



國立政治大學

National Chengchi University

社群網路與人智計算國際研究生博士學位學程

Social Networks and Human-Centered Computing

(TIGP-SNHCC)

課程手冊

CURRICULUM GUIDE

108 學年度/2019

College of Science

The College of Science was founded in 1994 from the former College of Arts and Sciences. Currently it comprises the Department of Mathematical Sciences, Department of Psychology, and the Department of Computer Science, as well as the Graduate Institute of Neuroscience and the Graduate Institute of Applied Physics. Furthermore, it also includes the following university-level research centers and programs: the Research Center for Mind, Brain and Learning, Master Program in Digital Content and Technologies (in conjunction with the College of Communication), Patents Course Program (co-founded with the College of Law in 2010), MA Program of Counseling and Guidance (co-founded with the College of Education in 2011), Bachelor Program in Digital Content and Technologies (co-founded with the College of Communication in 2011), and the Financial Mathematics Program (co-founded with the College of Commerce in 2011). In 2012, together with the College of Foreign Languages and Literature, the international and pioneering cross-disciplinary Language, Cognition and Brain Program was established. In 2014, the Social Networks and Human-Centered Computing (SNHCC) Ph.D. Program was founded in joint collaboration with the Department of Computer Science, Academia Sinica, and National Tsing Hua University.

History of SNHCC

Online Social Networks (OSNs), such as Facebook, Twitter and Foursquare, have become increasingly important in the last decade and are now an integral part of many people's daily life. For Facebook, there are 1.18 billion daily active users with an increase of 17% year-over-year and 1.79 billion monthly active users with an increase of 16% year-over-year in 2016. Facebook users spend an average of 35 minutes a day according to SocialMediaToday. For Twitter, there are more than 317 million monthly active users in 2016, up 3% year-over-year, and there are 0.5 billion tweets per day. Also, social networks and human computation have brought new applications to natural language processing (NLP), mobile computing, multimedia, data mining and human-centered computing. For example, NLP and data mining in social networks enable researchers to understand the trend, sentiment, influence, and opinions of the users in social networks. By considering the social comments, links, and interactions, the ranking and recommendations of multimedia contents become more precise and effective. Moreover, by examining the social relationship of users with mobile devices, researchers can exploit location-based and contextual information embedded with mobile social networks to create useful insights for community discovery, group

mobility patterns and location-based viral marketing. Finally, human-centered computing can leverage social networks to build systems for problem-solving in distributed environments. The social and human factors in these areas indeed enable many new applications, and new challenges arise due to the additional dimension necessary to be carefully examined. Therefore, it is envisaged that the direction of this program, Social Networks and Human-Centered Computing, is crucial from the perspectives of the academia and industry.

National Tsing Hua University (NTHU), National Chengchi University (NCCU), and Academia Sinica jointly establish the TIGP on Social Networks and Human-Centered Computing (SNHCC) in 2012. SNHCC are new important applications and technologies that have been rapidly developing in recent years. The TIGP SNHCC program can cultivate Taiwanese and international talents in related areas to the program, strengthen innovative potential, and enhance the level of academic research. NTHU, NCCU and Academia Sinica will co-play leading and supervisory roles, and provide research resources and equipment. Additionally, the participating scholars of these three institutions will be jointly responsible for teaching activities, supervising research, and guiding international graduate students.

Research Topics

- *Natural Language Processing and Information Retrieval with Applications in Social Networks
- *Data mining in Social Networks
- *Social Multimedia
- *Mobile Social Networks
- *Human-Centered Computing

Academic System and Milestones

| | National Tsing Hua University | National Cheng Chi University |
|----------------------------------|---|--|
| Year 1 | Decide your area of concentration. Find a mentor within a month each semester. Find an advisor and a co-advisor within a year after enrollment. | |
| Year 2 | Continue enrollment toward fulfilling core course requirement. | |
| Year 3 Ph.D. Candidate | 1. Complete all required courses within 5 semesters. 2. Pass TIGP Qualifying Evaluation. 3. Academic Excellence for NTHU ISA requirement: complete 18 Credits of Ph.D. Level Courses and each subject must be at least B+ | 1. Complete all required courses within 5 semesters. 2. Pass TIGP Qualifying Evaluation 3. Pass Cheng Chi Qualifying Exam: (one out of following) --Algorithm --Data Structure --Probability Theory --Linear Algebra |
| Year 4~6 | Finish PhD research Schedule thesis chapter to committee and oral defense. | |
| 7th Year | Graduate | |

Advisor : The student needs to find an advisor and a co-advisor, who are (assistant or associate) research fellow from Academia Sinica and (assistant or associate) professor from the partner university. If the advisor is changed, a second review shall be conducted.

