiency** | ??????? |
| EFF4 | **EFF-4: 3D distance route efficiency** | Ratio of the sum of Baseline\_3D\_distance of all flight in the scenario to the sum of 3D\_dist of all flight in the scenario. |
| EFF5 | **EFF-5: Route duration efficiency** | Ratio of the sum of Baseline\_flight\_time of all flight in the scenario to the sum of FLIGHT\_time of all flight in the scenario. |
| EFF6 | **EFF-6: Departure delay** | Sum of Departure\_delay from FLST\_dataframe |
| ENV1 | **ENV-1: Work done** | Sum of work\_done for all drones of the scenario |
| ENV2 | **ENV-2: Weighted average altitude** | REGLOG\_dataframe |
| ENV4 | **ENV-4: Altitude dispersion** | REGLOG\_dataframe |
| SAF1 | **SAF-1: Number of conflicts** | CONFLOG\_datframe |
| SAF2 | **SAF-2: Number of intrusions** | LOSLOG\_dataframe |
| SAF2\_1 | **Number of crashes** | LOSLOG\_dataframe |
| SAF3 | **SAF-3: Intrusion prevention rate** | SAF2 and SAF1 |
| SAF4 | **SAF-4: Minimum separation** | Min of DIST (is that only for horizontal ?) |
| SAF5 | **SAF-5: Time spent in LOS** | Sum of LOS\_duration\_time from LOSLOG\_dataframe |
| SAF6 | **SAF-6: Geofence violations** | GEOLOG\_dataframe |
| SAF6\_1 | **Severe geofence violations** | GEOLOG\_dataframe |
| PRI1 | **PRI-1: Weighted mission duration** | FLIGHT\_time and priority from FLST\_dataframe |
| PRI2 | **PRI-2: Weighted mission track length** | priority and 3D\_dist (should that be 2D?) from FLST\_dataframe |
| PRI3 | **PRI-3: Average mission duration per priority level** | FLIGHT\_time and priority from FLST\_dataframe |
| PRI4 | **PRI-4: Average mission track length per priority level** | priority and 3D\_dist (should that be 2D?) from FLST\_dataframe |
| PRI5 | **PRI-5: Total delay per priority level** | arrival\_delay and priority from FLST\_datframe |