Introduction to Taiwan International Graduate Program (TIGP)

Academia Sinica has established the Taiwan International Graduate Program (TIGP) in collaboration with a consortium of key national research universities in Taiwan. The purpose of the program is to develop a pool of research manpower in those modern multidisciplinary fields that are important to the future economic and social development of Taiwan and to enhance the innovative potential and academic profiles of research in these and related fields.

TIGP will offer Ph.D. programs in only selected disciplines to be agreed upon between Academia Sinica and its national research university partners. It is the intent of the Program to offer Ph.D. degree programs only in inter-disciplinary areas, in the physical sciences, applied sciences, engineering, biological and agricultural sciences, health and medical sciences, and humanities and social sciences.

Academia Sinica will assume principal oversight of the academic options of the Program. It will provide the intellectual leadership, the research resources, and the research and physical facilities. Qualified and interested faculty members of the participating national research universities are invited to join the various programs as affiliated faculty of the Program, and participate in the teaching of courses, supervision of research, and mentoring of the international graduate students.
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 also arise due to the additional dimension necessary to be carefully examined. Therefore, it is envisaged that the direction of this program is crucial from the perspectives of the academia and industry. The TIGP on Social Networks and Human-Centered Computing (SNHCC) is a program established jointly by National Tsing Hua University (NTHU), National Chengchi University (NCCU), and Academia Sinica. Social Networks and Human-Centered Computing 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.
This TIGP program hopes to attract outstanding young domestic and foreign students. In the scope of social networks and human-centered computing, this program gives priority to computer science and engineering, and takes social and behavioral sciences as subsidiary to provide students with the training across multiple fields. The curriculum contents will probe into various fields, including natural language social multimedia and information retrieval, data mining, multimedia, mobile social networks computing and human-computer interaction that emphasized areas and combinations in computer science, sociology, communication and psychology covering society and behavioral sciences.

In TIGP on Social Networks and Human-Centered Computing, the cooperating universities and institutes will provide the required laboratory equipment and instrument for teaching and research. With the equipment and various expertise of the researchers from the cooperating institutions, this program can provide young students with a good educational opportunity to cultivate their research capabilities in interdisciplinary areas. This specific TIGP will focus on both theory and practice to provide students with a solid theoretical basis and technical capability to solve practical problems.

1. Natural Language Processing and Information Retrieval with Applications in Social Networks
   - 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 people. 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.

2. Data Mining in Social Networks:
   - 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.

3. Social Multimedia:

- As for 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.

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.

4. Human-Centered Computing:

- Human-Centered Computing (HCC) is a rapidly evolving area that focuses on designing, building and evaluating computational technologies as they relate to the human condition and society. HCC research can be viewed as a three dimensional space consisting human, computer and environment. The human dimension supports and responds the needs of human beings through certain goal-oriented groups. The computer dimension ranges from fixed computing devices to mobile devices, to sensors and devices embedded in the physical environment. The environment dimensions ranges from discrete physical computational devices to virtual environments. Topics of HCC research include systems for problem-solving by people interacting in distributed environments, multimedia and multimodal interfaces for people to communication with each other, collaborative systems that enable knowledge-intensive interactions, and social dynamics modeling and socially aware systems.
Advance to Candidacy

- Students have to successfully complete at least 18 credit units of course work within 2 years, and pass Ph.D Qualifying Examinations within 3 years.
- Students have to choose one of the five topics listed above in the Research Topics section as their area of concentration within the first year after enrollment.
- In the first four semesters, students have to complete 6 courses including at least three core courses ("Natural Language Processing and Information Retrieval with Applications in Social Networks" , “Data Mining in Social Networks”, “Social Multimedia”, “Mobile Social Networks”, and “Human-Centered Computing”), “Project Research” to work on research related to their thesis, and at least 3 elective courses. Also, students have to participate in "Seminars" for the first 6 semesters. According to students' backgrounds, degree requirements may include participation of prescribed planned curriculum. All courses are taught in English.

