**中正大學 資訊工程研究所 課程大綱**

|  |  |  |  |
| --- | --- | --- | --- |
| 課程名稱(中文)(Chinese Course type) | 多媒體資訊壓縮與檢索 | 開課單位(Department) | 資訊工程研究所  |
| 課程名稱(英文)(English Course name) | Multimedia Information Compression and Retrieval | 課程代碼 (Course code) | 4105456 |
| 授課教師(Instructor) | 邱志義 | 學分數(Credits) | 3 |
| 必/選修(Required/Selected) | 必修 選修 | 開課年級(Level) | 碩班或博班 |
| 課程屬性/類別(Course type) | 人文關懷課程 競賽專題課程 問題導向課程專題導向課程 總整課程 實作課程實習 其他 |
| 先修科目或先備能力(Prerequisites) | This is an introductory course, intended for senior undergraduate and graduate students. The prerequisites are courses on computer programming, algorithms, and linear algebra. |
| 課程概述(Course Descriptions) | Teach students who want to learn the basic concepts and state-of-the-art of multimedia information compression and related applications in information retrieval, including multimedia representation, clustering, product quantization, hashing, and cross-modal retrieval. |
| 學習目標(Learning Objectives) | 1. Learn how to formulate, experiment, and evaluate related methods when processing multimedia data.
2. Learn core concepts and theories of information retrieval and search.
3. Learn how to solve problems by machine learning and multimedia techniques.
 |
| 教科書(Textbooks and Reference) | None. |

|  |  |  |  |
| --- | --- | --- | --- |
| 課程大綱(Course Syllabus) | 分配時數(Number of Hours) | 核心能力(Core Capabilities) | 備註(Remarks) |
| 單元主題(Topic)  | 內容綱要(Content)  | 講授(Lecture)  | 示範(Demonstration)  | 習作(Assignment)  | 其他(Others)  |
| Lossless and lossy compression | Huffman coding, arithmetic coding, transform coding | 9 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8  |  |
| Scalar quantization and vector quantization | Codebook training and applications | 4.5 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| Clustering | K-means, EM algorithm, deep learning-based clustering | 4.5 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| Product quantization | Basic concepts, optimized PQ, deep learning-based PQ | 4.5 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| hashing | Random projection, supervised and unsupervised hashing | 4.5 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| Applications | Content-based multimedia indexing, cross-modal retrieval | 6 |  |  |  | [x] A1[ ] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| Project | Project introduction and result presentation |  | 1.5 | 4.5 |  | [ ] A1[x] A2[ ] A3[ ] A4[ ] A5[ ] A6[ ] A7[ ] A8 |  |
| Paper presentation | Presenting selected top conference and journal papers |  |  | 9 |  | [ ] A1[ ] A2[ ] A3[ ] A4[ ] A5[x] A6[ ] A7[ ] A8 |  |

|  |
| --- |
| 教育目標 |
| 1.具獨立從事學術研究或產品創新研發之人才 |
| 2.具團隊合作精神及科技整合能力，並在團隊中扮演領導、規劃、管理之角色 |
| 3.具創新研發、自我挑戰與終身學習能力之人才 |
| 4.具有學術倫理、工程倫理、國際觀之人才 |
| 核心能力 |
| A1.具有資訊工程與科學領域之專業知識(Competence in computer science and computer engineering.) |
| A2.具有創新思考、問題解決、獨立研究之能力(Be creative and be able to solve problems and to perform  independent research.) |
| A3.具有撰寫中英文專業論文及簡報之能力(Demonstrate good written, oral, and communication skills, in  both Chinese and English.) |
| A4.具策劃及執行專題研究之能力(Be able to plan and execute projects.) |
| A5.具有溝通、協調、整合及進行跨領域團隊合作之能力(Have communication, coordination, integration  skills and teamwork in multi-disciplinary settings.) |
| A6.具有終身學習與因應資訊科技快速變遷之能力(Recognize the need for, and have the ability to engage  in independent and life-long learning.) |
| A7.認識並遵循學術與工程倫理(Understand and commit to academic and professional ethics.) |
| A8.具國際觀及科技前瞻視野(Have international view and vision of future technology.) |
| 請尊重智慧財產權，不得非法影印教師指定之教科書籍(Please respect to the intellectual property rights, do not photocopy the textbooks which assigned by professors.) |

|  |
| --- |
| 教學要點概述 |
| 教材編選(Teaching Materials) | [x] 自製簡報(ppt) [ ] 課程講義 [ ] 自編教科書[ ] 教學程式 [ ] 自製教學影片 [ ] 其他  |
| 教學方法(Teaching Methods)  | [x] 講述 [ ] 小組討論 [x] 學生口頭報告 [ ] 問題導向學習[ ] 個案研究 [ ] 其他 |
| 評量工具(EvaluationTools) | [ ] 上課點名 0% [ ] 隨堂測驗 0% [ ] 隨堂作業 0% [ ] 程式實作 0% [ ] 實習報告 0% [ ] 期中報告 0% [x] 期末報告 40% [x] 專題報告 30% [x] 期中考 30% [ ] 期末考 0% [ ] 評量尺規 0% [ ] 其他 0% |
| 教學資源(Teaching Resources) | [x] 課程網站 [x] 教材電子檔供下載 [ ] 實習網站 |
| 教師相關訊息(Instructor’sInformation) | https://sites.google.com/site/multimediaretrieval/ |
| 教學相關配合事項(Course relative information) | https://sites.google.com/site/multimediaretrieval/ |

|  |
| --- |
| 課程目標與教育核心能力相關性 |
| 請勾選：A1A2A3A4A5A6A7A8 |
| A1 | **具有資訊工程與科學領域之專業知識**(Competence in computer science and computer engineering.**)** |
| 為何有關：大規模資料集是數位時代的趨勢，如何有效率地處理大量資料，已成為現代資訊工程與科學領域重要的專業知識。 |
| 達成指標：是否能夠瞭解相關技術？ |
| 評量方法：期中考等級5：成績達到80分以上。等級4：成績達到70分以上。等級3：成績達到60分以上。等級2：成績達到50分以上。等級1：成績未達50分。 |
| A2 | **具有創新思考、問題解決、獨立研究之能力**(Be creative and be able to solve problems and to perform independent research.) |
| 為何有關：讓學生運用課堂所學來解決問題。 |
| 達成指標：是否能完成特定專題任務? |
| 評量方法：專題製作等級5：成績達到80分以上。等級4：成績達到70分以上。等級3：成績達到60分以上。等級2：成績達到50分以上。等級1：成績未達50分。 |
| A6 | **具有終身學習與因應資訊科技快速變遷之能力**(Recognize the need for, and have the ability to engage in independent and life-long learning.) |
| 為何有關：大規模資料集是數位時代的趨勢，學生應該培養自學能力，隨著科技進步充實自己。 |
| 達成指標：是否能自行閱讀論文理解最新技術? |
| 評量方法：論文報告等級5：成績達到80分以上。等級4：成績達到70分以上。等級3：成績達到60分以上。等級2：成績達到50分以上。等級1：成績未達50分。 |