



Recurring Defect Clustering

10th Montreal Industrial Problem-Solving Workshop

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OPERATIONS EXCELLENCE



First flight from
Vancouver to Seattle

September 1
1937

First airline to install
alcohol de-icing nozzles



1938

First trans-Atlantic flight,
Montreal to Prestwick



1943

TCA's
3 millionth
passenger

July
1950



Installation
of anti-skid
brakes

1950s



1960s



Introduction of jet aircraft

1963



Computerized reservation system

1965



Covered walkways

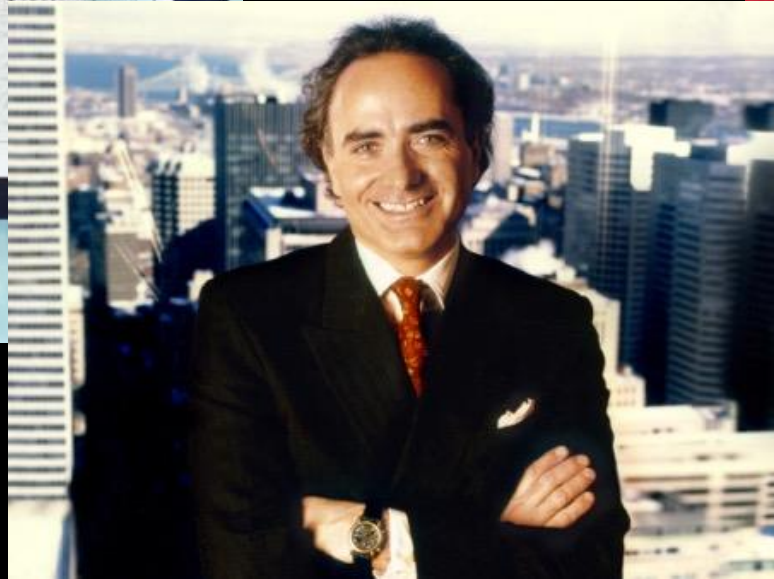


First female pilot,
Captain Judy Cameron

1977



2015



1988

Privatization of
Air Canada



First carrier to make its European flights non-smoking

1990s

Debut of
self-service
kiosks



Merger with Canadian Airlines



SARS



Hostile takeover bid



2000s

9-11





Celebrating over 80 years



2020 – Covid 19

Unprecedented in Aviation history



Also 2020...

The Rise of Artificial Intelligence

A Road to Recovery




C-GJWI

AIRBUS A321-200



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Recurring Defect Clustering

The problem we are here to solve

Context – what does recurring mean?

- To no surprise to yourself, aviation is a highly regulated industry. We literally fly thousands of tons of metal through the sky with tens of thousands of tons of jet fuel...
- Transport Canada (TC) regulates that we must track recurring defects for safety purposes, meaning defects that after they are resolved, recur again within a given time horizon.
 - The TC requirement at a minimum is to track 3 defects that recur within 15 flight segments.
- The actions we take thereafter identifying recurring defects is we change our maintenance program requirements to address these findings to prevent them from recurring in the future.



Context – What are defects?

- At any Airline we are mandated to have a maintenance program to upkeep the airworthiness of all our Aircraft.
 - Maintenance programs and limitations are defined by the original aircraft manufacturers and by our Engineers. It basically tells us when to replace parts and do inspections on various different parts of the aircraft.
- The reality though is that at times things break on an aircraft before the maintenance program requirement is due to be addressed.
 - We call these '**Defects**' and have a process to support the tracking of all occurrences.
 - The degree of accuracy in the report though varies based on the reporter's level of technical proficiency.
- Defects can be classified in 2 high level categories as Minimum Equipment List (MEL) and non-MEL, then sub divided further.



The Problem

- Classification of these defects at a detailed level is an extremely manual process.
- While MEL's provide unique identifiers to cluster defects, Non-MEL's do not have consistent unique identifiers (ie ATA codes).
- In addition, abbreviations and acronyms are widely used when describing the defects being reported.
- Therefore data mining in the traditional sense, doesn't work very effectively, and as a result we are forced to do a lot of manual work to identify and comply to the requirements set forth by TC.



Desired Solution

- Air Canada Maintenance wishes to detect recurring defects automatically that meets and exceeds Transport Canada requirements for both MEL and Non-MEL defects.
- For this workshop, the goal will be to automatically detect recurring intervals of 3 defects in 30 days (level 1), 4 in 40 days (level 2) and 5 in 50 days (level 3).
- The desired solution would leverage natural language processing (NLP), to cluster defects based on their description and other attributes to be provided that are the same in nature for the same aircraft given the above recurrent alert levels.
- Additionally, Air Canada desires to re-label reports with ATA Chapter/Section labels in a more exact way, to sanitize our dataset.





Questions?



Thank you
Merci



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