Graduation Requirement

*Course Requirement

A. Required Courses: Pass at least three out of five SNHCC Core Courses.

B. Elective Courses: AT least 9 credits, including CS/ISA/COMM from NTHU or Ph.D. level courses in NCCU. This does not include PhD Thesis, Special Project, seminar or Chinese Class.

C. Students have to participate in “Seminars” every semester in the first 6 semesters. According to students’ backgrounds, degree requirements may include participation of prescribed planned curriculum. Seminar is not included in the core course and it is mandatory to attend.

Qualification Assessment

To Qualify, students must pass the academic courses and research ability assessment.

1. Core Courses:

- A. Students are required to high pass 3 out of 5 core courses. Superior graduate level performance. Consistently demonstrates complete and accurate understanding and application of knowledge and skills. The professors from each core courses will determine the passing thresholds.
- B. The students are allowed to re-take the course and obtain “high pass.”
- C. Publication or paper submission is not allowed in lieu of the QE.
- D. Students who are not able to pass three (out of five) core courses WITH superior graduate level performance by the beginning of the third academic year. You are not qualified for research ability assessment.

2. Research ability assessment:

A. The purpose is to steer toward a right track, objective, fair and appropriate standard, of Social Networks and Human-Centered Computing.

B. Time Frame

(1) The application for Ph.D. Thesis proposal is only accepted after the student passes Academic Course Evaluation (and) Qualifying Exam. (TIGP + School).

(2) The deadline for Thesis Proposal Approval is by end of the third year.

C. The assessment committee will be composed of three faculty members: advisor, co-advisor and one SNHCC Academic Committee member.

D. The research ability assessment may be held twice. Student who do not pass the second assessment must withdraw from the PhD program in the following semester.

***Research Advisor**

A. The student is required to find an advisor and a co-advisor from our core faculty list.

B. The student can choose more than one co-advisor. But the primary co-advisor must be one of the core faculty members.

C. The student must decide their advisor and co-advisor within the first year. The student should find their advisor/co-advisor and get approved by the end of the third semester. Otherwise, the student shall be dismissed from the program.

D. The student cannot change their advisors in the year before the graduation.

Publication and Final Oral Defense

A. Publish at least one paper in a top journal or two papers in top conferences, which will be examined and verified by the TIGP Educational Administration Committee. The paper needs to be published, or a proof of its acceptance should be submitted.

B. Pass the oral defense. Noticed that a student must pass the examination of graduation by TIGP Educational Administration Committee before proposing the oral defense. The oral defense committee should include at least five members in related research fields. Among them, at least one third of the members should come from organizations other than NTHU, NCCU, and Academia Sinica.

C. Publish at least one paper in a top journal or two papers in top conferences, which will be examined and verified by the TIGP Educational Administration Committee. The paper needs to be published, or a proof of its acceptance should be submitted.

Course Planning

Students need to complete 3 of the 5 core courses and at least 3 elective courses. Since NTHU and NCCU honor the course credits granted by each other, students in this program can take related courses from both schools. Before completing 18 credits, students are required to take at least two courses "with" credits every semester.

| Fall | | | |
|-----------|--------------------------------|-----------|--------------------|
| Course# | Course Title | credits | Weekly Study hours |
| 761002001 | Data Mining in Social Networks | 3 credits | 6 |
| 761007001 | Human-Centered Computing | 3 credits | 6 |

| | | | |
|-----------|----------|----------|---|
| 761013001 | Seminars | 0 credit | 1 |
|-----------|----------|----------|---|

| Spring | | | |
|-----------|--|-----------|--------------------|
| Course# | Course Title | credits | Weekly Study hours |
| 761002001 | Natural Language Processing and Information Retrieval with Applications in Social Networks | 3 credits | 6 |
| 761005001 | Multimedia in Social Networks | 3 credits | 6 |
| 761006001 | Mobile Social Networks | 3 credits | 6 |
| 761013001 | Seminars | 0 credit | 1 |

Note : All international students are required to take Chinese Class for one year.

