機場能見度AI技術發展-以馬祖北竿機場為例

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摘　　要

　　機場能見度作為影響飛航安全的重要因素之一，是重要的研究方向。國家災害防救科技中心於2018年引進美國海洋暨大氣總署預報系統實驗室所發展的能見度經驗式，將其應用於台灣機場能見度的動力模式預警。本研究以馬祖北竿機場為案例，利用機器學習演算法，進行機場能見度的預警技術發展，並與原經驗式推估模式預警之能見度結果比較。研究結果顯示，經驗式的能見度預報方法在馬祖北竿機場的整體平均誤差為8948公尺，存在較高的誤差率，參考價值偏低。本研究結合了多種模式預報因子，並運用多元分類向量機與支援向量機進行比較。實驗結果顯示，當觀測能見度低於3200公尺以下時，預報誤差由3058公尺降低至662公尺，誤差獲得明顯的改善，約有78%的改善幅度。

關鍵字：能見度、模式預警、AI

Development of AI-Based Visibility Technology at Airports: A Case Study of Beigan Airport

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Abstract

Airport visibility, as one of the important factors affecting flight safety, is a significant area of research. In 2018, the National science and technology Center for Disaster Reduction introduced the visibility empirical formula developed by the United States National Oceanic and Atmospheric Administration's Forecast Systems Laboratory, aiming to apply it to dynamic modeling for Taiwan's airport visibility warning. This study focuses on Beigan Airport in Matsu as a case study and utilizes machine learning algorithms to develop visibility warning techniques for airports, comparing the results with those estimated by the original empirical formula. The research findings indicate that the empirical visibility forecasting method has an overall average error of 8,948 meters at Beigan Airport, demonstrating a higher error rate and limited reference value. This study combines multiple factors from model outputs and compares the results using multivariate classification vector machines and support vector machines. The experimental results indicate that when the observed visibility is below 3,200 meters, the forecast error decreases from 3,058 meters to 662 meters, with an improvement rate of approximately 78%.

Key word: visibility, warning, AI