Boeing and Airbus Crashes Comparison 2000-2022

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Introduction

Air travel has become easier and cheaper than ever before. This is partly due to the emergence of new airlines each year, which creates more competition and drives down prices. However, the industry remains largely dominated by the top two manufacturers, Airbus and Boeing. Due to recent negative news reports, there have been concerns that Boeing aircraft have been involved in more crashes in recent years, Let's find that Boeing's accident more than Airbus or not.

Question

1. Which manufacturer made highest accident?
2. Which aircraft type has the highest accident?
3. What are the reason of accident?
4. How many case of accident that cause by technical reason?
5. How many case of accident that cause by Human Factor reason?

Tools

1. Posit Cloud(R)

Dataset

Historical Plane Crash Data(Kaggle.com) (https://www.kaggle.com/datasets/abeperez/historical-plane-crash-data)

Analysis

Download Library

```
library(tidyverse)
library(ggplot2)
library(dplyr)
library(lubridate)
library(ggthemes)
library(forcats)
library(RColorBrewer)
```

Read CSV File and Clean-up The Data

```
# read csv file
df <- read_csv("Plane Crashes.csv")
# remove duplicate
df_clean <- df[!duplicated(df), ]
# create year column
df_clean$Year <- year(df_clean$Date)

#check row and column's name
nrow(df_clean)
```

```
## [1] 28457
```

```
colnames(df_clean)
```

```
##  [1] "Date"             "Time"             "Aircraft"         "Operator"
##  [5] "Registration"     "Flight phase"     "Flight type"      "Survivors"
##  [9] "Crash site"       "Schedule"         "MSN"              "YOM"
## [13] "Flight no."       "Crash location"   "Country"          "Region"
## [17] "Crew on board"    "Crew fatalities"  "Pax on board"     "PAX fatalities"
## [21] "Other fatalities" "Total fatalities" "Circumstances"    "Crash cause"
## [25] "Year"
```