Course Description

| Course# | Course Title | No. of Credits | Academic Semester |
|-----------|--|----------------|-------------------|
| 761001001 | Natural Language Processing and Information Retrieval with Applications in Social Networks | 3 | Spring |

[Course objectives]

As social media and social network sites have become one of the major means of communication and content producing, researchers can access rich and heterogeneous information from the social media and social network sites that include not only text content but also social relationships among persons. The content on social media and social network websites is different from the others in terms of style, tone, purpose. Therefore, it is not suitable for applying existing natural language processing (NLP) or information retrieval (IR) techniques on such content. Therefore, new challenges for NLP and IR arises in social media and social networks, including summarization of posts/replies, relationship extraction, social structure and position analysis, opinion retrieval, sentiment analysis, entity resolution, trend analysis, etc. It is thus important to develop new algorithms for addressing the above needs.

[Course Overview]

This course covers a broad range of topics in NLP and IR. Practical applications, fundamental algorithms and mathematical models are introduced. To raise students' study motivation, besides midterm and final exam, students are requested to be involved in one hands-on IR projects near the midterm and another NLP project in the end of semester.

| Course# | Course Title | No. of Credits | Academic Semester |
|-----------|--------------------------------|----------------|-------------------|
| 761002001 | Data Mining in Social Networks | 3 | Fall |

[Course objectives]

Some websites own considerable amount of data, e.g., the user topology of Facebook contains billions of nodes. For a large variety of social networking applications, community detection is the one of the most basic issues for mining their data. Moreover, new topics emerge for modeling the user behaviors with the abundant social information, e.g., credibility mining, user interest modeling, user demographics and social strategy inference, advertisement targeting, fraud/anomaly detection, influence probability learning. On the other hand, analyzing social links provides fundamental knowledge for different applications, e.g., link prediction for friend/item recommendation, social influence for viral marketing, and anchor link inference for identity authentication. Also, graph pattern mining is one of the most important topics for graph data mining as well as the pairwise shortest path query and triangle counting. Furthermore, to avoid malice adversary obtaining users' real identities of each corresponding node, privacy-preserving graph mining plays a very important role when social network data is used in practical commercial sales. The clustering and classification of documents in social media are also important for social networks.

[Course Overview]

In this course, the following topics will be presented and discussed: social media analysis, blogs and friendship network analysis, email and messaging analytics, influence spreading and viral marketing, social reputation and trust, user profiling and recommendation systems, social media searches, expertise and authority discovery, community identification, link prediction, collaborative data analysis, and data mining with social factors.

| Course# | Course Title | No. of Credits | Academic Semester |
|---|--------------------------|----------------|-------------------|
| 761007001 | Human-Centered Computing | 3 | TBA |
| <p>[Course Objective]</p> <p>Users of various forms, including individual human actors, teams and communities, are increasingly integral parts of computing systems. In professional and everyday use of software and hardware as well as online communication and social computing systems, users demand system utility, usability and enjoyable experience of use. It is a present and pressing challenge to endow computing systems with these qualities, and to better service users of all kinds (professional, non-professional, and special populations) with careful, considerate designs. Decades of research in Human-Centered Computing (HCC) related fields, including Human-Computer Interaction, Software Engineering, Ergonomics, Cognitive Science, Industrial and Interaction Design, and Digital Society and Technologies have demonstrated much rationale and benefit to lay the basis of technology building on the understanding of the goals, characteristics, constraints and needs of users and their contexts. User research that applies behavioral and social science methods and theories is thus an important foundation to HCC. Prototyping and evaluation methods distinguish HCC from non-HCC system building in that user-based testing and iteration are central to HCC research and development. Innovations in HCC further leverage human and collective intelligence, and integrate human and machine processing for complex problem solving and value creation.</p> <p>The mission of the HCC aspect in the TIGP-SNHCC program is to ensure that students specializing in HCC have a firm grasp of the methods, concepts and principles of HCC research and development. Through our education and cultivation, HCC students will develop knowledge, skills and confidence in empirical user research, system design, prototyping, evaluation and innovation.</p> | | | |
| <p>[Course Overview]</p> <p>The course aims to provide graduate students of the TIGP program of Social Network and Human-Centered Computing (SNHCC) an overview of human-centered computing (HCC), particularly from the view of user-oriented computing system design and research. As an emerging, multidisciplinary field, HCC is commonly referred to and characterized by the idea of devising</p> | | | |

