AI技術於防災氣象之落實與應用
Implementation and Application of AI Technology in Meteorological Disaster Prevention

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摘　　要

　　本研究以人工智慧(Artificial Intelligence，簡稱AI)演算法進行氣象防災領域的產品開發。除了利用機器學習的演算法修正模式能見度的推估誤差，提供離島機場能見度預警資訊。同時也進一步建構深度學習模組並應用於提高台灣降雨空間解析度。此外，本研究也嘗試結合多種AI演算法，建置次季節以及天氣判識模組。從初步的判識結果分析，次季節的判識誤差約在十天之內，而天氣判識的掌握程度(以秋季天氣為例)大約八成。其他模組如雲量判識、衛星資料雲反演以及AI氣象模型(Data-driven Weather Prediction，簡稱DWP)等，也將於報告中呈現。本研究考量各模組功能屬性，針對不同災害(如短延時強降雨、旱災、水災等)進行模組串接與防災產品的開發。同時也導入數位孿生概念與視覺化技術，將產品呈現於三維圖台並且進行即時作業化測試。相關產品與技術除了於會中討論外，也同步呈現於天氣與氣候監測網中。

關鍵字：氣象防災、天氣判識、次季節、數位孿生

Abstract

　　This study focuses on the development of products in the field of meteorological disaster prevention using Artificial Intelligence (AI) algorithms. In addition to employing machine learning algorithms to correct the errors of visibility forecasts, the study provides visibility warning information for offshore airports. Furthermore, this research constructs a deep learning module applied to enhance the spatial resolution of rainfall in Taiwan. The study also attempts to integrate various AI algorithms to establish sub-seasonal and weather recognition modules. Preliminary analysis of recognition results indicates that the error of sub-seasonal recognition is within ten days, and the accuracy of weather recognition (using weather recognition in autumn as an example) is approximately 80%. Other modules, such as cloud amount recognition, satellite data cloud retrieval, and Data-driven Weather Prediction (DWP) models, will also be introduced in the workshop. This study connects different modules and develops disaster prevention products for various types of disasters (e.g., short-duration heavy rainfall, drought, flooding). It also introduces the concept of digital twins and visualization techniques, displaying the products on a three-dimensional platform and conducting real-time operational tests. The related products and technologies are discussed in the workshop and simultaneously presented on the Weather Analysis and Taiwan Climate Hybrid monitor system.

Keywords : Disaster, weather type, sub-seasonal, digital twins