

科技部人文社會科學研究中心

補助科技部跨領域研究計畫之前置規劃案結案報告

航運 4.0 之 AI 研究

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中文摘要

隨著國際物流運輸服務需求日以俱增，航運運量近幾年日益飆升，尤以受 COVID-19 疫情影響，運價飆漲、貨櫃塞港問題仍然棘手。除此之外，全球生存環境議題迫在眉睫，國際海事組織 IMO 設定目標於 2050 年前將船舶的溫室氣體 (GHG) 排放量降至 2008 年水準的 50%，對於智慧航運未來發展之「效率」、「安全」、「環境」三大訴求面向，技術層面勢必需要一番革新。以世界重要的樞紐港口如荷蘭鹿特丹港、新加坡港、德國漢堡港為例，皆陸續引進 AI 人工智慧與區塊鏈等新興科技協助布建智慧港口、更新船舶系統，臺灣理應與世界接軌。藉此，本研究利用機器學習與深度學習 AI 模型，針對未來航運 4.0 智慧化展望提出三項子計畫，分別為 (1) 貨櫃損壞偵測研究；(2) 船舶軌跡預測研究；(3) 船舶油耗預測研究，透過 AI 技術應用，預期達到自動化作業流程及最佳化資源運用之目的。本文亦呈現初步成果，以及探討研究現況與瓶頸，期以透過現階段成果與討論，得以擬出未來更具體研究架構與流程，為臺灣智慧化航運發展有所助益。

關鍵字：AI 人工智慧、機器學習、深度學習、航運 4.0

Abstract

Nowadays, with the increasing demand for global logistics transportation services, the transporting volume of the shipping industry has reached an unprecedented high point. Moreover, due to the impact of the COVID-19 pandemic, astonishing situations like port congestions or skyrocketing shipping costs are still sweeping the globe, making the supply chains under great pressure. As for the environmental issues, International Maritime Organization (IMO) has declared to half the emissions of greenhouse gas (GHG) by 2050 compared to emissions of 2008. Under these circumstances, the shipping industry needs to apply revolutionary technologies to meet the goals of a more efficient, eco-friendly, and safer future. Take ports of Rotterdam, Singapore, and Hamburg for example, all the three ports have introduced technologies of Artificial Intelligence (AI) or Blockchains to build the smart ports, which can be role models for Taiwan to implement the transformation of smart shipping. Therefore, three subprojects are proposed in this study, namely (1) Container Damage Identification; (2) Ship Trajectory Prediction, and (3) Ship Fuel Consumption Prediction. Through the applications of machine learning and deep learning AI techniques, we hope to establish models to meet the goal of workflow automation and energy optimization. Meanwhile, the preliminary results are also presented in this study, followed by discussions of the challenges and future planning. In this way, we hope to construct a more solid research framework, contributing to the future of “Maritime 4.0” in Taiwan.

Keywords: artificial intelligence (AI), machine learning, deep learning, Maritime 4.0