Degree Requirements

- Complete at least 3 out of 5 core courses and the prescribed credit hours.
- Obtain Ph.D. Candidacy.
- Pass the dissertation proposal.
- 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. Students have to be the primary author of the paper. The paper needs to be published, or a proof of the acceptance should be submitted.

- Pass the oral defense. Notice 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 another institution.
- The length of study is at most seven years.

Admission to the Ph.D. Program

- Master’s degree in computer science or other related areas, or equivalent qualification based on the regulation of the Ministry of Education of Taiwan.
- Fluency in English:
  a. TOEFL: A total score of 550 on paper-based, 79 on internet-based (TOEFL-iBT) or higher.
  b. IELTS: A minimum overall Band Score of 5.5 or higher.
  c. GEPT: Applicants in Taiwan can take the General English Proficiency Test (GEPT) administered by the Language Training and Testing Center. Applicants are required to submit their High-intermediate level certificate when applying for admission.

This requirement can be waived for those who have obtained bachelor or master degrees from native English-speaking countries.
For example, applicants with degrees from: Australia, Canada (except Quebec), New Zealand, Singapore, United Kingdom (England, Scotland, Ireland, Wales) will automatically receive an English language waiver.

- GRE score from the general exam. An applicant may submit one of the following materials in place of a GRE general test score:
  1. Any evidence of research ability such as papers published in international conferences or journals.
  2. Satisfactory performance in any course or project work related to the areas of this program or projects completed.
- A Statement of Purpose that includes a research plan.
- Official transcripts from academic institutions attended after senior high school.
- Three letters of recommendation.
- GRE score from related subject exam (highly recommended, but not mandatory).
- Concerning the standardized exams listed above (TOEFL; GRE general, GRE subject), our institution CODE is 7142 and NAME is Academia Sinica.

After reviewing all the supporting documents mentioned above, candidates passing the first screening might be invited for an interview. Local candidates will be asked to come to Academia Sinica for interviews. For international students, interview via skype will be conducted.

The deadline for all applications will be on March 31 every year. If you wish to apply, please complete your application though online application system (https://db1x.sinica.edu.tw/tigp).

**TIGP Admission Office**
128, Academia Road, Section 2, Nankang, Taipei 11529, Taiwan

The submitted application materials will not be returned to applicants under any circumstances. The complete application materials should be received by TIGP before March 31.
Faculty Members

Institute of Information Science, Academia Sinica

Wen-Lian Hsu
Ph.D., Cornell University, USA
Algorithms, computational molecular biology, intelligent agents, knowledge management, natural language processing

Hsin-Min Wang
Ph.D., National Taiwan University, Taiwan
Spoken language processing, natural language processing, multimedia information retrieval, pattern recognition

Wen-Tsuen Chen
Ph.D., University of California, USA
Intelligent sensing and applications, mobile computing, high-speed communications networks, parallel algorithms and systems, software engineering

Hong-Yuan Mark Liao
Ph.D., Northwestern University, USA
Content-based multimedia retrieval, video-based human behavior analysis, multimedia protection, 3D mesh decomposition and recognition, multimedia signal processing

Wen-Liang Hwang
Ph.D., New York University, USA
Wavelet analysis, signal, image and video processing

Jan-Ming Ho
Ph.D., Northwestern University, USA
Information retrieval and knowledge management, combinatorial optimization, digital library and archive technology, multimedia network protocol and applications, Bioinformatics

Ting-Luh Liu
Ph.D., New York University, USA
Computer vision, pattern recognition, machine learning

Da-Wei Wang
Ph.D., Yale University, USA
Privacy enhancing technology, graph theory and algorithms, medical informatics

Tsan-Sheng Hsu
Ph.D., University of Texas at Austin, USA
Design, analysis, implementation and performance evaluation of computer algorithms, graph theory and its applications, data-intensive computing, data privacy, theory of computer games

Meng-Chang Chen
Ph.D., University of California, USA
QoS networking, wireless networks, operating systems, data, text and knowledge management, information retrieval

Chu-Song Chen
Ph.D., National Taiwan University, Taiwan
Pattern recognition, computer vision, image processing