Find The Answer of The Questions

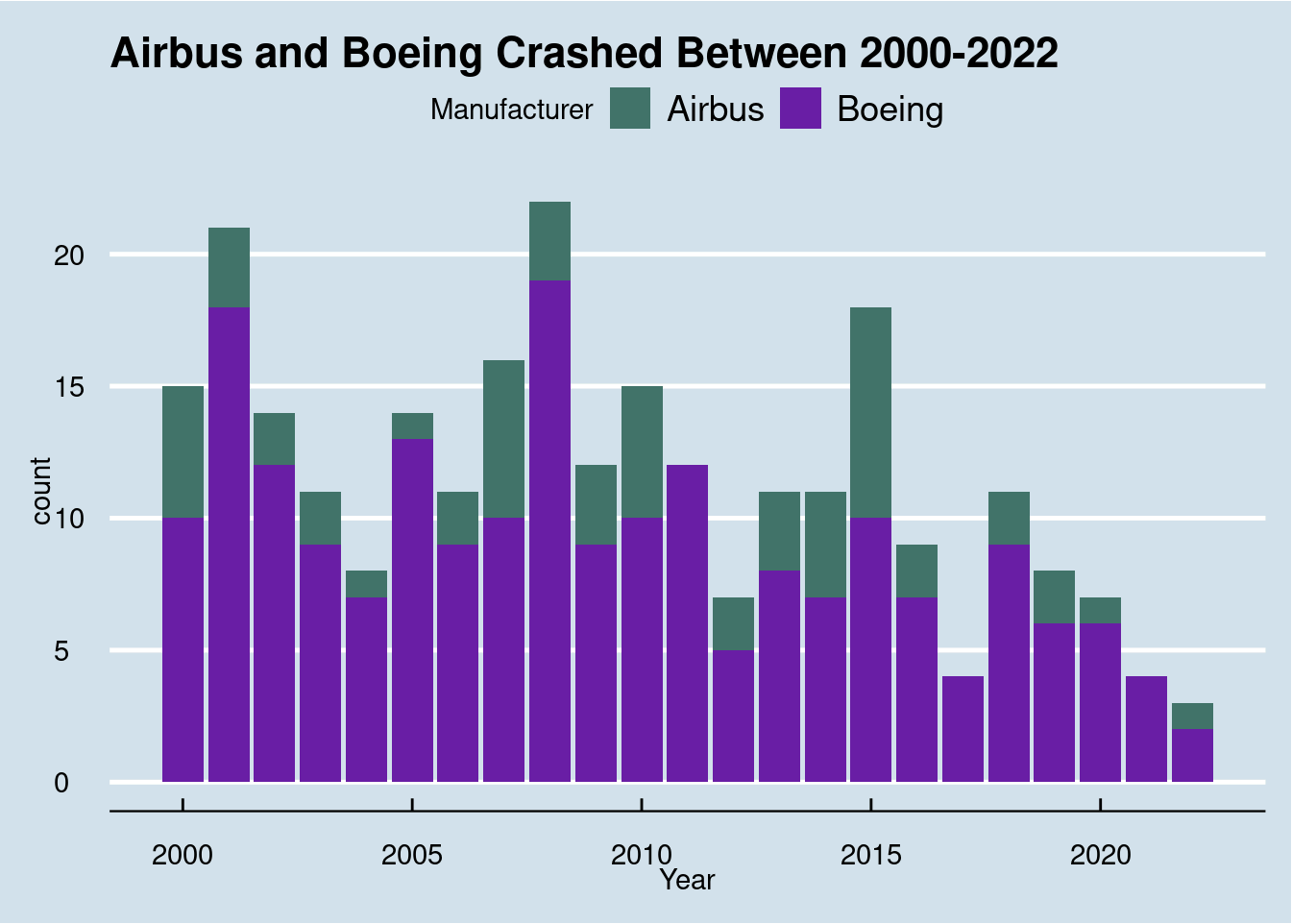
1.Who is the most accident (all accident)?

```
# filter for Boeing and Airbus crash between 2000-2022 (by all Reason)
# filter Airbus A3XX and Boeing 7XX because commercial aircraft of Airbus start with A3XX and Bo
eing start with 7XX, The others is for military aircraft
aircrashes_all_reason <- df_clean %>%
  filter(grepl("^Airbus A3", Aircraft) | grepl("^Boeing 7", Aircraft)) %>%
  mutate(Manufacturer = if_else(grepl("^Airbus", Aircraft), "Airbus", "Boeing")) %>%
  filter(Year >= 2000)


aircrashes_all_reason %>%
  count(Manufacturer)
```

```
## # A tibble: 2 × 2
##   Manufacturer     n
##   <chr>        <int>
## 1 Airbus          58
## 2 Boeing         206
```

