Aviation Events, 1948-2016

Summary Statistics - total number of events (accidents and incidents): 78,447

- Number of accidents that resulted in:
  - Fatal injuries: 15,667 (21%)
  - Non-fatal injuries: 59,426 (79%)
  - Unknown: 212 (<1%)
- Number of events where:
  - Aircraft destroyed: 17,190 (22%)
  - Substantial damage to aircraft: 56,385 (72%)
  - Minor damage to aircraft: 2,498 (3%)
  - Unknown damage to aircraft: 2,374 (3%)
- Number of events that occurred in:
  - Visual meteorological conditions (pilot has sufficient visibility to fly aircraft): 69,782 (89%)
  - Instrument meteorological conditions (pilot must fly primarily by reference to instruments): 5,637 (7%)
  - Unknown: 3,028 (4%)

Injury Trends - In the past decade there has been a decrease in the number of reported aviation events, from 1,851 in 2006 to 1,576 in 2015. The total number of individuals involved in aviation events also decreased, from 12,989 to 9,416 in the same time period. In 2006, for every 100 aviation events there were 80 fatalities, 22 serious injuries, and 25 minor injuries sustained with 573 individuals remaining unaffected. In 2015, for every 100 aviation events there were 54 fatalities, 23 serious injuries, 29 minor injuries, and 590 unaffected individuals. The average number of fatalities significantly decreased while serious and minor injuries only increased slightly.

Predicting whether Aviation Event will result in at least one casualty (fatality or injury) - For clients concerned with the odds of an aviation event resulting in at least one casualty, the aviation data was used to build a model to predict a casualty. Only data that mimicked the clients' experiences were used in the model; this includes data on events that occurred on domestic flights, aircraft that was professionally built, and events that occurred after 1995. In addition, only events that fell under Federal Aviation Rules Part 91 (General Aviation), 135 (Air Taxi & Commuters), and 121 (Air Carriers) were used, excluding aircraft used for agricultural, military, or foreign purposes. Different combinations of factors were considered; the latest model uses weather condition and type of aircraft to predict casualty odds. All else being equal, weather conditions that force pilots to rely on instruments (IMC) is associated with an increase in the odds of a casualty by 5.4 times, compared to weather conditions where the pilot can rely on maintaining visual separation. Compared to airplanes, aircraft considered 'Ultralight' are associated with an increase in the odds of a casualty by 262. While this model cannot predict whether or not an aviation event will occur, it does highlight some of the factors that may be beneficial to an individual if an event were to occur. It is recommended that the client examine the weather forecast and travel by airplane. Weather is important; if an airplane accident/incident were to occur, the probability of the event resulting in a casualty is only 33% in good weather conditions versus 73% if a pilot's visibility is reduced and he/she must rely primarily on navigational instruments.

Term Frequency - Inverse Document Frequency (TF-IDF) of narratives - in addition to the main Aviation Data, narratives from events occurring from 1985 to 2015 were examined. The TF-IDF refers to a word's relative importance in the narrative, taking into account the total number of times the word appears in all of the narratives. In five year intervals, the top 10 average TF-IDF scores for all narratives were examined. In earlier years there were similar significant words (aircraft, pilot, fuel, landing, runway). Starting in 1990, "airplane" became more significant than general "aircraft". Similarly in the Aviation Data, the number of events recorded with "airplane" ranged from 2-9 in 1983-1990 to 17-42 from 1990-2000. Further examination revealed that the aircraft type was normally not recorded. It wasn't until 2007 when the largest aircraft category was no longer "unknown". It seems that the aircraft category was not reliably recorded until the late 2000's, which reflects the already shifting narratives where investigators started to specify aircraft type in their commentary, rather than generic 'aircraft'.