designs of computing systems based on properties, needs and constraints of the users and their tasks, rather than the inverse.

Thus HCC embodies more than technology building, such as how to the software and hardware systems for supporting people. It also includes systematic understanding of people and the interactions between people and technologies. In this course, we'll explain and illustrate the state of the art of human-centered computing, focusing on fundamental concepts and practices of interface/interaction design and engineering, methods for studying users/tasks, methods for design-prototyping, and key topics that are closely related to the TIGP program, such as human computation, social computing, mobile computing, and tangible interaction etc.

| Course# | Course Title | No. of Credits | Academic Semester |
|-----------|-------------------------------|----------------|-------------------|
| 761005001 | Multimedia in Social Networks | 3 | Spring |

[Course objectives]

In *Social Multimedia*, not only multimedia contents are included, but also social comments, social links, and social interactions are considered, so that the result of analysis will be more accurate and meet the requirements more precisely. Research issues include user reasoning, user interest profiling, community activity analysis, privacy preservation, spreading speed analysis/prediction, CTR (Click Through Rate) prediction, social setting based content pooling, user grouping for multimedia broadcasting, interaction system design and implementation, emotional impact analysis/prediction, image/video ranking and application development with emotion model, aesthetic quality assessment, efficiency improvement on data/metadata collection, music classification, recommendation, and watermark, and multimedia ground truth construction with crowdsourcing. Since multimedia data is linked widely in multiple dimensions, the topic of privacy has been concerned over the recent years.

[Course Overview]

1. Introduction to Multimedia
 - 1.1. What is Multimedia?
 - 1.2. Overview of Multimedia Applications
 - 1.3. Multimedia Research Resources
2. Multimedia Basics
 - 2.1. Graphics and Image Data Representations
 - 2.2. Color in Image and Video
 - 2.3. Fundamental Concepts in Video
 - 2.4. Basics of Digital Audio
3. Multimedia Processing & Coding
 - 3.1. Video coding fundamentals
 - 3.2. Lossless Compression & Lossy Compression
 - 3.3. Transform Coding
 - 3.4. Motion Compensated Predictive Coding
4. Multimedia Coding Standards
 - 4.1. JPEG, JPEG-2000
 - 4.2. H.261, H.263, MPEG-1, MPEG-2, MPEG-4, and H.264
5. Social Network Basics
 - 5.1. An Introduction to Social Networks
 - 5.2. Properties and Models of Social Networks
 - 5.3. Centrality Analysis and Community Detection
 - 5.4. Information Diffusion in Social Networks
6. Social Multimedia Analytics
 - 6.1. Sentiment, Opinion, Locations, and Multimedia
 - 6.2. Search and Recommendation in Social Media
 - 6.3. User Understanding
 - 6.4 Using Social Multimedia for Prediction and Forecast
7. Advanced Multimedia Processing
 - 7.1. Image Manipulation Techniques
 - 7.2. Interactive Multimedia Editing

| Course# | Course Title | No. of Credits | Academic Semester |
|-----------|------------------------|----------------|-------------------|
| 761006001 | Mobile Social Networks | 3 | Spring |

[Course objectives]

Researchers are increasingly interested in addressing a wide spectrum of challenges in mobile social networks to extract useful knowledge. Different from online social networks, mobile social networks exploits mobile devices as an integrated part of users' social networks and life style. Mobile social networks span over various research topics, such as identifying common static topological structures and dynamic evolutions of social networks, and exploiting location-based and contextual information embedded with mobile social networks to create useful insights. The insights foster important implications on community discovery, anomaly detection, trend prediction with the applications in many domains, such as recommendation systems, information retrieval, future prediction, and so on. In light of the above crucial need, sophisticated data mining and query processing techniques on both social and spatial dimensions are demanding for extracting representative information from mobile social network.

