應用限制條件邏輯規劃演算法求解混合型工廠排程問題

黃鴻鈞、陳偉星

E-mail: 9126807@mail.dyu.edu.tw

摘 要

本研究利用限制條件邏輯規劃Constraint Logic Programming（CLP）演算法求解混合型工廠排程問題(Mixed Mode Shop Scheduling Problem)。混合型工廠排程問題在於將零工式生產排程模式及開放式生產排程模式中的工作排程問題合併考慮，並考慮工作本身或與其他工作之間處理步驟可以存在優先順序的相依限制關係。本研究的目標是把每件工作適度地安排於各個機器上，並且在不違反所有限制條件的情況下，使得每一個機器上的負荷量能夠達到平均與排程之總時程(Makespan)最小化。通常工廠排程屬於NP-complete 問題，用一般數學規劃不易表述所對應之目標函數與限制式，目前相關的研究領域當中，大部分利用啟發式演算法來尋求其最佳解。然而相對於問題限制式的轉變，個別啟發式演算法無法迅速套用於所衍生改變的問題中，而必須重新推導。CLP的優點，是透過在建立條件限制式模式時，可迅速清楚地將問題模式表達清楚。當任何一個問題在其求解的過程中，其問題本身存在許多限制式，經由透析與滿足這些限制條件，達到相關資源的最佳配置利用，可求得問題本身的可行解。透過限制程式Oz建構出一個限制式排程模式，以更有效率的技術來解決有關現實工廠排程問題。本研究建構一套限制式排程系統模式，能快速且清楚的建構問題限制模式，並快速求得一較有效率且更切合實際應用之近似最佳解，以提供實務界業者應用，達成降低生產成本之目的。

關鍵詞 : 限制條件邏輯規劃、混合型工廠排程、OZ

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