THE TRAGEDY OF FLIGHT – A Comprehensive Crash Analysis using TABLEAU

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1.INTRODUCTION:

1.1 OVERVIEW

Airplane crash analysis is performed to determine the cause of errors once an accident has happened. In the modern aviation industry, it is also used to analyze a database of past accidents in order to prevent an accident from happening. Many models have been used not only for the accident investigations but also for educational purpose.

In the aviation industry, human error is the major cause of accidents. About 38% of 329 major airline crashes, 74% of 1627 commuter/air taxi crashes, and 85% of 27935 general aviation crashes were related to pilot error. The Swiss cheese model is an accident causation model which analyses the accident more from the human factor aspect.

An airplane crash analysis is a detailed investigation into the causes of an aviation accident. The goal of an airplane crash analysis is to identify any factors that contributed to the accident, with the ultimate goal of improving safety and preventing future accidents. The process of conducting an airplane crash analysis typically involves the collection and analysis of a wide range of data, including information about the aircraft and its systems, the operators, and any other relevant factors.

This data is typically collected from Kaggle. Once the data has been collected, it is analysed through tableau, to identify any potential causes of the accident. The results of an airplane crash analysis are typically published in a report, which may include recommendations for improving safety and preventing similar accidents in the future.

These recommendations may be implemented by the relevant authorities or industry organizations.

1.2 PURPOSE

The purpose of an airplane crash analysis is to identify any factors that contributed to the accident, with the ultimate goal of improving safety and preventing future accidents. Accident analysis models and methods provide safety professionals with a means of understanding why accidents occur. To effectively discover the hazards that led to the accident and to prevent their recurrence in a future accident or incident. In the course of that investigation, additional hazards which increased damage and injury (inadequate crashworthy systems, system safeguards, rescue team response, etc.)

Choosing an analysis technique is, however, not a simple process. A wide range of methods are available; each offering various theoretical and practical benefits and drawbacks. Accident analysis is a major tool in obtaining an understanding of the existing situation and how it could be improved by ITS. It helps to provide an understanding of the most effective solutions and is essential for monitoring and evaluating the safety of the road network.

Airplane Accident statistics include a record of air crash statistics and can be used to identify hazardous driving locations. In doing so, distinction is made between accidents based on accident experiences and accidents based on the specific geographic or physical features of the location. Flight data analysis as a process of analysing recorded flight data to improve the safety of flight operations. The prime objective of accident investigation is prevention. Finding the causes of an accident and taking steps to control or eliminate it can help prevent similar accidents from happening in the future. It is essential to preserve the evidence at the scene of an accident so that it can be used to determine what happened and who may be liable.

2.PROBLEM DEFINITION AND DESIGN THINKING:

2.1 EMPATHY MAP

The number of commercial accidents worldwide (defined here by the Bureau of Aircraft Accidents Archives as crashes that damaged the plane beyond repair) has steadily been declining since around 1980, even as the total amount of air traffic has increased.

Meanwhile, experts say there's no strong evidence that sitting near the front or back of the plane makes your odds of surviving a crash higher.

The deadliest aviation-related disaster, regarding fatalities on both the aircraft and the ground, was the destruction of the World Trade Center in New York City on September 11, 2001.

Over the past 20 years, there have been 1,598 deaths over a total of 143 billion miles flown by US carriers. This works out to 1.11 fatalities per 100 million miles traveled by airplanes. Meanwhile, car fatality rat

Though a Popular Mechanics analysis did find sitting near the back was slightly safer, it relied on a very small sample size of 20 crashes.

In Nepal's worst air crash in nearly five years, at least 69 people were killed after a Nepalese passenger plane with 72 people onboard crashed into a river gorge on Sunday while landing at the Pokhara airport.

The largest loss of life on board a single-aircraft is the 520 fatalities in the 1985 Japan Airlines Flight 123 accident,

On April 2020, there have been 33 aviation incidents in which 200 or more people died.

Turbine engines with improved durability and failure containment mechanisms[

Control surfaces of the aircraft can become stuck preventing proper control of the aircraft;

Hydraulic systems can fail preventing proper movement of the aircraft control systems and/or the landing gear;

Advanced avionics, incorporating computerized auto-recovery and alert systems[43]

A helicopter crash that killed the head of India's armed forces and 13 others was caused by a pilot disoriented by a sudden turn in the weather.

Computer graphics reconstruction of the moment immediately before the disaster: flight KLM 4805 (right) is about to collide with flight Pan Am 1736 (left). Part of the fog has been removed to give a clearer picture of the two planes. Main article: Tenerife airport disaster 583: The Tenerife airport disaster, which occurred on March 27, 1977.

the largest loss of life overall in a collective incident is the 2,996 fatalities in the coordinated terrorist destruction of airplanes and occupied buildings in the 2001 September 11 attacks.

Landing gear that can be lowered even after loss of power and hydraulics[45]

Instrument failures can trick the unsuspecting pilot into believing the aircraft is behaving one way when in fact it is performing another;

Fuel leaks can develop leading to unexpected reductions in the range of the aircraft and can lead to mid-air fires;

January 9, 2021 A Boeing 737, operated by Sriwijaya Air, crashed into the Java Sea minutes after taking off from Jakarta. All 62 people on board, including seven children and three babies, were killed.

Evacuation slides, to aid rapid passenger exit from an aircraft in an emergency situation

The largest loss of life in multiple aircraft in a single accident is the 583 fatalities in the two Boeing 747's that collided in the 1977 Tenerife airport disaster,

The first aircraft accident in which 200 or more people died occurred on March 3, 1974, when 346 died in the crash of Turkish Airlines Flight 981.

Until May 30, 2012, the Directorate General of Civil Aviation investigated incidents involving aircraft. Since then, the Aircraft Accident Investigation Bureau has taken over investigation responsibilities.[74]

Aircraft designs vary greatly. Airplanes have different types of engines, propellers, wings, and cockpit instrumentation. **If any of these components are not designed properly**, crashes can occur.

Listen to your flight attendant. always secure your oxygen mask.

Many aviation accidents are caused when pilots misread flight equipment, misjudge weather conditions or fail to properly address mechanical errors. **Pilot error** is considered the number one reason why planes crash.

Improved design of equipment and procedures can support a more error tolerant system, which cannot be eliminated by training. However training which is based on well thought out and designed procedures can provide a significant positive in avoiding mistakes.

Put on the oxygen mask the minute it drops. During a loss of cabin pressure, the fall in oxygen can knock you unconscious in as little as 20 seconds.

As technology in the industry has advanced to have passenger safety as a principal consideration, **airplane seats can withstand 16 times gravity's force**. These seats are also fireproof and do not emit toxic fumes if they were to catch on fire.