Chi-Jen Lu
Ph.D., University of Massachusetts, USA
Machine learning, computational complexity, algorithms, game theory

Chun-Shien Lu
Ph.D., National Cheng-Kung University, Taiwan
Compressed sensing, sparse signal processing, security and privacy in multimedia and sensor networks

Chien-Min Wang
Ph.D., National Taiwan University, Taiwan
Cloud computing, parallel and distributed computing, distributed file systems, virtualization technology, dynamic binary translation

Ling-Jyh Chen
Ph.D., University of California, USA
Mobile and wireless networks, network measurements, networked sensing, human computation

Sheng-Wei Chen (Kuan-Ta Chen)
Ph.D., National Taiwan University, Taiwan
Quality of experience, multimedia systems, social computing, crowdsourcing and human computation

De-Nian Yang
Ph.D., National Taiwan University, Taiwan
Social networks and mobile data management, mobile multimedia networks and applications

Mi-Yen Yeh
Ph.D., National Taiwan University, Taiwan
Data mining, databases

Yuan-Hao Chang
Ph.D., National Taiwan University, Taiwan
Next-generation storage systems and their applications, real-time embedded systems and their OS designs, multi-core architecture and virtualization technology

Lun-Wei Ku
Ph.D., National Taiwan University, Taiwan
Natural language processing, computational linguistics, sentiment (opinion and emotion) analysis, information extraction and retrieval, Chinese language processing, topic detection and tracking

Keh-Yih Su
Ph.D., University of Washington, Seattle, USA
Statistical semantic machine translation, machine reading, statistical language modeling, natural language processing, natural language understanding, machine learning

Li Su
Ph.D., National Taiwan University, Taiwan
Music information retrieval, sound and music computing, biomedical signal processing
Research Center for Information Technology Innovation, Academia Sinica

Pi-Cheng Hsiu
Ph.D., National Taiwan University, Taiwan
Networked embedded systems, real-time systems, wireless mobile networks

Wei-Ho Chung
Ph.D., University of California, Los Angeles, USA
Communications, signal processing, networks, and multimedia

Wen-Huang Cheng
Ph.D., National Taiwan University, Taiwan
Multimedia content analysis, computer vision, mobile multimedia applications, human computer interaction

Yen-Yu Lin
Ph.D., National Taiwan University, Taiwan
Computer vision, pattern recognition, machine learning, multimedia systems

Yi-Hsuan Yang
Ph.D., National Taiwan University, Taiwan
Music information retrieval, analysis, and visualization, machine learning, multimedia systems, smart phone and cloud-based applications, lyrics analysis

Yu Tsao
Ph.D., Georgia Institute of Technology, USA
Speech and audio processing, pattern recognition and machine learning, human language processing, multimedia signal and information processing

Ronald Y Chang
Ph.D., University of Southern California, USA
Wireless communications and networking, signal processing applications

Chih-Yu Wang
Ph.D., National Taiwan University, Taiwan
Game theory, wireless communication, social network

Chuan-Ju Wang
Ph.D., National Taiwan University, Taiwan
Computational Finance: lattice model, derivative pricing, risk management; Data Analytics: text mining, social network analysis, time series modeling

National Tsing Hua University

Chung-Ta King
Ph.D., Michigan State University, USA
Pervasive computing, cluster computing, parallel and distributed systems

Von-Wun Soo
Ph.D., Rutgers University, USA
Intelligent agent, machine learning, Bioinformatics

Jason S. Chang
Ph.D., New York University, USA
Natural language processing, knowledge management, IR, MT, AI

Chia-Wen Lin
Ph.D., National Taiwan University, Taiwan
Computer vision, pattern recognition

Cheng-Hsin Hsu
Ph.D., Simon Fraser University, Canada
Multimedia networking, mobile computing, and computer networks

Yi-Shin Chen
Ph.D., University of Southern California, USA
Web intelligence, multimedia retrieval, Meta-search, realtime queries for continues data streams

