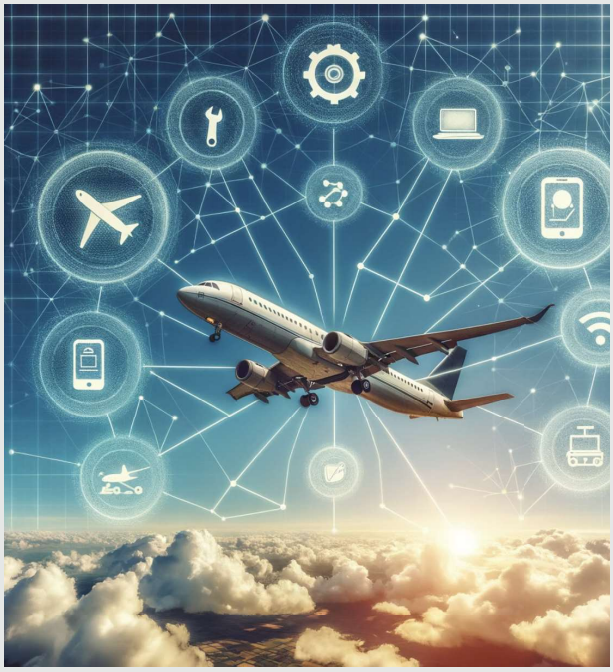
Why the aviation industry is facing 'turbulence' in adopting AI?

by Namit Pandey

The aviation industry has been at the forefront of technological excellence for decades. From leading the development of GPS, radars, and composite materials to the early adoption of semiconductor technology, the industry has consistently pushed the boundaries of innovation. However, it has been exceptionally cautious in adopting artificial intelligence, arguably one of the most disruptive technologies of the 21st century, and with good reason.

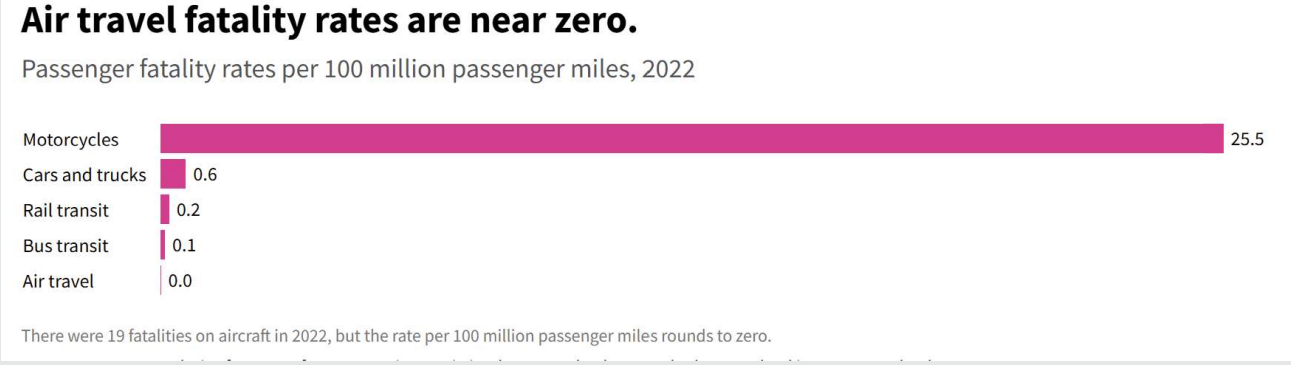
The aviation industry is one of the most regulated industries in the world. Building and operating an airplane involves integrating highly complicated components, systems, and processes which are rigorously tested to meet the safety standards set by the regulations. The safety of the passengers is of paramount importance in air travel, and this has been vigorously enforced for decades, making air travel the safest mode of transport (the probability of a car accident is more than 1000 times that of an airplane).

These regulations are established by means of a "certification" which is a formal process of verifying that the aircraft meets the required quality and safety standards. All the details regarding the testing standards, evaluation methodologies, and verification process of the aircraft must be transparent to the regulatory authorities, which is where we run into problems with AI.



Unlike previous technologies, AI has introduced a unique set of challenges. First is the black box problem. AI models (especially neural networks) are highly opaque, making it difficult for even their developers to understand the rationale behind the model's decision-making.

Second is the problem of instability in machine learning models. Due to the statistical nature of the models, there can be a risk of high output variability for even slight variations in their inputs. Verifying the stability and robustness of AI applications is



challenging, as the verification's completeness seems currently impossible.

The third is the dependence on knowledge bases & datasets to develop the models. The quality of the datasets is essential for the effectiveness of the models, which is difficult to track. A lack of traceability of the dataset used for training the model, which will influence the output, is a significant cause of concern.

These factors make it difficult for regulatory agencies to assess and sometimes even understand the testing, evaluation, and verification process involved in AI models. This lack of transparency is a persistent obstacle for an industry that prides itself on maintaining a high safety standard. Who will be responsible for an accident if a decision taken by leveraging AI turns out to be inaccurate? A similar debate was observed in the 2018 car crash in Arizona, where a self-driving Uber crashed into a passenger due to an incorrect assessment by the algorithm.

So, does it mean that the most disruptive technology of the 21st century will not transform aviation?

On the contrary, there is a call for a human-centric approach to AI in aviation. EASA (EU Aviation Authority) and FAA (US Aviation Authority) have both released their roadmaps for AI in aviation, where the development of a human-centric AI trustworthiness framework remains a high priority.

Similarly, the two largest aerospace manufacturers have launched digital transformation initiatives centered around Artificial Intelligence.

So, it's clear that the industry is ready to embrace the new transformation, just not at the expense of safety at its core!

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