2.2 IDEATION & BRAINSTORMING MAP

3. RESULT:

3.1 DATA VISUALIZATION:

1. Comparing Aboard vs Fatalities vs Ground

2. Max accidents based on year

3. Accidents happened in 1972 (MAX ACCIDENTS) based on months

4. Highest No. of accident happened by Operators

5. Top 10 locations which had more accidents

6. Top 3 flights which have maximum accidents history

7. Accidents based on region
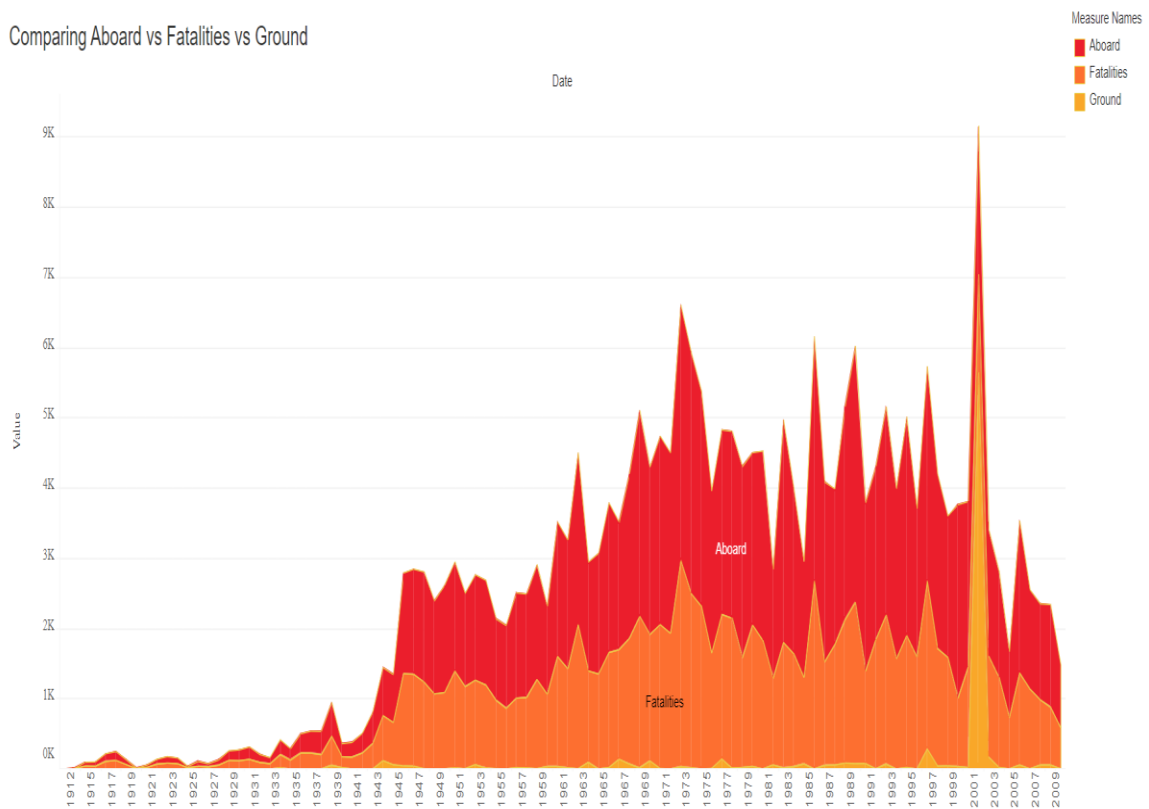
3.2 DASHBOARD:
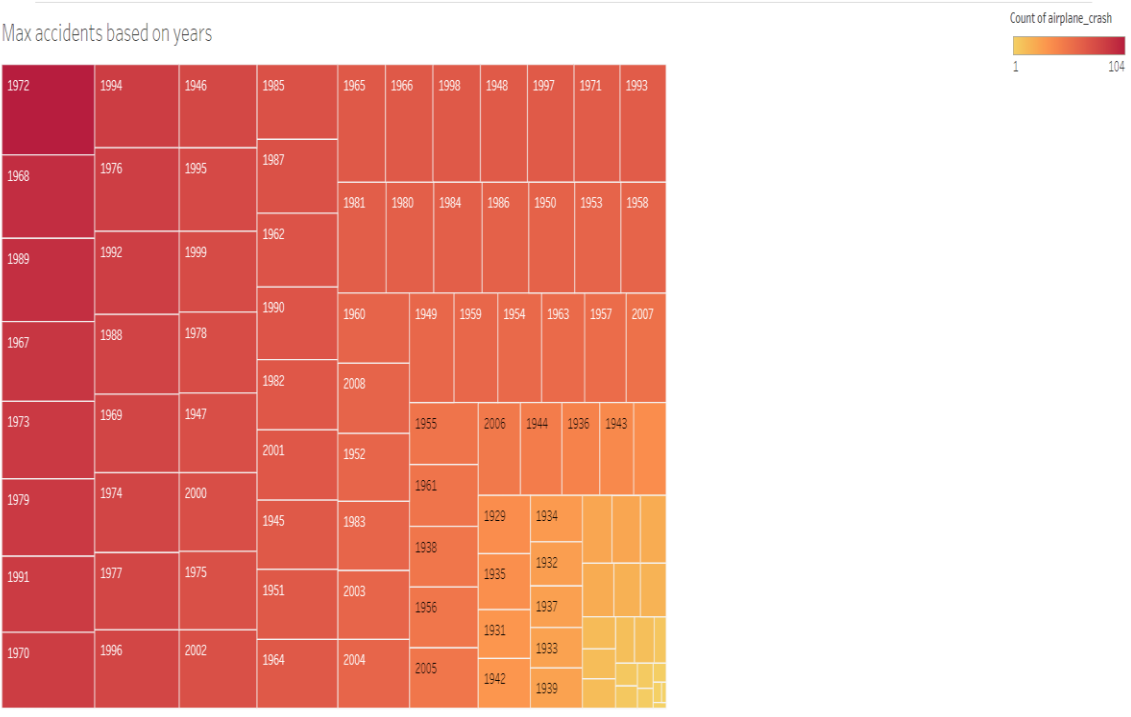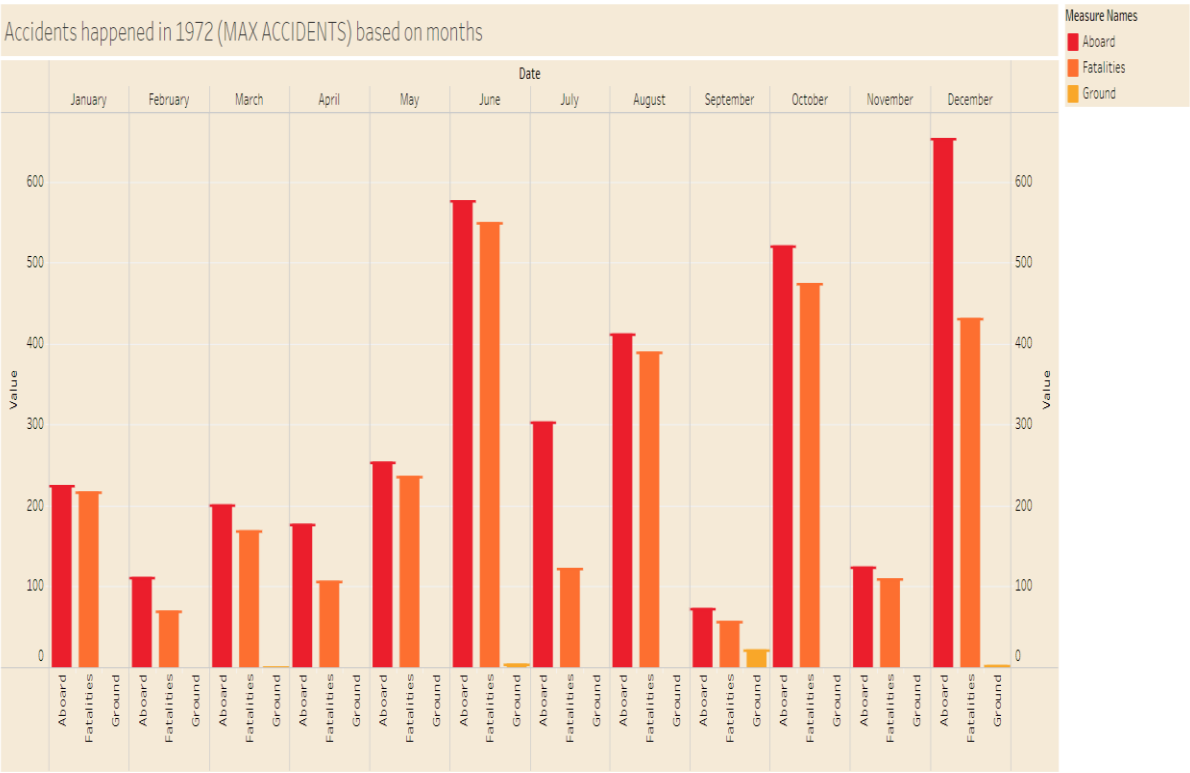