Chia-Wen Lin
Ph.D., Tsing Hua University, Taiwan
Multimedia networks, visual communication, image/signal processing

Fu-Ren Lin
Ph.D., University of Illinois at Urbana-Champaign, USA
Multimedia systems and computer networks, mobile multimedia, video dissemination over hybrid networks, cloud multiplayer games, and efficient content sharing in mobile social networks

Jyun-Cheng Wang
Ph.D, University of Wisconsin-Madison, USA
Social network, community & EC, patent analysis

Shelly Shwu-Ching Young
Ph.D., The Ohio State University, USA
e-learning, networked learning community, game-based/joyful learning, mobile learning

Hwann-Tzong Chen
Ph.D., National Taiwan University, Taiwan
Computer Vision, Image Processing, Machine Learning

Chih-Ya Shen
Ph.D., National Taiwan University, Taiwan
Big Data and Social Network Analytics, query processing, data mining for mental healthcare, spatial database management.
National Chengchi University

Kung Chen
Ph.D., Yale University, USA
Programming languages, software systems, data-driven application development

Yuh-Jong Hu
Ph.D., University of Missouri at Rolla, USA
Semantic web, privacy-preserving big data analysis, privacy-aware social web, data protection in the cloud, information and law

Tsai-Yen Li
Ph.D., Stanford University, USA
Robotics, computer animation, artificial intelligence, intelligent user interface, interactive storytelling, user behavior modeling, social media analysis

Chao-Lin Liu
Ph.D., University of Michigan, USA
Automatic reasoning, natural language processing and information retrieval, computational linguistics, digital humanities, intelligent tutoring system, intelligent transportation systems

Jyi-Shane Liu
Ph.D., Carnegie Mellon University, USA
Social network analysis and mining, social informatics, digital humanities, digital library

Man-Kwan Shan
Ph.D., National Chiao Tung University, Taiwan
Big data, data mining, multimedia systems, social networks, computer music, cloud databases, digital humanities

Hung-Chin Jang
Ph.D., University of Illinois at Chicago, USA
Wireless communications, mobile network management, mobile communication systems, green network communication, Machine to Machine (M2M), iOS / Android APP development

Cheng-Chia Chen
Ph.D., National Taiwan University, Taiwan
Software language engineering, logic in computer science, theory of computation,

Tzu-Chieh Tsai
Ph.D., University of California, USA
Wireless computer networks, QoS management, mobile internet, computer simulation environment design

Wen-Hung Liao
Ph.D., University of Texas at Austin, USA
Computer vision, pattern recognition, human-computer interaction

Raylin Tso
Ph.D., University of Tsukuba, Japan
Cryptography, network security, information security

Ming-Te Chi
Ph.D., National Cheng Kung University, Taiwan
Non-photorealistic rendering, stylistic rendering, applied perception in graphics and visualization, point rendering

Cheng-Pei Kuo
Ph.D., University of Tokyo, Japan
Multimedia Content Retrieval and Analysis, Digital Content and Publishing, Digital Archive

Ming-Feng Tsai
Ph.D., National Taiwan University, Taiwan
Information retrieval, machine learning, web search and mining, social network analysis, natural language processing

Neng-Hao Yu
Ph.D., National Taiwan University, Taiwan
Interactive tabletop, tangible and multi-touch interactions, mobile and cloud computing

Chun-Feng Liao
Ph.D., National Taiwan University, Taiwan
Smart Environment (Pervasive Computing), service-oriented systems, cloud computing, linked open data, healthcare systems

Jia-Ming Chang
Ph.D. Centre for Genomic Regulation (CRG) and UPF, Spain
Bioinformatics

Tung-Wei Kuo
Ph.D., National Taiwan University, Taiwan
Data center networking, Software-Defined Networking (SDN) and Network Function Virtualization (NFV), Approximation algorithms, wireless system
Course

Students need to complete at least 3 core courses and electives offered by TIGP or partner universities, total 18 credits.

Since NTHU and NCCU honor the course credits granted by each other, students in this program can take related Ph.D level courses in English from both schools.