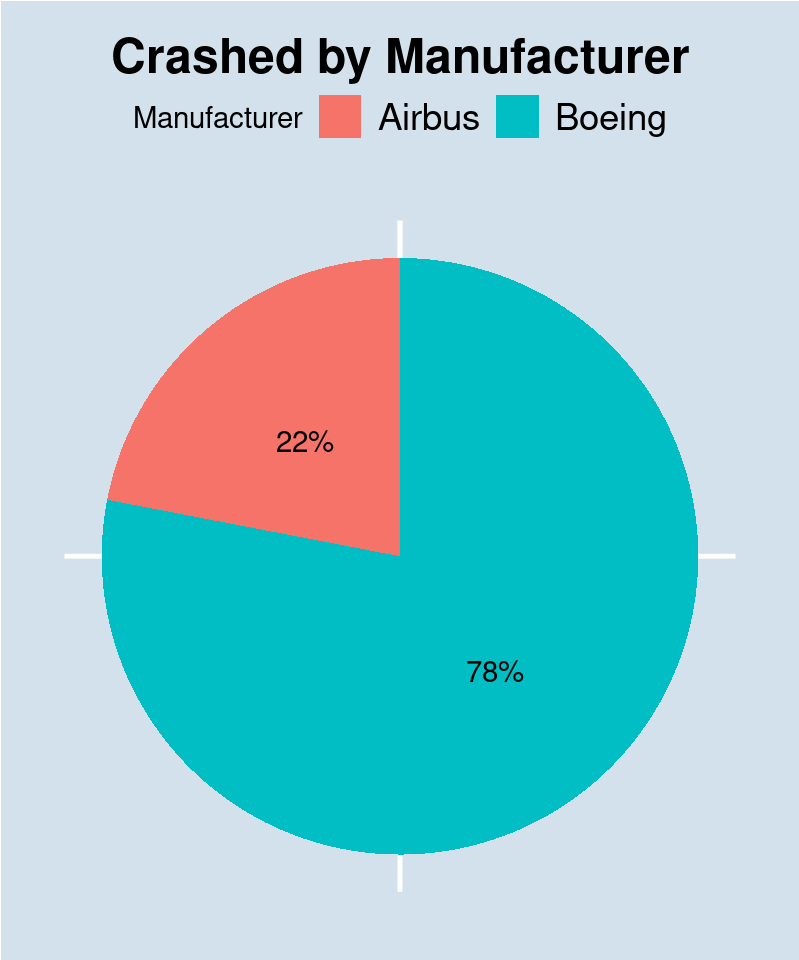
```
# bar chart
ggplot(aircrashes_all_reason, aes(Year, fill=Manufacturer)) +
  geom_bar() +
  ggtitle("Airbus and Boeing Crashed Between 2000-2022") +
  theme_economist() +
  scale_fill_manual(values=c('#43766C', '#6C22A6'))
```



You will see that Boeing have many aircraft crash from time to time.

```
# make a percentage for pie chart
percentage_manufacturer <-aircrashes_all_reason %>%
  group_by(Manufacturer) %>%
  summarize(counts = n(),
            percentage = n()/nrow(aircrashes_all_reason))


# Pie Chart : Crashed by Manufacturer
ggplot(percentage_manufacturer, aes(x="", y=percentage, fill=Manufacturer)) +
  theme_economist() +
  geom_bar(stat="identity", width=1) +
  coord_polar("y", start=0) +
  geom_text(aes(label = paste0(round(percentage*100), "%")),
            position = position_stack(vjust = 0.5)) +
  theme(panel.background = element_blank(),
        axis.line = element_blank(),
        axis.text = element_blank(),
        axis.ticks = element_blank(),
        axis.title = element_blank(),
        plot.title = element_text(hjust = 0.5, size = 18)) +
  ggtitle("Crashed by Manufacturer")
```