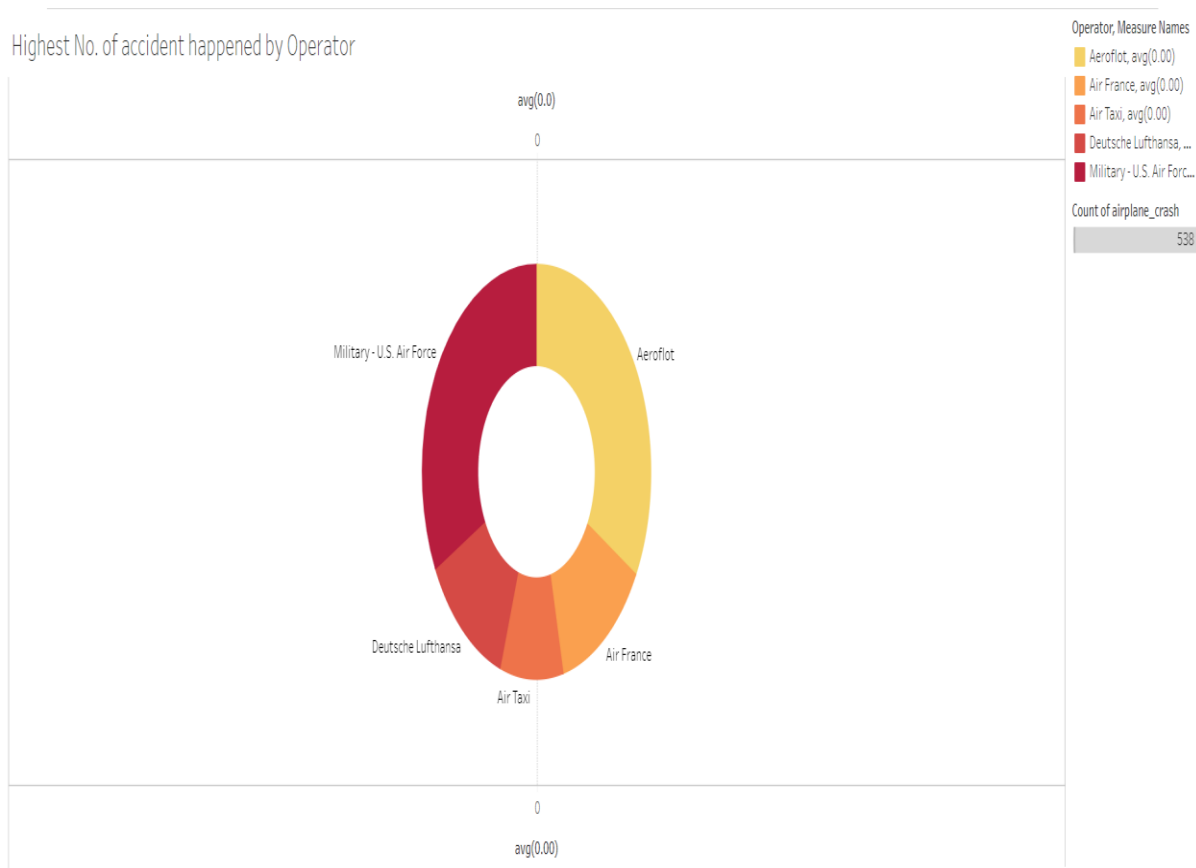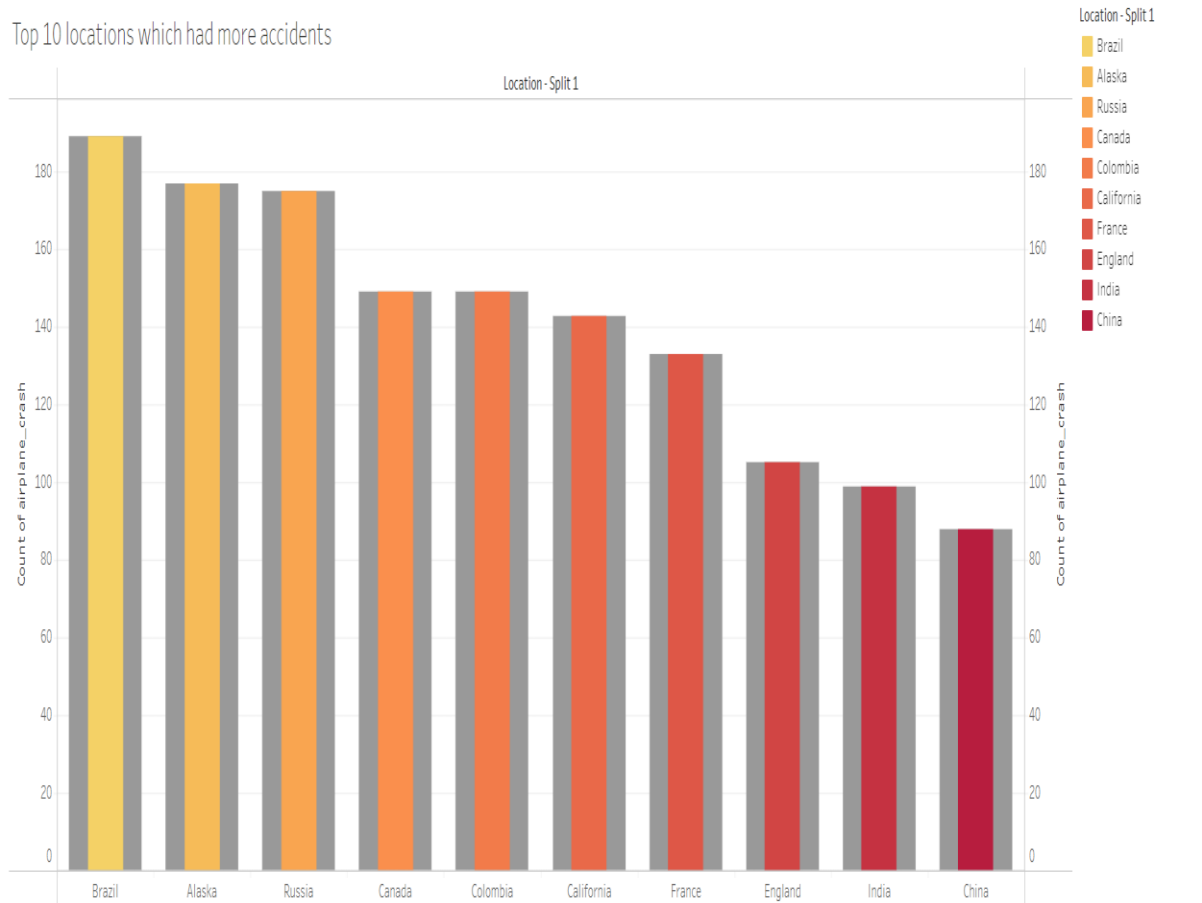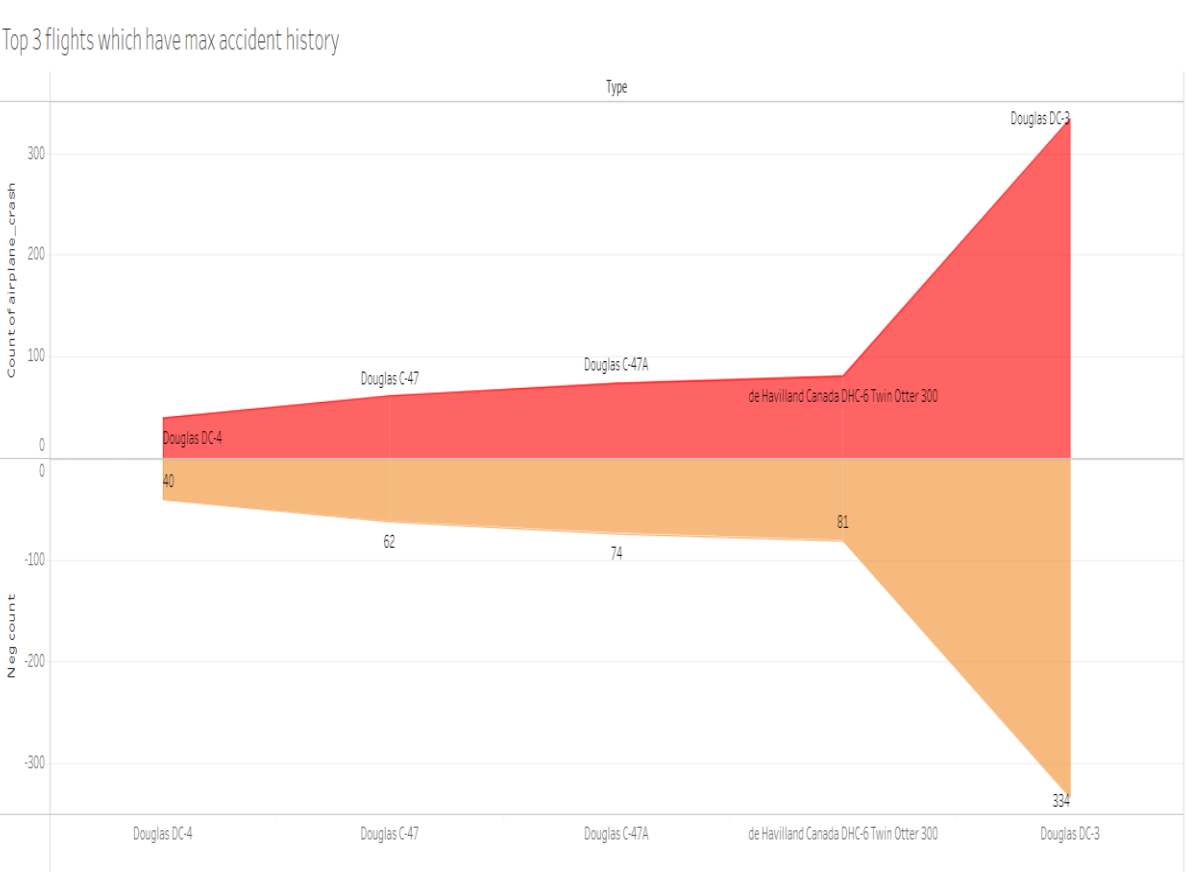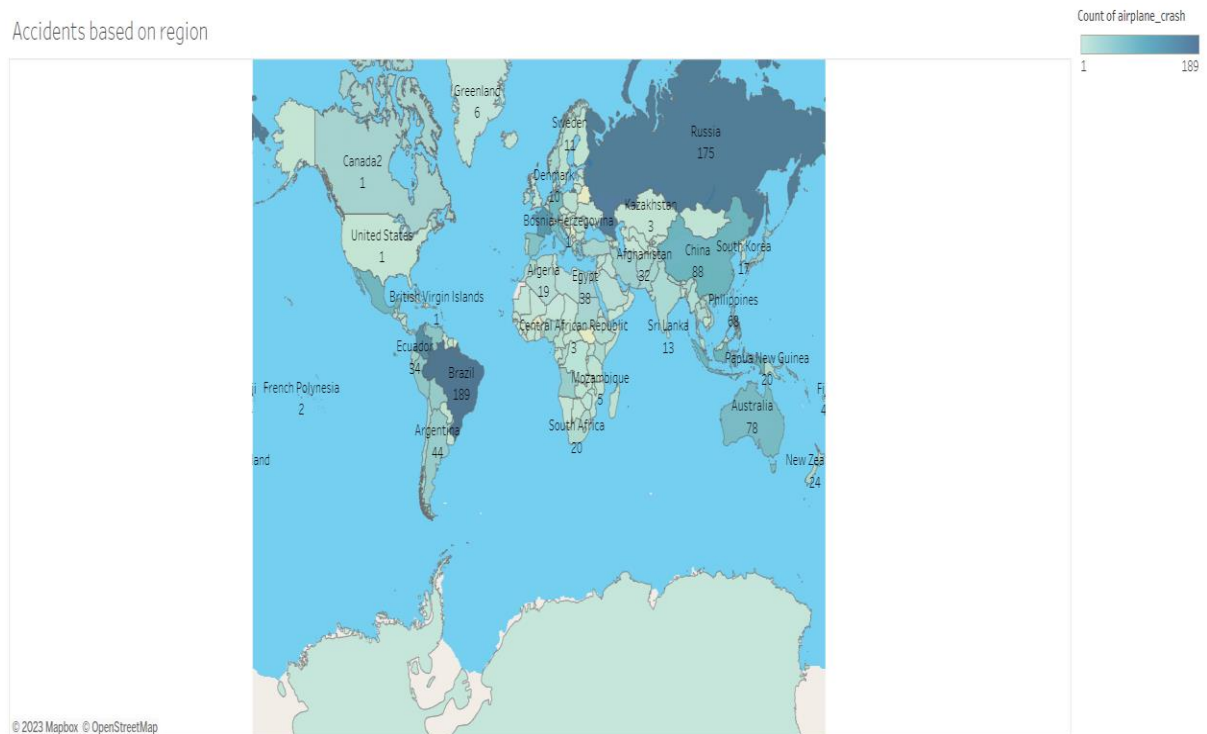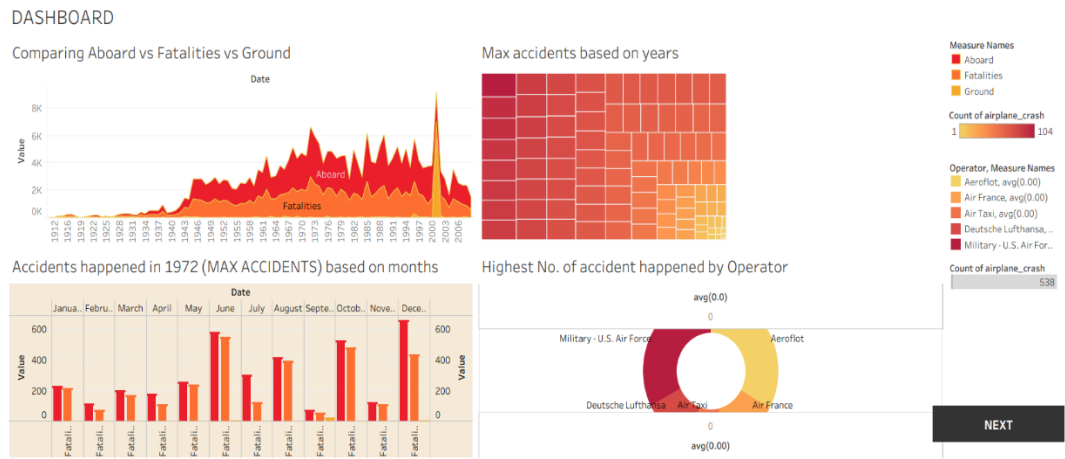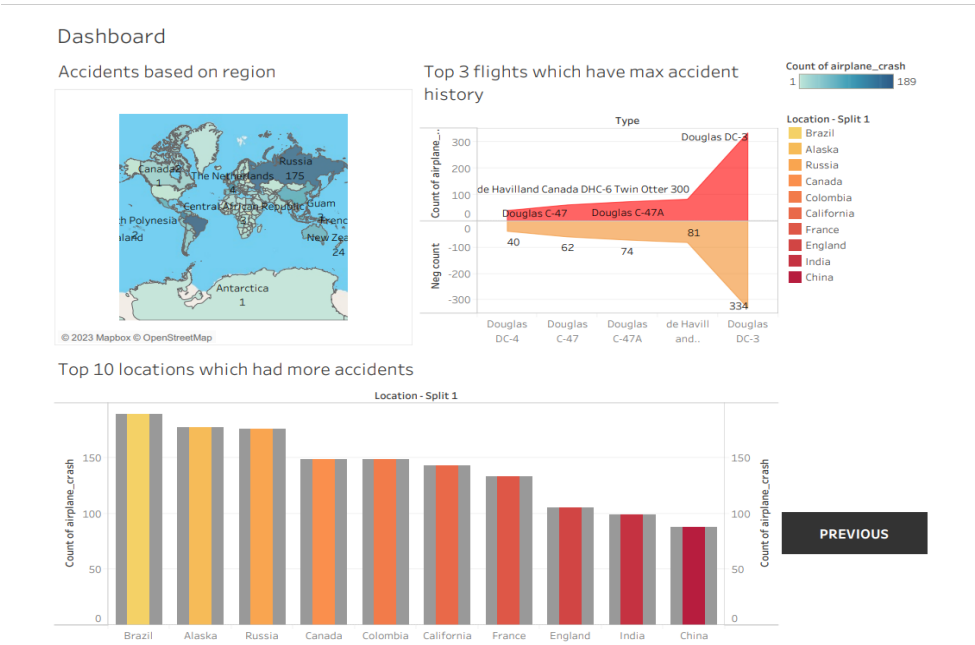
1. Responsive and design of Dashboard

