

混合式基因演算法的研究及對控制系統的應用研究

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摘要

基因演算法(Genetic Algorithm, GA)和粒子群優化法(Particle Swarm Optimization, PSO)都是應用在最佳化的問題上。由於基因演算法有Mutation機制使之有全域搜尋能力,但Crossover有陷入局部最佳解及提早收斂的現象。PSO有快速、有效率的優點;然而PSO在搜尋高維度的題型時,有時會困在局部最佳解而無法尋找到全域最佳解。為了解決上述的問題,所以本論文提出一個混合式的演算法,結合了基因演算法和粒子群優化法這兩種演算法的優點。利用基因演算法進行對整個解空間的搜尋,並結合粒子群優化法進行局部搜尋(Local Search),希望能夠達到有效率且快速的搜尋局部區域,並提高搜尋全域最佳解的機會。從實驗結果得知,混合GA-PSO在搜尋最佳解都優於基因演算法和粒子群優化法,即使在高維度的題型中都可以找到最佳解。因此利用混合GA-PSO應用於尋找PID控制器的最佳參數,使PID系統可以快速達到穩定之效果。

關鍵詞: 基因演算法、粒子群優化法、混合GA-PSO、PID

目錄

| | | | |
|------------------------|-----|---|-----|
| 封面內頁 簽名頁 授權書 | iii | 中文摘要 | iii |
| | iv | 英文摘要 | v |
| | vi | 目錄 | vii |
| | ix | 圖目錄 | x |
| | ix | 表目錄 | x |
| 第一章 緒論 1.1簡介 | 1 | 1.2論文探討 | 2 |
| 1.2論文大綱 | 3 | 第二章 基因演算法之理論 2.1前言 | 3 |
| | 4 | 2.2基因演算法流程 | 6 |
| | 6 | 2.3基因演算法編碼與解碼方式 | 8 |
| | 10 | 2.4基因演算法之主要三種運算子 | 10 |
| | 11 | 2.4.1 擇優(Selection) | 10 |
| | 11 | 2.4.2 交配(Crossover) | 10 |
| | 11 | 2.4.3 突變(Mutation) | 13 |
| | 14 | 2.5實數基因演算法與交配運算子之比較 | 16 |
| | 22 | 2.6選取交配運算子方法 | 26 |
| | 26 | 第三章 粒子群優化算法 3.1前言 | 26 |
| | 27 | 3.2粒子群優化算法流程 | 24 |
| | 27 | 3.3粒子群優化算法常用的更新方法 | 26 |
| | 29 | 3.3.1 慣性權重法 | 26 |
| | 29 | 3.3.2 最大速度法 | 26 |
| | 31 | 3.3.3 收縮係數法 | 27 |
| | 31 | 第四章 混合式基因演算法 4.1前言 | 29 |
| | 31 | 4.2混合式基因演算法介紹 | 29 |
| | 31 | 4.3混合GA-PSO | 29 |
| | 31 | 4.4實驗結果 | 33 |
| | 37 | 第五章 PID控制器理論架構 5.1前言 | 37 |
| | 40 | 5.2PID控制器 | 37 |
| | 40 | 5.3Ziegler-Nichols介紹 | 37 |
| | 40 | 5.3.1反應曲線法(Reaction curve based method) | 40 |
| | 46 | 5.3.2振盪法(Oscillation method) | 42 |
| | 46 | 5.4演算法運用在調整PID的參數 | 46 |
| | 52 | 第六章 結論 | 51 |
| | 52 | 參考文獻 | 51 |
| | 52 | 附件為程式相關光碟 | 52 |

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