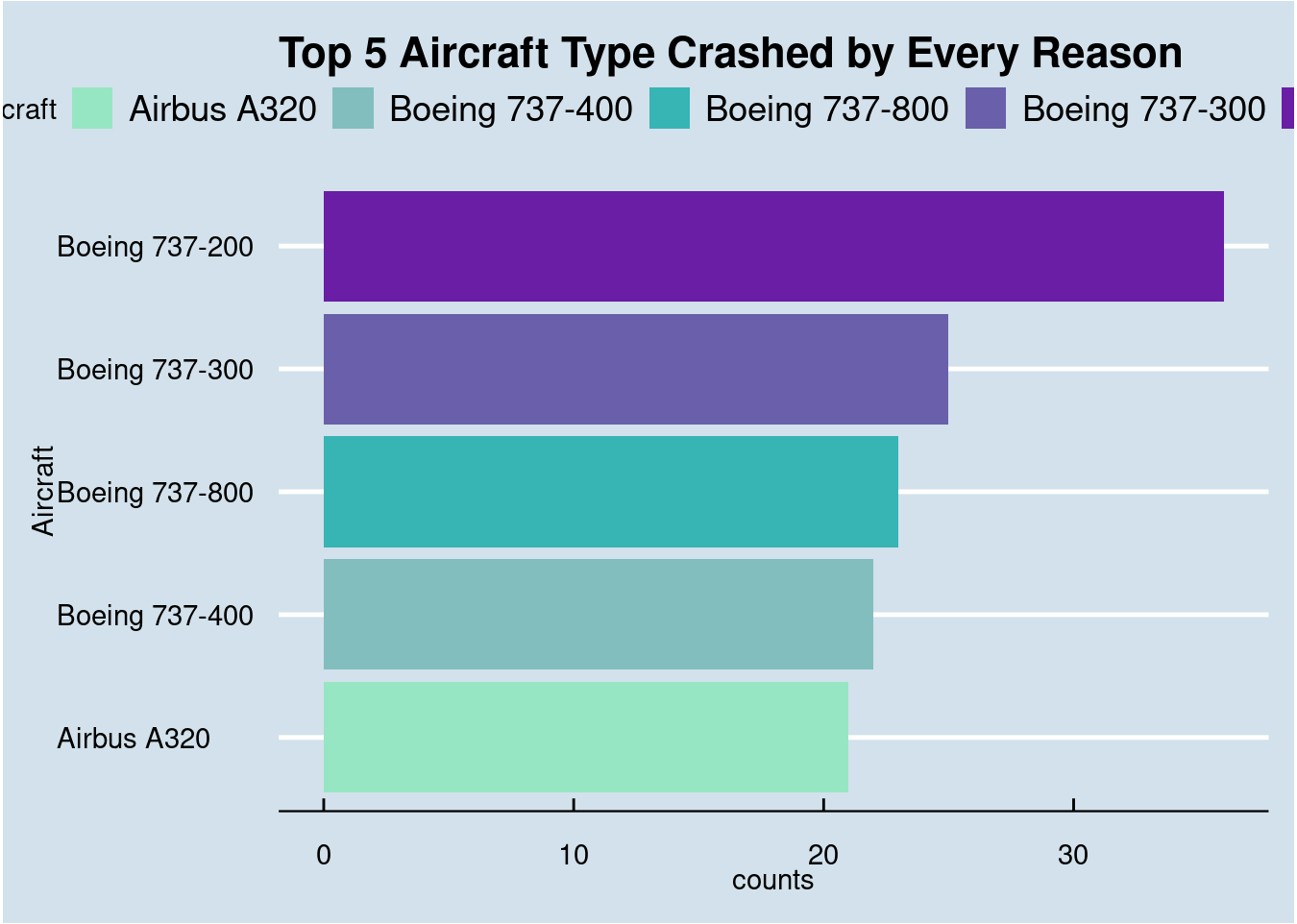


From 2000 to 2022 Boeing has an accident more a half of all event.

2. Which aircraft type has the highest accident?

```
count_type <- head(aircrashes_all_reason %>%
                     select(Aircraft) %>%
                     group_by(Aircraft) %>%
                     summarise(counts = n()) %>%
                     arrange(desc(counts)),5)


# bar chart : Top 5 Aircraft Type Crashed by Every Reason
count_type %>%
  select(Aircraft, counts) %>%
  mutate(Aircraft = fct_reorder(Aircraft, counts)) %>%
  ggplot(aes(Aircraft, counts, fill=Aircraft)) +
  geom_col() +
  theme_economist() +
  coord_flip() +
  ggtitle("Top 5 Aircraft Type Crashed by Every Reason") +
  scale_fill_manual(values=c('#96E9C6', '#83C0C1', '#37B5B6', '#6962AD', '#6C22A6'))
```