3.3 STORY:

1. No. of scenes of Story
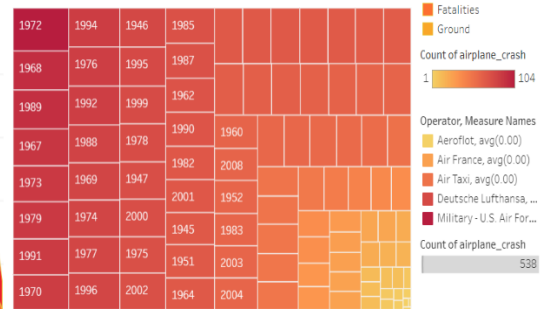
3.4 DASHBOARD AND STORY EMBED WITH UI FLASK

3.1 DATA VISUALIZATION:

1. COMPARING ABOARD Vs FATALITIES Vs GROUND:

2. MAXIMUM ACCIDENTS BASED ON YEAR:

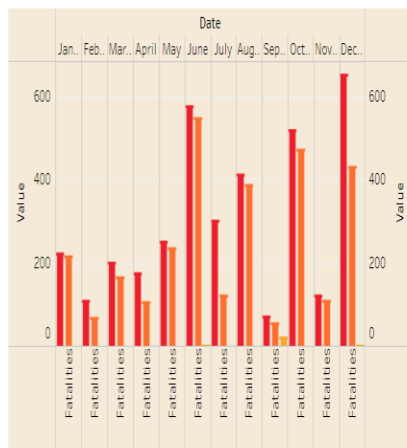Max accidents based on years

3. ACCIDENTS HAPPENED IN 1972 (MAX ACCIDENTS) BASED ON MONTHS:

Accidents happened in 1972 (MAX ACCIDENTS) based on months

4. HIGHEST NO. OF ACCIDENTS HAPPENED BY OPERATORS:

Highest No. of accident happened by Operator

5. TOP 10 LOCATIONS WHICH HAD MORE ACCIDENTS

Top 10 locations which had more accidents

6. TOP 3 FLIGHTS WHICH HAVE MAXIMUM ACCIDENTS HISTORY:

Top 3 flights which have max accident history

Type

Douglas DC-3

Douglas C-47A

Douglas C-47

de Havilland Canada DHC-6 Twin Otter 300

Douglas DC-4

Count of airplane_crash

40

62

74

81

334

Neg count

Douglas DC-4   Douglas C-47   Douglas C-47A   de Havilland Canada DHC-6 Twin Otter 300   Douglas DC-3

