A Research for the Component-Based Modular Analysis of Varied Products

楊鈺銓、曾懷恩

E-mail: 9221565@mail.dyu.edu.tw

ABSTRACT

In order to solve the problem of rising components which cause by variety of products. Through the modularity lets designers or manufacturers have more flexibility to create new products or rise the functions to products. Traditions modular research was based on the Liaison Graph that depends on the knowledge of designers. In my research, I used the scoring card to evaluate the engineering characteristics to the liaisons of components. Through the matrices of liaisons and the function of distance, I tried to use the distance to show the degree of difference between the liaisons. Then, I used the Minimal Spanning Tree Algorithm to produce the assembly graph before assembling. After choosing a base part, the components have been clustered together. Then, I used the distance of Barry center to compare the difference to each cluster and found the liaisons that need to be changed. In this research, I used two simple products and revised the scoring card, tried to use the value of distance to find the relationship and variable of components from reusing, redesigning and merging.

Keywords: Product Variety; Modularity; Minimal Spanning Tree Algorithm; Liaison Graph; Base Part; Barry Center

Table of Contents

目錄 封面內頁 簽名頁 授權書............................................................................................ iii 中文摘要............................................................................................................................ vi 簽名頁............................................................................................................................ vii 目錄............................................................................................................................ viii 圖目............................................................................................................................ x 表目............................................................................................................................. xii 第一章緒論.......................................................................................... 1 1.1 研究動機與目的............................................................... 1 1.2 研究範圍與假設............................................................... 6 1.3 研究方法........................................................................... 9 1.4 研究流程及架構..............................................................11 第二章文獻探討................................................................................ 13 2.1 組裝規劃之演進.............................................................. 13 2.2 模組化形成之探究.......................................................... 19 2.2.1 功能樹表達法...................................................... 21 2.2.2 功能觀點之模組化研究...................................... 23 2.3 文獻回顧結論.................................................................. 25 第三章組裝網路演算法.................................................................... 28 3.1 Component資料結構...................................................... 28 3.1.1 Component之接觸方式....................................... 33 3.1.2 Component之使用工具....................................... 34 3.1.3 Component之結合方向....................................... 35 3.2 Arc權重計算................................................................... 35 3.3 最小展開樹演算法.......................................................... 36 3.4 組裝網路關係範例─釘書機.......................................... 38 第四章模組化分群演算法................................................................ 49 4.1 基礎元件(Base Part)........................................................ 51 4.2 距離指標(Distance Index, DI)......................................... 52 4.3 功能性模組(Functional Modular, FM) ........................... 56 4.4 質量中心.......................................................................... 57 4.5 分群範例─釘書機(續) .................................................. 59 第五章實例探究................................................................................ 66 5.1 演算法之執行步驟......................................................... 66 5.2 系統說明......................................................................... 68 5.3 實例探討─CD隨身聽................................................... 72 第六章結論與建議............................................................................ 86 6.1 結論.................................................................................. 86 6.2 後續研究.......................................................................... 86 參考文獻.............................................................................................. 88

REFERENCES


中文部分:


[33] 劉立晟,「方形組件之組裝次序與加工次序之整合分析與評估」, 私立元智工學院工業工程系碩士論文, (1997)。

[34] 黎文龍, 工程設計與分析, 東華書局, (2000)。
