Safety_Score_Calculation

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4/10/2018

```
library(readr)
airline_safety <- read_csv("Desktop/Stats2018/airline-safety.csv")
```

```
## Parsed with column specification:
## cols(
##   airline = col_character(),
##   avail_seat_km_per_week = col_double(),
##   incidents_85_99 = col_integer(),
##   fatal_accidents_85_99 = col_integer(),
##   fatalities_85_99 = col_integer(),
##   incidents_00_14 = col_integer(),
##   fatal_accidents_00_14 = col_integer(),
##   fatalities_00_14 = col_integer()
## )
```

```
View(airline_safety)
```

Step 1: subtract an airline's crash rate from the average for all airlines since 1985

```
# 1985-2014 Average Crash Rate
# Incidents
sumIncidents =
  (sum(airline_safety$incidents_85_99)
   + sum(airline_safety$incidents_00_14)) / (nrow(airline_safety) * 2)

# Fatal Incidents
sumFatalAccident =
  (sum(airline_safety$fatal_accidents_85_99)
   + sum(airline_safety$fatal_accidents_00_14)) / (nrow(airline_safety) * 2)

# Total Fatalities
sumTotalFatalities =
  (sum(airline_safety$fatalities_85_99)
   + sum(airline_safety$fatalities_00_14)) / (nrow(airline_safety) * 2)

# 85 to 99
airline_safety$Score_indident_Rate_85_99 =
  sumIncidents - airline_safety$incidents_85_99

airline_safety$Score_fatalAccident_Rate_85_99 =
  sumFatalAccident - airline_safety$fatal_accidents_85_99

airline_safety$Score_fatalities_Rate_85_99 =
  sumTotalFatalities - airline_safety$fatalities_85_99
```

```r
# 00 to 14
airline_safety$Score_indident_Rate_00_14 =
  sumIncidents - airline_safety$incidents_00_14

airline_safety$Score_fatalAccident_Rate_00_14 =
  sumFatalAccident - airline_safety$fatal_accidents_00_14

airline_safety$Score_fatalities_Rate_00_14 =
  sumTotalFatalities - airline_safety$fatalities_00_14
```

Step 2: Multiply the result by the square root of the number of seat kilometers flown

```r
# square root of ASK
airline_safety$ASKsqrt = sqrt((airline_safety$avail_seat_km_per_week * 52 * 15))

# 85 to 99
airline_safety$Score_indident_Rate_85_99 =
  airline_safety$Score_indident_Rate_85_99 * airline_safety$ASKsqrt

airline_safety$Score_fatalAccident_Rate_85_99 =
  airline_safety$Score_fatalAccident_Rate_85_99 * airline_safety$ASKsqrt

airline_safety$Score_fatalities_Rate_85_99 =
  airline_safety$Score_fatalities_Rate_85_99 * airline_safety$ASKsqrt

# 00 to 14
airline_safety$Score_indident_Rate_00_14 =
  airline_safety$Score_indident_Rate_00_14 * airline_safety$ASKsqrt

airline_safety$Score_fatalAccident_Rate_00_14 =
  airline_safety$Score_fatalAccident_Rate_00_14 * airline_safety$ASKsqrt

airline_safety$Score_fatalities_Rate_00_14 =
  airline_safety$Score_fatalities_Rate_00_14 * airline_safety$ASKsqrt
```

Step 3: Standardize the score in each category to calculate how many standard deviations an airline is above or below the mean

```r
# I used the scale() function in r to calculate z-score/standardize

# 85 to 99
airline_safety$Score_indident_Rate_85_99 =
  scale(airline_safety$Score_indident_Rate_85_99)

airline_safety$Score_fatalAccident_Rate_85_99 =
  scale(airline_safety$Score_fatalAccident_Rate_85_99)

airline_safety$Score_fatalities_Rate_85_99 =
  scale(airline_safety$Score_fatalities_Rate_85_99)
```

```
# 00 to 14
airline_safety$Score_indident_Rate_00_14 =
  scale(airline_safety$Score_indident_Rate_00_14)

airline_safety$Score_fatalAccident_Rate_00_14 =
  scale(airline_safety$Score_fatalAccident_Rate_00_14)

airline_safety$Score_fatalities_Rate_00_14 =
  scale(airline_safety$Score_fatalities_Rate_00_14)
```

Step 3 Continued: average the scores from the three categories together to get the Safety Score

```
airline_safety$SafetyScore_85_99 = (airline_safety$Score_indident_Rate_85_99
                                    + airline_safety$Score_fatalAccident_Rate_85_99
                                    + airline_safety$Score_fatalities_Rate_85_99) / 3
airline_safety$SafetyScore_00_14 = (airline_safety$Score_indident_Rate_00_14
                                   + airline_safety$Score_fatalAccident_Rate_00_14
                                   + airline_safety$Score_fatalities_Rate_00_14) / 3
```