7. ACCIDENTS BASED ON THE REGION:

Accidents based on region

3.2 DASHBOARD:

1. RESPONSIVE AND DESIGN OF DASHBOARD:

DASHBOARD 1

DASHBOARD 2

3.3 STORY:

1. NO. OF SCENES OF STORY:
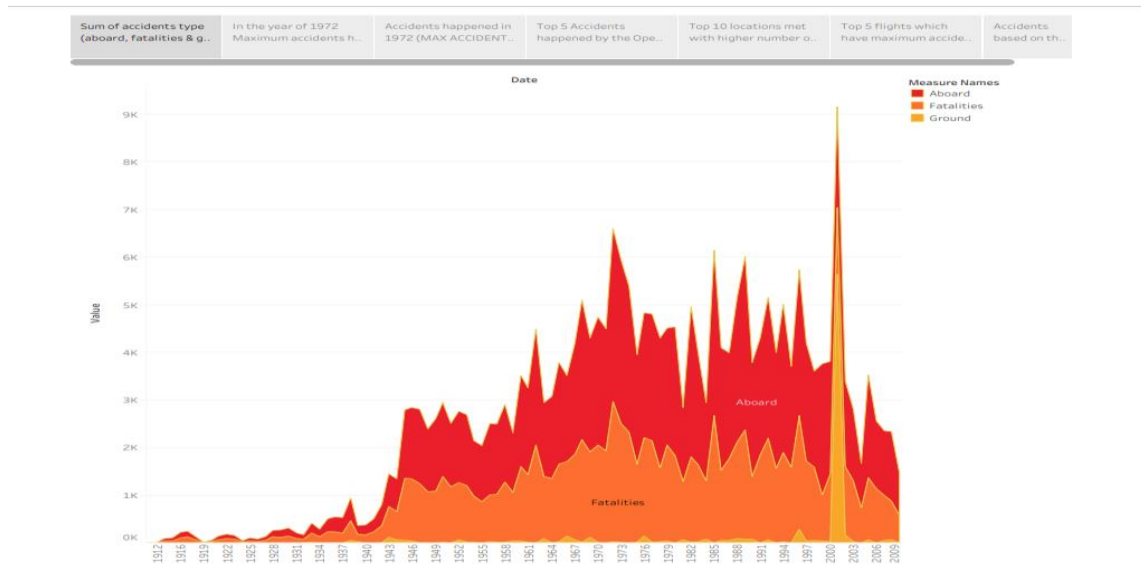
3.4 DASHBOARD AND STORY EMBED WITH UI FLASK
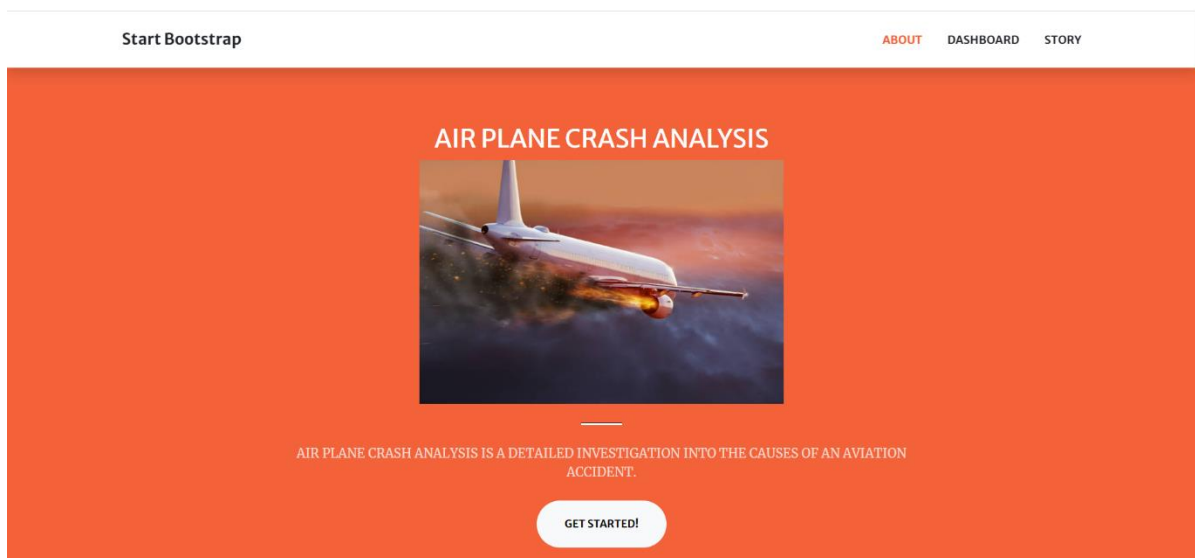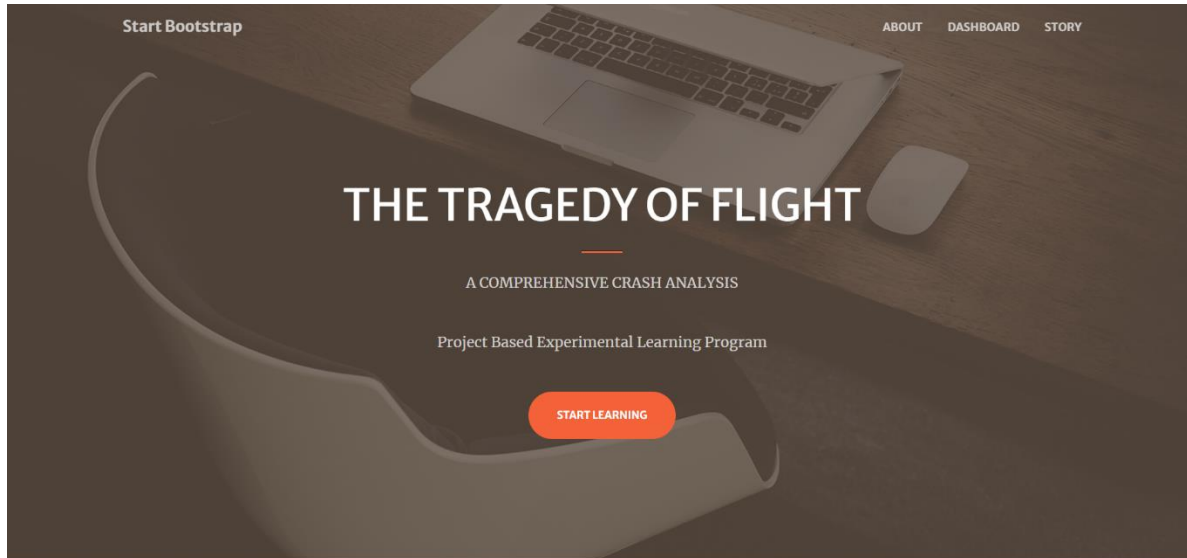
DASHBOARD