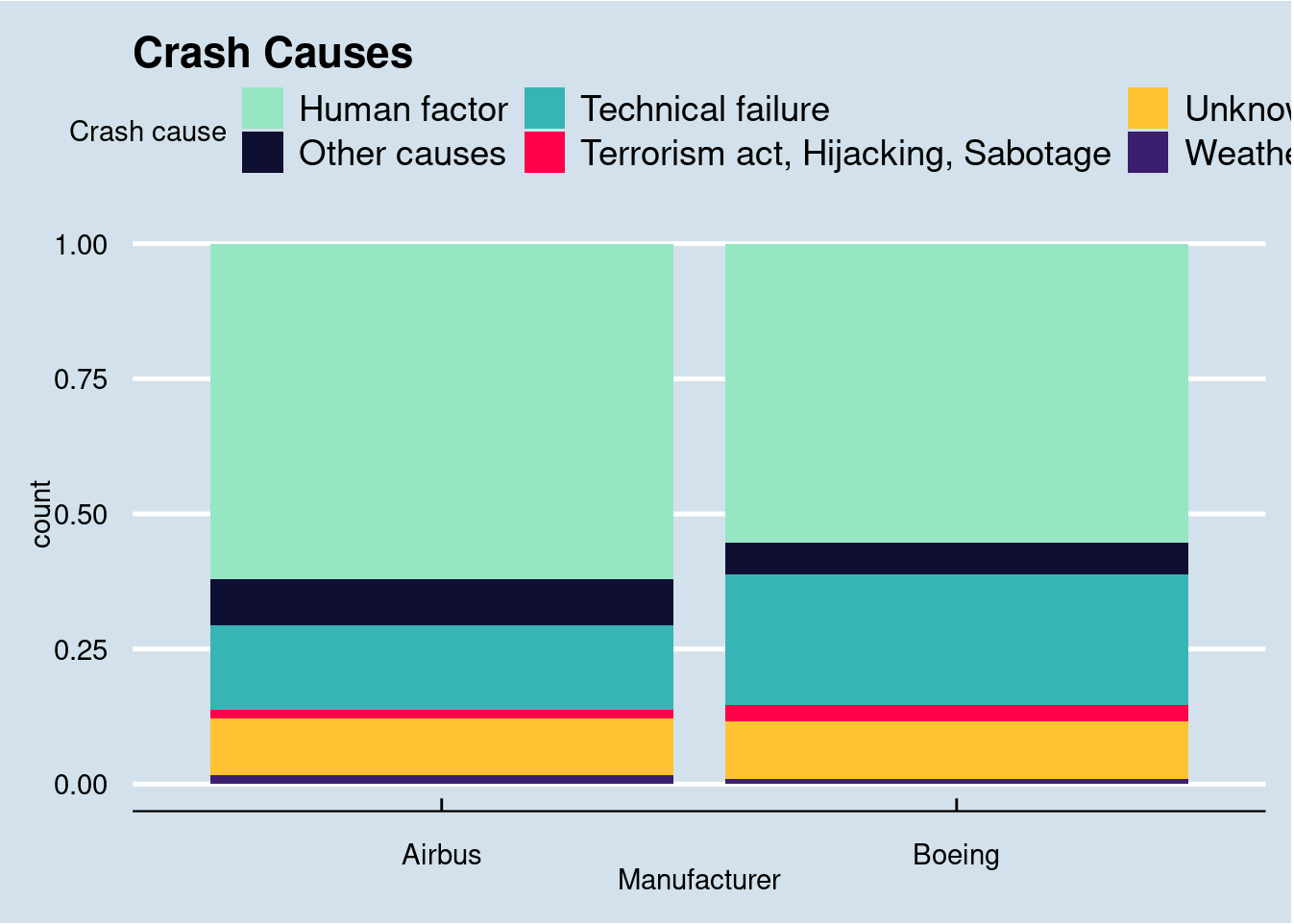



```
Looking at each type, Top 4 of the most accidents are from Boeing but we will find the crash cau
se in the next step. Maybe the accident cause by another reason that not by tecnical failure fro
m manufacturer.
```

3. What are the reason of accident?

```
crash_cause <- select(aircrashes_all_reason, Manufacturer, `Crash cause`)


ggplot(crash_cause, aes(Manufacturer, fill=`Crash cause`)) +
  geom_bar(position = "fill") +
  theme_economist() +
  ggtitle("Crash Causes") +
  scale_fill_manual(values=c('#96E9C6', '#0F1035', '#37B5B6', '#FF004D', '#FFC436', '#401F71'))
```




```
The most crash cause is from Human Factor but if we focus on the Technical Failure, Boeing has m
any case than Airbus.
```