[Course Overview]

- A. Introduction on Mobile Social Networks
- B. Mobile Social Network Services
- C. Context-Aware Mobile Computing in Mobile Social Networks
- D. Data Analysis in Mobile Social Networks
- E. Security and Privacy in Mobile Social Networks

| Course# | Course Title | No. of Credits | Academic Semester |
|-----------|--------------|----------------|-------------------|
| 761013001 | Seminar | 0 | Fall/Spring |

[Course objectives]

To enhance the learning experiences as a student, students are expected to attend and participate in the school's Weekly Seminar Series. These seminars feature the latest cutting edge research and can expend their research interests.

[Course Overview]

Research-related topics.

Checklist for Course Requirement

| Core Courses | | | | |
|---|---------|--------|--------------------------|--|
| Course Title | Credits | Grades | | |
| Natural Language Processing and Information Retrieval with Applications in Social Networks | 3 | | <input type="checkbox"/> | *Students need to complete 3 of the 5 core courses and at least 3 elective courses *All international students are required to take Chinese Class for one year. *Students have to participate in “Seminars” every semester in the first 6 semesters. |
| Data Mining in Social Networks | 3 | | <input type="checkbox"/> | |
| Human-Centered Computing | 3 | | <input type="checkbox"/> | |
| Multimedia in Social Networks | 0 | | <input type="checkbox"/> | |
| Mobile Social Networks | 3 | | <input type="checkbox"/> | |
| Seminars | 0 | | <input type="checkbox"/> | |
| Elective Courses | | | | |
| Course Title | Credits | Grades | | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| _____ | | | <input type="checkbox"/> | |
| Course Requirement (at least completing 18 credits) Core Courses : _____ Elective Courses : _____ | | | | |

Faculty Members

The Faculty members are composed of Academia Sinica, National Chengchi University and National Tsing Hua University.

Institute of Information Science, Academia Sinica



Dr. Wen-Lian Hsu(hsu@iis.sinica.edu.tw)

Research : Analysis of algorithms, graph theory, search methods in artificial intelligence, bioinformatics, computational biology, computational linguistics, natural language understanding, intelligent agent systems.



Dr. Hsin-Min Wang(whm@iis.sinica.edu.tw)

Research : Spoken language processing, natural language processing, multimedia information retrieval, pattern recognition.



Dr. Wen-Tsuen Chen(chenwt@iis.sinica.edu.tw)

Research : Intelligent sensing and applications, mobile computing, high-speed communications networks, parallel algorithms and systems, software engineering.



Dr. Wen-Liang Hwang(whwang@iis.sinica.edu.tw)

Research : Wavelet analysis signal, image and video processing.



Dr. Yuan-Hao Chang(johnson@iis.sinica.edu.tw)

Research : Next-Generation storage systems and their applications, Real-Time embedded systems and their OS designs, multi-Core architecture and virtualization technology.



Dr. Jan-Ming Ho(hoho@iis.sinica.edu.tw)

Research : Combinatorial optimization and algorithm design, multimedia network protocol and applications, design of algorithms and applications of big data technologies in bioinformatics and financial computing, design of algorithms and efficient software in financial risk management.



Dr. Tyng-Luh Liu(liutyng@iis.sinica.edu.tw)

Research : Computer vision, pattern recognition, machine learning.



Dr. Da-Wei Wang(wdw@iis.sinica.edu.tw)

Research : Privacy enhancing technology, graph theory and algorithm, medical informatics.



Dr. Tsan-Sheng Hsu(tshsu@iis.sinica.edu.tw)

Research : Design, analysis, implementation and performance evaluation of computer



Dr. Chu-Song Chen(song@iis.sinica.edu.tw)

Research : Pattern recognition, computer vision, image processing.

algorithms, graph theory and its applications, data-intensive computing, data privacy ,theory of computer games.



Dr. Chi-Jen Lu(cjl@iis.sinica.edu.tw)
Research : Machine learning, computational complexity, algorithms, game theory.