DASHBOARD

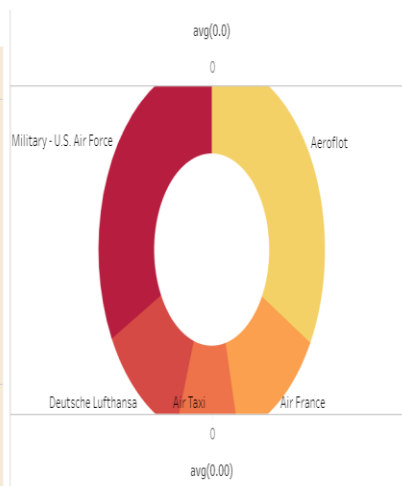### Comparing Aboard vs Fatalities vs Ground
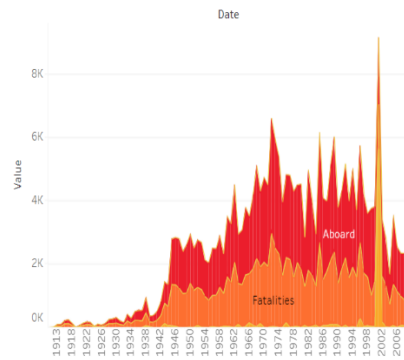
Max accidents based on years

Measure Names
- Aboard
- Fatalities
- Ground

Count of airplane_crash
1 — 104

Operator, Measure Names
- Aeroflot, avg(0.00)
- Air France, avg(0.00)
- Air Taxi, avg(0.00)
- Deutsche Lufthansa, ...
- Military - U.S. Air For...

Count of airplane_crash
538

Accidents happened in 1972 (MAX ACCIDENTS) based on months

Highest No. of accident happened by Operator
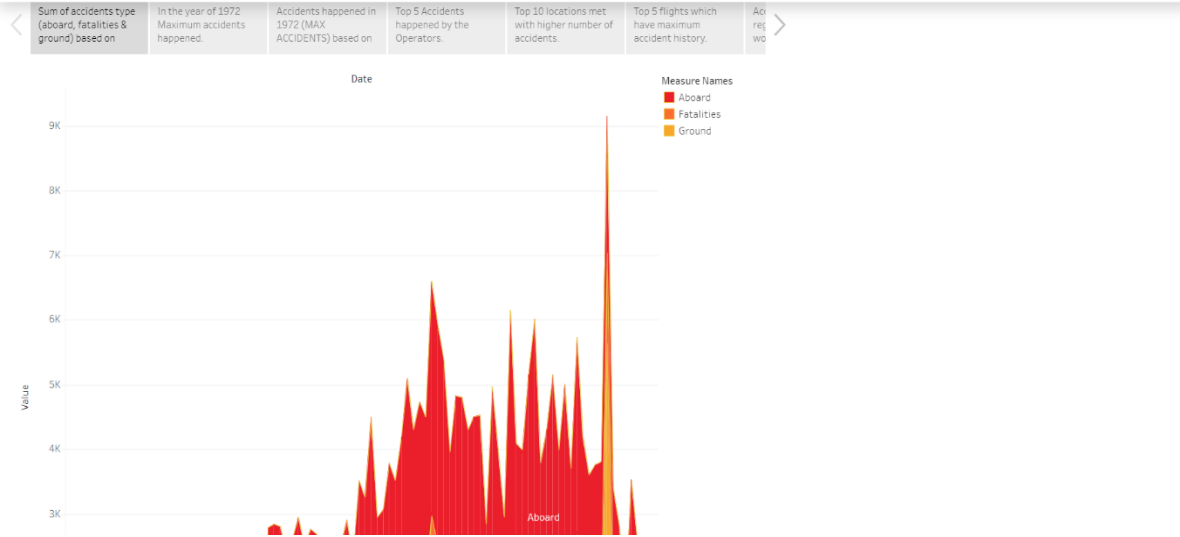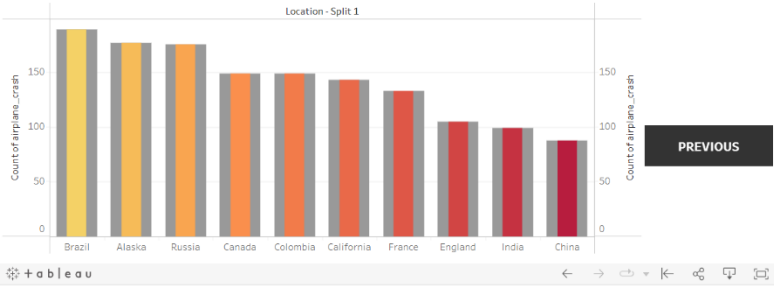

NEXT

+ableau

DASHBOARD

Dashboard

Accidents based on region

© 2023 Mapbox © OpenStreetMap

Top 3 flights which have max accident history

Count of airplane_crash

1 — 189

Type

Douglas DC-3

de Havilland Canada DHC-6 Twin Otter 300

Douglas C 47   Douglas C-47A

Location - Split 1
- Brazil
- Alaska
- Russia
- Canada
- Colombia
- California
- France
- England
- India
- China

Count of airplane...: 300, 200, 100, 0

Neg count: -100, -200, -300

40   62   74   81

334

Douglas DC-4   Douglas C-47   Douglas C-47A   de Havillan..   Douglas DC-3

Top 10 locations which had more accidents

Location - Split 1

Count of airplane_crash: 150, 100, 50, 0

Brazil   Alaska   Russia   Canada   Colombia   California   France   England   India   China

PREVIOUS

+ableau

Sum of accidents type (aboard, fatalities & ground) based on | In the year of 1972 Maximum accidents happened. | Accidents happened in 1972 (MAX ACCIDENTS) based on | Top 5 Accidents happened by the Operators. | Top 10 locations met with higher number of accidents. | Top 5 flights which have maximum accident history. | Ac re wo

Date

Measure Names
- Aboard
- Fatalities
- Ground

Value: 9K, 8K, 7K, 6K, 5K, 4K, 3K

Aboard

4. ADVANTAGES AND DISADVANTAGES:

4.1 ADVANTAGES

- By this project, we can determine the cause of the crash and any contributing factors involved in the crash. Investigative authorities also provide recommendations for safe operations

- We can understand the most effective solutions and is essential for monitoring and evaluating the safety.

- The objective of accident analysis is to prevent accidents in the future. So that with a few objectives we can avoid air accidents in coming days.

- Aviation accidents can be traced to a variety of causes, including pilot error, air traffic controller error

- Design and manufacturer defects, maintenance failures, sabotage, or inclement weather so by tracing such things we can avoid and be careful in upcoming days.

4.2 DISADVANTAGES:

- The potential for these human errors is almost limitless: spatial disorientation, aeronautical decision-making, maintenance malpractice, violations, organizational influences, culture, design and manufacturing, training, funding etc…

- The odds of dying in a plane crash are about one in 11 million, but the chances of surviving depend on your seating choice.

- The aircraft structure collapses and the individual is injured by impact with the airframe.

- These injuries can include amputations, major lacerations and crushing.

- When the structure collapses, the victims may become trapped within the wreckage and die of fire, drowning or traumatic asphyxia.

5. APPLICATIONS:

Improve Training for Pilots and Ground Workers

➤ The training of pilots and ground workers is very important. They should be properly trained so that they can deal with different situations. They should also be made aware of the potential hazards around the airport.

Improve Communication Between the Crew and Air Traffic Control

➤ In order to avoid misunderstandings and confusion, it is important to have clear and concise communication between different members of the crew.

