

ML-Powered Application For Predicting Flight Delays: Insights From Sri Lankan Aviation Industry

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Flight delays in Sri Lanka's aviation industry significantly impact operational aspects, finances, and passenger satisfaction. Factors such as maintenance issues, weather conditions, airport congestion, and air traffic flow contribute to delays. A prediction system can replace the traditional method used to analyze delays with ML algorithms including Cat Boost and others. ML is a subset of artificial intelligence that uses technology to minimize the consequences of flight delays. Literature verified that a predictive model can deploy proactive actions to minimize delays. The study objectives were to analyze variables and identify where ML adoption is required to mitigate flight delay repercussions using fuzzy logic theory. Fuzzy is used to quantify the qualitative benefits of the airline industry concerning the degree of occurrence of delays. We utilized two sets of couple variables to realize the flight status through the fuzzy logic approach. The results were categorized into five fuzzy linguistic variables in flight status: late, very late, moderately late, cancelled, and on-time performance, evident in several specific study cases. Based on these findings, the study proposes utilizing machine learning (ML) algorithms associated with the fuzzy logic system to predict flight delays with two primary outcomes: delayed or cancelled. The study concludes that an ML-powered predictive system for robust air operations is essential. It will augment cost savings and customer satisfaction in the aviation industry in Sri Lanka. The algorithm and the model deployment in the other fields of logistics are futuristic.

Keywords: *artificial intelligence (AI), flight delay, machine learning (ML), fuzzy inference system, benefits realization*