Core courses
- Natural Language Processing and Information Retrieval with Applications in Social Networks (3 credits)
- Data Mining in Social Networks (3 credits)
- Social Multimedia (3 credits)
- Mobile Social Networks (3 credits)
- Human-Centered Computing (3 credits)
- Seminars (0 credit)
- Project Research (0 credit)
- Dissertation (0 credit)

Elective courses
- Advanced Computer Architecture (3 credits)
- FPGA Architecture & CAD (3 credits)
- Randomized Algorithms (3 credits)
- Graph Drawing (3 credits)
- Parallel Programming (3 credits)
- Social Computing (3 credits)
- E-Learning (3 credits)
- Data Mining: Concepts, Techniques, and Applications (3 credits)
- Data Science in Practice
- Advanced Database Systems (3 credits)
- Introduction to Bioinformatics and Systems Biology (3 credits)
- Computational Geometry (3 credits)
- Intelligent Agents (3 credits)
- Research and Presentation Skills (3 credits)
- High Performance Computer System (3 credits)
- Wireless Multimedia Networking Technologies and Applications (3 credits)
- Advanced Discrete Structure (3 credits)
- Advanced in Graph Algorithms (3 credits)
- VLSI Design for Manufacturability (3 credits)
- Concrete Mathematics (3 credits)
- Special Topics on Multi-Media (3 credits)
- Advanced UNIX Programming (3 credits)
- Pattern Recognition (3 credits)
- Graph Theory and its Applications to Networks (3 credits)
- Mobile and Distributed Computing (3 credits)
- Introduction to Cyber-Physical Systems
- Applied Quantitative Methods for Human-Computer Interaction
- Human Relation
**TA and Chinese Language**

TA experience is an essential part of our program. Thus, all students from TIGP must serve as TA for at least one semester. Additionally, in order to help their daily lives and communication with the local people, international students are required to take a one-year course in Mandarin Chinese.

**Student Status and Degree**

**Conferral Policy**

The admission to this program is limited to 20 students per year. In addition to international students with proficient English ability, Taiwanese students with solid English abilities can enroll after passing one of the English proficiency tests listed above. Students can choose to enroll in NTHU or NCCU. This program gives priority to computer science and takes social and behavioral science as subsidiaries to provide students with training across different disciplines.

**Cost of Study**

The payment of tuition fees (basic fees + credit fees are about US$1,000 per semester) for all students should be made by the deadline.

**Fellowship and Stipends**

The TIGP will provide fellowship support for all graduate students during the first year of their enrollment at about NT$34,000 (about US$1,060) per month. The support will be extended for another two years upon evidence of satisfactory progress towards the degree. In subsequent years, the financial support will be provided by the student’s thesis advisor. The amount of the support will be at the discretion of the advisor.

**Medical Insurance**

Six months after the students receive their Alien Resident Certificate, they will qualify for Taiwan’s National Health Insurance Program. The students pay the premium and will be entitled to the same medical coverage as Taiwanese citizens.

**Living and Housing Costs**

On campus self-catering student dormitory is available to TIGP students at reasonable costs (for details please visit our website at http://tigp.sinica.edu.tw/Accommodation.html). Off-campus private housing is generally more expensive. Rents for off-campus apartments range from NT$5,000-15,000 per month.

Meals are available on campus at the Activity Center Cafeteria, the Café, the Chinese restaurant, and the Western restaurant at modest costs. Various types of local cuisines are also available at off-campus cafeterias and restaurants within walking distance and at affordable prices.
Correspondence and Information

For general information concerning TIGP, please contact:
Ms. Huan-Yi Shen
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Taiwan International Graduate Program
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Websites Information

Taiwan International Graduate Program
http://tigp.sinica.edu.tw

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http://tigpsnhcc.iis.sinica.edu.tw

Academia Sinica
http://www.sinica.edu.tw

National Tsing Hua University
http://www.nthu.edu.tw

National Chengchi University
http://www.nccu.edu.tw

If there is any discrepancy on this pamphlet with the most updated regulation, the latter is to be followed.

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