Dr. Chun-Shien Lu(lcs@iis.sinica.edu.tw)
Research : Compressed sensing, sparse signal processing, security and privacy in multimedia and sensor network.



Dr. Sheng-Wei Chen(swc@iis.sinica.edu.tw)
Research : Quality of experience, multimedia systems, social computing, crowdsourcing / human computation.



Dr. De-Nian Yang(dnyang@iis.sinica.edu.tw)
Research : Social networks and mobile data management, mobile multimedia networks and applications.



Dr. Hong-Yuan Mark Liao(liao@iis.sinica.edu.tw)
Research : Content-based multimedia retrieval, video-based human behavior analysis, multimedia protection, 3D mesh decomposition and recognition, multimedia signal processing.



Dr. Wei-Yun Ma(ma@iis.sinica.edu.tw)
Research : Natural Language Processing, Semantic Analysis of Social Media, Machine Reading, Machine Translation, Knowledge Representation, Question Answering.



Dr. Keh-Yih Su(kysu@iis.sinica.edu.tw)
Research : Statistical semantic machine translation, machine reading, statistical language modeling, natural language processing, natural language understanding, machine learning.



Dr. Ling-Jyh Chen(ccljj@iis.sinica.edu.tw)
Research : Mobile and wireless networks, network measurements, networked sensing, human computation.



Dr. Meng-Chang Chen(mcc@iis.sinica.edu.tw)
Research : QoS networking, wireless networks, operating systems, data, text and knowledge management, information retrieval.



Dr. Mi-Yen Yeh(miyen@iis.sinica.edu.tw)
Research : Data mining, databases.



Dr. Chien-Min Wang(cmwang@iis.sinica.edu.tw)
Research : Cloud computing, parallel and distributed computing, distributed file systems, virtualization technology, dynamic binary translation.



Dr. Lun-Wei Ku(lwku@iis.sinica.edu.tw)
Research : Natural Language Processing ; Computational Linguistics ; Sentiment (Opinion and Emotion) Analysis ; Information Extraction and Retrieval ; Chinese Language Processing ; Topic Detection and Tracking ; Artificial

Intelligence ; Computer Assisted Language Learning (CALL).



Dr. Li Su

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Music information retrieval, sound and music computing, biomedical signal processing

- **Research Center for Information Technology Innovation, Academia Sinica**



Dr. Wen-Huang

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Research : Multimedia content , analysis Computer vision, mobile multimedia applications, human computer interaction.



Dr. Chuan-Ju Wang

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Research: Computational Finance: lattice model, derivative pricing, risk management

Data Analytics: text mining, social network analysis, time series modeling



Dr. Wei-Ho

Chung(whc@citi.sinica.edu.tw)

Research : communications, signal processing, networks, and multimedia.



Dr. Yi-Hsuan

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Research : Music information retrieval, analysis and visualization, machine learning, multimedia system, smart phone and cloud-based applications, lyrics analysis.



Dr. Ronald Y.

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Research : Wireless communications and networking, signal processing applications.



Dr. Pi-Cheng

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Research : Embedded systems, Real-Time systems, mobile network.



Dr. Chih-Yu Wang(cywang@citi.sinica.edu.tw)
 Research : Game theory, wireless communication, social network.



Dr. Yu Tsao(Yu.tsao@citi.sinica.edu.tw)
 Research : Speech and audio processing, pattern recognition and machine learning, human language processing, multimedia signal and information processing.



Dr. Yu-Chiang Frank Wang(ycwang@citi.sinica.edu.tw)
 Research : Pattern recognition, machine learning, computer vision, multimedia signal processing, information retrieval.



Dr. Yen-Yu Lin(yylin@citi.sinica.edu.tw)
 Research : Computer vision, pattern recognition, machine learning, multimedia systems.

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Dr. Tsai-Yen Li(li@nccu.edu.tw)
 Research : Robotics, computer animation, artificial intelligence.



Dr. Yuh-Jong Hu(jong@cs.nccu.edu.tw)
 Research : Semantic web, privacy-preserving big data analysis, privacy-aware social web, data protection in the cloud, Information and law.



