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國立高雄科技大學
NATIONAL KAOHSIUNG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY

授課大綱 Syllabus

部別：日間部博士

112學年度第2學期

列印日期：2024/03/01

中文課程名稱：基因演算法	英文課程名稱：Genetic Algorithm	授課教師：陳俊豪
開課班級：博子一甲	學分：3.0	授課時數：3.0
合班班級：碩資工一甲, 碩資工二甲		實習時數：0.0

1. 中文教學目標(Chinese Teaching objectives)

本課程將介紹基因演算法的相關知識、技術與其優點，旨在教授學生如何運用最佳化技術解決實際問題，亦即相關的基因演算法與其運作原理，包含：遺傳演算法、多目標遺傳演算法等。隨後，將進行相關的應用案例討論強化實際問題解決能力。具體課程目標如下所述：(1) 認識最佳化問題與類型，譬如：單目標或多目標最佳化問題。(2) 理解各種演化計算技術，包含：基因演算法、多目標基因演算法、群組基因演算法等。(3) 利用演化計算技術解決實際問題，例如：設計推薦模型最佳化技術。(4) 具備洞察現有演化計算技術之能力，例如：發現演算法問題或設計更有效的候選解評估函數。

2. 英文教學目標(English Teaching objectives)

This course will introduce related knowledge, techniques and merits of genetic algorithms for providing useful ways for students to solve the real-world application problems. In other words, it will teach related optimization techniques and how they work, and introducing related applications and discussions to enhance the ability to solve real-world application problems. Hence, the goals of this course including: (1) Knowing the type of optimization problems, e.g., single-objective or multi-objective optimization problems. (2) Understanding various type of evolutionary computation techniques, including genetic algorithms, muti-objective genetic algorithms, grouping genetic algorithms, etc. (3) Utilizing evolutionary computation techniques to solve real application problem, e.g., designing recommendation model optimization techniques. (4) Possessing the ability to assess existing evolutionary computation techniques. e.g., discovering problems of existing algorithms, or designing more effective fitness function for candidate solution evaluation.

3. 中文教學綱要(Chinese CourseDescription)

1. 介紹最佳化技術。 2. 學習單目標最佳化技術。 3. 學習多目標最佳化技術。 4. 案例與論文研討。 5. 專題實作(使用專題導向學習(Project-based Learning))

4. 英文教學綱要(English CourseDescription)

1. Introducing optimization techniques. 2. Learning single-objective optimization techniques. 3. Learning multi-objective optimization techniques. 4. Case study and paper study. 5. Project Implementation (Using Project-based Learning)

5. 中文核心能力

核心能力名稱	核心能力百分比
1 英語文能力, 專業溝通能力	10%
2 電資領域共同基礎能力, 資工系專業基礎能力, 資工系專業核心能力	70%
3 自學能力	10%
4 負責能力	10%

6. 英文核心能力

核心能力名稱	核心能力百分比
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1	Communication skills	10%
2	Common core ability in information science, professionalism in information engineering, professionalism in specialized core sectors	70%
3	Autonomous learning	10%
4	Self-discipline skills	10%

7. 教科書

中文書名： 英文書名：Genetic Algorithms + Data Structures = Evolution Programs

中文作者： 英文作者：Zbigniew Michalewicz

1 中文出版社： 英文出版社：Springer

出版日期：年 月 備註：

8. 參考書

中文書名： 英文書名：Data Mining : Concepts and Techniques, 3/e (Hardcover)

中文作者： 英文作者：Jiawei Han, Micheline Kamber, Jian Pei

1 中文出版社： 英文出版社：Morgan Kaufmann

出版日期：年 月 備註：

中文書名： 英文書名：Python for Finance (Analyze Big Financial Data)

中文作者： 英文作者：Yves Hilpisch

2 中文出版社： 英文出版社：O'Reilly Media

出版日期：年 月 備註：

9. 教學進度表

週次或項目 Week or Items	中文授課內容 Chinese Course Content	英文授課內容 English Course Content	分配節次 Assigned Classes	備註 Note
Week1	基因演算法課程介紹	Introduction to genetic algorithms		
Week 2	1. 專題式學習-準備階段 2. GAs: What are they? (Simple Genetic Algorithms)	1. PBL - Preparation 2. GAs: What are they? (Simple Genetic Algorithms)		
Week 3	1. 專題式學習-發掘問題 2. GAs: Why do they work? (Schema Theorem)	1. PBL - Problem Discovery 2. GAs: Why do they work? (Schema Theorem)		
Week 4	1. 專題式學習-發掘問題II 2. Binary or Float? (Real Code Genetic Algorithms)	1. PBL - Problem Discovery II 2. Binary or Float? (Real Code Genetic Algorithms)		
Week 5	1. 專題式學習-解題規劃 2. Grouping Problem and Grouping Genetic Algorithm	1. PBL - Problem Solving Plan 2. Grouping Problem and		

Grouping Genetic Algorithm

Week 6	1. 專題式學習-解題規劃II 2. Multi-objective Problems and Solutions	1. PBL - Problem Solving Plan II 2. Multi-objective Problems and Solutions
Week 7	1. 專題式學習-自我學習I 2. Advanced Optimization techniques - SPEA, SPEAII	1. PBL - Self Learning I 2. Advanced Optimization techniques - SPEA, SPEAII
Week 8	1. 專題式學習-自我學習II 2. Advanced Optimization techniques - Memetic Algorithms	1. PBL - Self Learning II 2. Advanced Optimization techniques - Memetic Algorithms
Week 9	Midterm Examination (Project Proposal)	Midterm Examination (Project Proposal)
Week 10	Applications on News Analysis	Applications on News Analysis
Week 11	Applications on Portfolio Management	Applications on Portfolio Management
Week 12	Applications on Trading Strategy Portfolio Optimization	Applications on Trading Strategy Portfolio Optimization
Week 13	Case Discussion & Paper Study (PBL - Team Discussion I)	Case Discussion & Paper Study (PBL - Team Discussion I)
Week 14	Case Discussion & Paper Study (PBL - Team Discussion II)	Case Discussion & Paper Study (PBL - Team Discussion II)
Week 15	Case Discussion & Paper Study (PBL - Team Discussion III)	Case Discussion & Paper Study (PBL - Team Discussion III)
Week 16	Final Project Presentation I (PBL - 呈現結果)	Final Project Presentation I (PBL - Final Presentation I)
Week 17	Final Project Presentation II (PBL - Final Presentation II)	Final Project Presentation II (PBL - Final Presentation II)
Week 18	Final Examination (PBL總結評鑑)	Final Examination (PBL Evalaution)

10. 中文成績評定(Chinese Evaluation method)

Attendance : 20% (Zuvio) Mark of usual : 20% (PBL) Midterm & Final reports : 20% Paper presentation & Slide Quality : 20% Final Project Presentation : 20% (Slide and project performance)

11. 英文成績評定(English Evaluation method)

Attendance : 20% (Zuvio) Mark of usual : 20% (PBL) Midterm & Final reports : 20% Paper presentation & Slide Quality : 20% Final Project Presentation : 20% (Slide and project performance)

12. 中文課堂要求(Chinese Classroom requirements)

積極參與PBL討論。

13. 英文課堂要求(English Classroom requirements)

Actively participate in PBL.

14. 本課程與SDGs相關項目(This course is relevant to these of SDGs as following_)

「遵守智慧財產權」；「不得非法影印」！