Combined Safety Score

```
airline_safety$Combined_Safety_Score =
  (airline_safety$SafetyScore_85_99 + airline_safety$SafetyScore_00_14) / 2
```

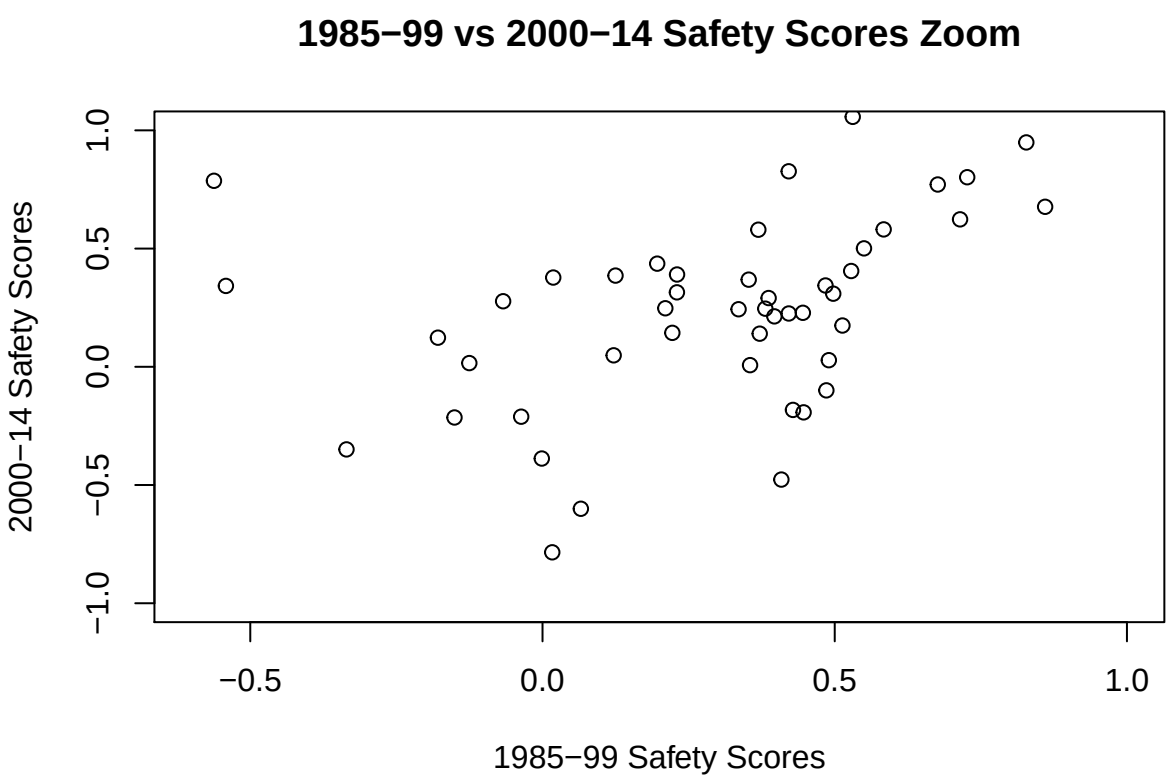
Plots

1985-99 vs 2000-14 Safety Scores

```
plot(airline_safety$SafetyScore_85_99, airline_safety$SafetyScore_00_14,
     xlab="1985-99 Safety Scores", ylab="2000-14 Safety Scores",
     main = "1985-99 vs 2000-14 Safety Scores")
```

Zoom in on top right corner of plot

```
plot(airline_safety$SafetyScore_85_99, airline_safety$SafetyScore_00_14,
     xlab="1985-99 Safety Scores", ylab="2000-14 Safety Scores",
     main = "1985-99 vs 2000-14 Safety Scores Zoom",
     xlim=c(-0.6, 1), ylim=c(-1, 1))
```




```
Safety_Scores_DF = data.frame(airline_safety$airline,
                      airline_safety$SafetyScore_85_99,
                      airline_safety$SafetyScore_00_14,
                      airline_safety$Combined_Safety_Score)
Safety_Scores_DF =
  Safety_Scores_DF[order(Safety_Scores_DF$airline_safety.Combined_Safety_Score,
                         decreasing = TRUE),]

head(Safety_Scores_DF)
```

```
##    airline_safety.airline airline_safety.SafetyScore_85_99
## 16        Cathay Pacific*                         0.8277789
## 34             Lufthansa*                         0.5308069
## 44     Southwest Airlines                         0.8599918
## 15       British Airways*                         0.7266894
## 5              Air Canada                         0.6762830
## 38                Qantas*                         0.7144528
##    airline_safety.SafetyScore_00_14 airline_safety.Combined_Safety_Score
## 16                        0.9490004                              0.8883896
## 34                        1.0571134                              0.7939602
## 44                        0.6767237                              0.7683578
## 15                        0.8017485                              0.7642189
## 5                         0.7710274                              0.7236552
## 38                        0.6235670                              0.6690099
```