Dr. Cheng-Chia Chen(chence@cs.nccu.edu.tw)
 Research : Software language engineering, Logic in computer science, theory of computation.



Dr. Hung-Chin Jang(jang@cs.nccu.edu.tw)
 Research : Wireless communications, mobile network management, mobile communication systems, Green network communication, Machine to Machine (M2M), iOS / Android APP development.



Dr. Man-Kwan Shan(mkshan@nccu.edu.tw)
 Research : Data mining, multimedia information systems, social networks, computer music, cloud databases, digital archive.



Dr. Jyi-Shane Liu(jsliu@cs.nccu.edu.tw)
 Research : Social network analysis and mining, social informatics, digital humanities, digital library.

Dr. Chao-Lin

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Research : Automatic reasoning, Machine learning, Natural language processing and information retrieval, Intelligent tutoring systems, Intelligent transportation systems.

Dr. Ray-lin

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Research : Cryptography, network security, Information security.

Dr. Peggy

Kuo(peggykuo@cs.nccu.edu.tw)



Research : Multimedia retrieval and analysis, digital content technology, digital archive.

Dr. Ming-Feng

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Research : Information retrieval, machine learning, Web search and mining, social network analysis, natural language processing.

Dr. Chun-Feng

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Research : Smart Environment (Pervasive Computing), service-oriented systems, cloud computing , Linked Open Data , healthcare systems.

Dr. Tung-Wei Kuo

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Research: Data center networking, Software-Defined Networking (SDN)

Dr. Kung Chen(chen@cs.nccu.edu.tw)

Research : Programming languages, software design for cloud computing (SaaS development), aspect-oriented technologies, technologies for web-based information systems.



Dr. Wen-Hung Liao(whliao@cs.nccu.edu.tw)

Research : Computer vision, pattern recognition, human-computer interaction.



Dr. Ming-Te Chi(mtchi@cs.nccu.edu.tw)

Research : Non-Photorealistic rendering, stylistic rendering, applied perception in graphics and visualization, point rendering.



Dr. Jia-Ming Chang

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Research: Bioinformatics



Dr. Tzu Chieh Tsai(ttsai@cs.nccu.edu.tw)

Research : Computer Network, Mobile Computing.



and Network Function Virtualization (NFV), Approximation algorithms

- o for problems with MASSIVE data.

For instance, problems from big data applications.

- o for NP-hard problems

Wireless systems

- **Institute of Information Systems and Applications, National Tsing Hua University**



Dr. Chung-Ta

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Research : Pervasive computing, cluster computing, parallel and distributed systems.



Dr. Von-Wun

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Research : Artificial intelligence, machine learning, expert systems.



Dr. Jason S.

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Research : Natural language processing, knowledge management, IR, MT, AI.



Dr. Hwann-Tzong

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Research : Computer vision, image processing, machine learning.



Dr. Yi-Shin

Chen(yishin@cs.nthu.edu.tw)

Research : Web intelligence, multimedia retrieval meta-search, Real-time queries for continues data streams.



Dr. Hao-Chuan

Wang(haochuan@cs.nthu.edu.tw)

Research : Human-computer interaction, social computing, language technologies, educational technology.



Dr. Cheng-Hsin

Hsu(chsu@cs.nthu.edu.tw)

Research : Multimedia systems and computer networks, mobile multimedia, video dissemination over hybrid networks, cloud multiplayer games, and efficient content sharing in mobile social networks.



Dr. Chia-Wen

Lin(cwlin@ee.nthu.edu.tw)

Research : Multimedia networks, visual communication, image/signal processing.

Dr. Fu-Ren Lin(frlin@mx.nthu.edu.tw)

Research : Data/text mining and knowledge discovery, professional community and knowledge management, business process innovation and e-business management, electronic commerce: developing dynamic e-business, service science, management, and engineering.



Dr. Shelly Shwu-Ching

Young(scy@mx.nthu.edu.tw)

Research : E-learning model and design of internet information spread, Handheld learning devices and Mobile Learning, Game-based learning, Learning application of tangible device.



Dr. Jyun-Cheng

Wang(jcwang@mx.nthu.edu.tw)

Research : Social network, community & EC, patent analysis.