秋季天氣類型自動判識研究

林冠伶　江宙君　徐理寰　朱容練　于宜強

國家災害防救科技中心

摘　　要

　　本研究的目標是建立秋季天氣類型AI即時判識系統，以5種大尺度環流特徵進行每日自動化天氣類型判識。主要工作可分成二大部份，分別是秋季天氣類型的診斷分析與AI自動判識模組的建置。從資料的分析可知，秋季天氣可分成5種類型，分別是颱風(TC)、東北風(NE)、共伴(TC-NE)、東風(E)與北風(N)類型。AI模組的建置，則以Auto-Encoder與K-means為核心進行開發，並針對上述秋季5大天氣類型，進行判識方法測試。結果顯示，如直接以相似度比對天氣類型，模組的誤判率偏高，這可能與相似度比對無法同時處理群內距離與群間距離有關。從運用給定質心與挑選訓練成員方法的實驗顯示，秋季天氣類型AI即時判識系統的正確分辨率可達75%，相關結果將於文中進行討論。

關鍵字：秋季、天氣分類、相似度比對、K-means

Research on Automatic Autumn Weather Typing in Taiwan

Kuan-Ling Lin, Chou-Chun Chiang, Li-Huan Hsu, Jung-Lien Chu, Yi-Chiang Yu

National Science and Technology Center for Disaster Reduction

Abstract

The goal of this research is to establish an AI real-time autumn weather typing system in Taiwan, which can automatically identify daily weather types based on 5 synoptic features. The main work can be divided into two parts: diagnostic analysis of autumn weather types and establishment of AI automatic recognition module. From the data analysis, the 5 clusters are: a cyclonic circulation or TC covering Taiwan (TC type), northeasterly wind near northern Taiwan (NE type), a TC-like circulation in the South China Sea accompanied northeasterly wind near northern Taiwan (TC-NE type), weak easterly wind (E type), and weak northly wind (N type). The AI module is developed based on Auto-Encoder and K-means, and tested by the 5 weather types above. The results show that if the weather type is directly compared by similarity, the error rate of the module is high. This may be related to the fact that similarity comparison cannot simultaneously handle intra-group distance and inter-group distance. From the experiments using given centroids and selected training members by K-means, it is shown that the accuracy of the AI real-time autumn weather typing system in Taiwan can reach 75%, and related results will be discussed in the paper.

Key word: Autumn, Weather Typing, Similarity, K-means