4. How many case of accident that cause by technical reason?

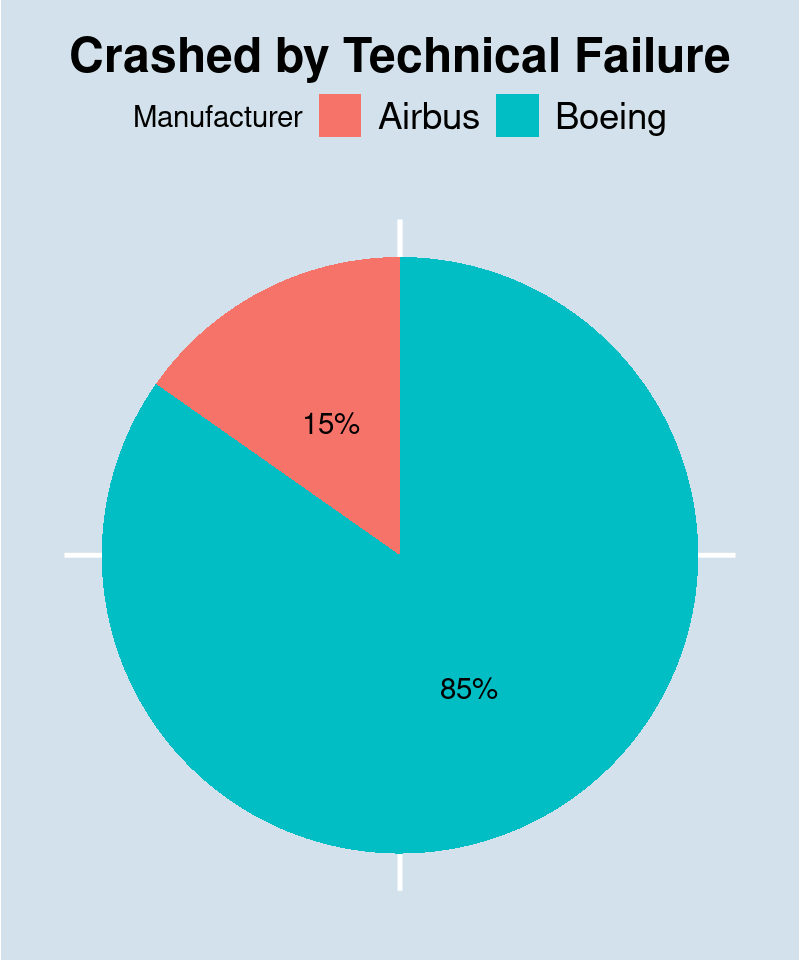
```
# filter for Boeing and Airbus crash (Technical Reason)
aircrashes_technical_reason <- aircrashes_all_reason %>%
  filter(grepl("Technical failure", `Crash cause`))


# percentage
percentage_thechnical_reason <-aircrashes_technical_reason %>%
  group_by(Manufacturer) %>%
  summarize(counts = n(),
            percentage = n()/nrow(aircrashes_technical_reason))

percentage_thechnical_reason
```

```
## # A tibble: 2 × 3
##   Manufacturer counts percentage
##   <chr>         <int>      <dbl>
## 1 Airbus            9      0.153
## 2 Boeing           50      0.847
```

```
# Plot Pie Chart
ggplot(percentage_thechnical_reason, aes(x="", y=percentage, fill=Manufacturer)) +
  theme_economist() +
  geom_bar(stat="identity", width=1) +
  coord_polar("y", start=0) +
  geom_text(aes(label = paste0(round(percentage*100), "%")),
            position = position_stack(vjust = 0.5)) +
  theme(panel.background = element_blank(),
        axis.line = element_blank(),
        axis.text = element_blank(),
        axis.ticks = element_blank(),
        axis.title = element_blank(),
        plot.title = element_text(hjust = 0.5, size = 18)) +
  ggtitle("Crashed by Technical Failure")
```



Focus on the Technical Failure, Boeing has up to 85% of all crash event from 2000-2022