➤ There should also be proper communication between the crew and air traffic control. All instructions must be conveyed clearly so that there is no room for misunderstanding or confusion.

It is Important to Have Proper Maintenance

➤ It is very important to have proper maintenance and inspection procedures in place. This will help to detect and fix any problems before they lead to an accident. To ensure the safety of the airplane, it is important to have proper maintenance.

Avoid Flying in Areas Where There is a High Risk of Bird Strikes

➤ One of the leading causes of airplane crashes is bird strikes. To avoid this, it is important to avoid flying in areas where there is a high risk of bird strikes. Pilots should be aware of these areas and take measures to avoid them.

6. CONCLUSION:

Overall, there are many different causes of plane crashes. By taking some preventive measures, the risks can be reduced. Such tragic events cause great loss of life as well as property damage. There is nothing worse than losing a loved one in an airplane accident. The grief is unimaginable. You might be wondering what causes such accidents. The reasons vary and could be anything from technical faults to bad weather conditions. Sometimes, it is also due to human error. We will be discussing the main causes of plane crashes and what preventive measures can be taken to avoid them. Given below are the major reasons behind airplane crashes. Plane crashes are not that commonly heard of, but when they do occur, they make headlines. However, accidents can still happen even if all the safety measures are in place. Therefore, it is important to be prepared for an accident and know what to do in such a situation. All members of the crew and passengers should be aware of the safety procedures so that they can act quickly and efficiently in the event of an accident. We hope that this analysis has been informative and helpful.

7.FUTURE SCOPE:

- The primary focus of safety management in aviation is on safety of flights encompassing also all associated and support services, which can have an impact on safety, for example air navigation services, aerodrome operations management, etc.

- The primary focus of safety management in aviation is on safety of flights encompassing also all associated and support services, which can have an impact on safety, for example air navigation services, aerodrome operations management, etc.

- Hazard identification and risk assessment using state-of-the-art risk assessment methods.

- Safety reporting systems used to collect, analyse and share operational safety related data.

- Competent investigation of safety occurrence with sole purpose of identifying systemic safety deficiencies.

- Safety monitoring and safety oversight aimed to asses safety performance and eliminate problem areas.

- Dedicated safety training for personnel.

- Safety lesson dissemination and sharing best practices among operators and service providers.

- Building a corporate safety culture that fosters good safety practices and encourages safety communications in a non-punitive environment.

8.APPENDIX:

A. SOURCE CODE

```html
<!DOCTYPE html>
<html lang="en">
    <head>
        <meta charset="utf-8" />
        <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
        <meta name="description" content="" />
        <meta name="author" content="" />
        <title>THE TRAGEDY OF FLIGHT</title>
        <!-- Favicon-->
        <link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
        <!-- Bootstrap Icons-->
        <link href="https://cdn.jsdelivr.net/npm/bootstrap-icons@1.5.0/font/bootstrap-icons.css" rel="stylesheet" />
        <!-- Google fonts-->
        <link href="https://fonts.googleapis.com/css?family=Merriweather+Sans:400,700" rel="stylesheet" />
        <link href="https://fonts.googleapis.com/css?family=Merriweather:400,300,300italic,400italic,700,700italic" rel="stylesheet" type="text/css" />
        <!-- SimpleLightbox plugin CSS-->
        <link href="https://cdnjs.cloudflare.com/ajax/libs/SimpleLightbox/2.1.0/simpleLightbox.min.css" rel="stylesheet" />
        <!-- Core theme CSS (includes Bootstrap)-->
        <link href="css/styles.css" rel="stylesheet" />
    </head>
    <body id="page-top">
        <!-- Navigation-->
        <nav class="navbar navbar-expand-lg navbar-light fixed-top py-3" id="mainNav">
            <div class="container px-4 px-lg-5">
                <a class="navbar-brand" href="#page-top">Start Bootstrap</a>
                <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-toggle="collapse" data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-expanded="false" aria-label="Toggle navigation"><span class="navbar-toggler-icon"></span></button>
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                    <ul class="navbar-nav ms-auto my-2 my-lg-0">
```

```html
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href="#ABOUT">ABOUT</a></li>
                            <li class="nav-item"><a class="nav-link"
href="#DASHBOARD">DASHBOARD</a></li>
                            <li class="nav-item"><a class="nav-link"
href="#STORY">STORY</a></li>
                        </ul>
                    </div>
                </div>
            </nav>
            <!-- Masthead-->
            <header class="masthead">
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content-center text-center">
                        <div class="col-lg-8 align-self-end">
                            <h1 class="text-white font-weight-bold">THE TRAGEDY OF
FLIGHT</h1>
                            <hr class="divider" />
                        </div>
                        <div class="col-lg-8 align-self-baseline">
                            <p class="text-white-75 mb-5">A COMPREHENSIVE CRASH
ANALYSIS</p>
                            <p class="text-white-75 mb-5">Project Based
Experimental Learning Program</p>
                            <a class="btn btn-primary btn-xl" href="#ABOUT">START
LEARNING</a>
                        </div>
                    </div>
                </div>
            </header>
            <!-- ABOUT-->
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                    <div class="row gx-4 gx-lg-5 justify-content-center">
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Free Images - iStock  | Paper airplane crash, Airplane crash icon, Airplane
crash interior" data-noaft="1" style="width: 465px; height: 310px; margin:
0px;">
```

```html
                    <hr class="divider divider-light" />
                    <p class="text-white-75 mb-4">AIR PLANE CRASH ANALYSIS
IS A DETAILED INVESTIGATION INTO THE CAUSES OF AN AVIATION ACCIDENT.</p>
                    <a class="btn btn-light btn-xl" href="#DASHBOARD">Get
Started!</a>
                </div>
            </div>
        </div>
    </section>
    <!-- DASHBOARD-->
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    </section>
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var vizElement = divElement.getElementsByTagName('object')[0];
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var scriptElement = document.createElement('script');
scriptElement.src = 'https://public.tableau.com/javascripts/api/viz_v1.js';
vizElement.parentNode.insertBefore(scriptElement, vizElement);
</script>

        <!-- Call to action-->
        <section class="page-section bg-dark text-white">
            <div class="container px-4 px-lg-5 text-center">
                <h2 class="mb-4">THANKYOU</h2>

            </div>
        </section>
        <!-- Contact-->

        <!-- Footer-->
        <footer class="bg-light py-5">
            <div class="container px-4 px-lg-5">
        </footer>
        <!-- Bootstrap core JS-->
        <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.3/dist/js/bootstrap.bundle.min.
js"></script>
        <!-- SimpleLightbox plugin JS-->
        <script
src="https://cdnjs.cloudflare.com/ajax/libs/SimpleLightbox/2.1.0/simpleLightbox
.min.js"></script>
        <!-- Core theme JS-->
```

```
        <script src="js/scripts.js"></script>
        <!-- * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * *-->
        <!-- * *                              SB Forms JS
* *-->
        <!-- * * Activate your form at
https://startbootstrap.com/solution/contact-forms * *-->
        <!-- * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * *-->
        <script src="https://cdn.startbootstrap.com/sb-forms-
latest.js"></script>
    </body>
</html>
```