Kun-Ting Chen

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CURRENT APPOINTMENT :

➢ Jun, 2022－current: **Postdoctoral researcher in Visualisation Research Centre of Universität Stuttgart (VISUS)**, Stuttgart, Germany**.**

RESEARCH SUMMARY :

- ➢ Information Visualisation
- ➢ Network Visualisation
- ➢ Layout Algorithms
- ➢ Human-Computer Interaction

Kun-Ting Chen is a postdoctoral researcher at Visualization Research Centre of Universität Stuttgart (VISUS) within Daniel Weiskopf's group. Kun-Ting Chen received his PhD from Data Visualisation & Immersive Analytics (DVIA) lab, Department of Human-Centred-Computing (HCC) at Monash University, supervised by Tim Dwyer, Kim Marriott, and Benjamin Bach.

Kun-Ting's research involves human-centred development of novel interactive visualisation techniques that help analysts to explore complex data. To achieve this, Kun-Ting contributed new algorithms for network visualisation, novel interaction design, and extensive empirical testing and comparative user studies to evaluate and further refine these techniques. So far, he has eight peer-reviewed publications in premiere information visualisation and human-computer interaction venues, including four ACM CHI papers, one IEEE VIS paper and other prior publications.

PHD RESEARCH :

My research concerns complex and dense data sets, such as thousands of links between data points. In such data it is difficult for data analysts in many domains to understand connectivity or clusters within the data. My work makes it easier to comprehend such data sets by improving the network layout quality and readability. Specifically, I look at network diagrams that are drawn on a 2-dimensional torus topology, a rectangular area while "wrapping" specific links around the border, like the game Asteroids where a player can leave the screen on, e.g., the right side, and reappear on the left. This allows us to create network layouts that have less link crossings and better reveal its high-level network structures. In our user studies, it clearly shows that participants were able to use such "doughnut" wrapping to identify network structures such as clusters more accurately than in standard representations.

The title for my PhD thesis is *It's a Wrap: Visualisations that Wrap Around Cylindrical, Spherical, or Toroidal Topologies*. The thesis contributes an exploration of visualisations

that “wrap around”, that is, visualisations which when interactively panned such that marks disappear from one side of the display, these marks reappear on the opposite side. Our studies demonstrate that these are useful for representation of, for example, cyclical time-series data (e.g. average hourly measurements across a 24-hour period). We explore the design space of such visualisations, in terms of their underlying topologies: cylindrical for one-dimensional wrapping, or toroidal for two-dimensional wrapping. This design space exploration leads us to novel interaction techniques for not only such time series data, but also geographic, multidimensional and network structured data. Through a series of user studies, we find numerous benefits for such interaction, and also a number of caveats and design guidelines for future applications.

As part of my PhD, I have developed a few websites that demonstrate novel visualisations and comparative user evaluation experimental software.

➢ Making complex and dense datasets (networks) easier to understand their structures than the standard layout: https://ialab.it.monash.edu/~kche0088/its-a-wrap/index.html

➢ Charts that wrap around - Real-world examples of 2D interactive wrapping of 3D geometry & its usefulness: https://ialab.it.monash.edu/~kche0088/WrappingChart/

➢ What is the best torus network layout: https://ialab.it.monash.edu/~kche0088/WebCola/examples/torusgraphexample.html

➢ Investigating Network Visualisations That Wrap Around Spherical or Toroidal Topologies: https://study-dvialab.infotech.monash.edu/static/index.html

➢ Investigating Cyclic Time Series Visualisations That Wrap Around Cylindrical Topologies: https://study-dvialab.infotech.monash.edu:8443/static/index.html

EDUCATION :

➢ Apr, 2019—May, 2022: **Ph.D. in Department of Human-Centred Computing, Faculty of Information Technology,** Monash University, Melbourne, Australia**.**

➢ Sep, 2007—Jul, 2009: **M.Sc. in Computer Science and Engineering,** National Chiao Tung University, Hsinchu**,** Taiwan.

➢ Sep, 2002—Jun, 2006: **B.Sc. in Computer Science Engineering,** Tatung University, Taipei, Taiwan.

PROFESSIONAL EXPERIENCE :

Kun-Ting has 6 years’ experience working as a software engineer, 4 years as an agile Scrum team player and device owners of Automatic Fare Collection (AFC) software, developing and maintaining mission-critical AFC software for bus and MRT systems in Singapore, Bangkok and Manila. Kun-Ting’s significant software development skills and enthusiasm allowed him to work with teams to successfully deploy the software applications system-wide in more than 50 Skytrain stations and depots in Bangkok Mass Transit System (BTS).

➢ **Sep, 2017-Apr, 2019: Consultant at Fare System Business Unit, System Development Division, MSI Global Pte Ltd, Land Transport Authority (LTA), Singapore**

· Device lead and full-stack software developer of Monitor and Control Workstation (MCW) software and Station Computer (SC) for Auto Fare Collection (AFC) for Bangkok

Mass Transit System (BTS) Skytrain.

· Designed and developed web server applications for monitoring real-time, event-driven event, status and control of station equipment across multiple client applications using Apache Active MQ, C++ messaging service (CMS), and web socket

· Analysed and improved SC Windows GUI application performance and MySQL database server performance

· Designed and developed SVG-based station layout authoring tools for BTS MCW

· Introduced software visualization tool Visual Studio Code Map/IntelliJIDEA Flow to improve software design and issue discussion, debugging, and knowledge transfer

➢ **Sep, 2015-Sep, 2017: Senior Software Engineer at Zenith InfoTech (S) Pte Ltd,** working at client site**:** Fair system department, **Land Transport Authority (LTA), Singapore**

· Device lead and full-stack software developer of Master Depot Computer System (MDCS) software for Auto Fare Collection (AFC) for the public transport bus contracting model (BCM) in Singapore. The software was successfully deployed system-wide in more than 13 bus depots in Singapore.

· Designed and developed web applications for monitoring real-time bus communication status inclusive of information about uploading transactions from bus console UI to depot gateway (DAGW), downloading configuration parameters from MDCS, and authenticating card key version with DAGW and authentication server

· Agile tools: used Scrum, Jira, Trello to manage product development process.

➢ **Oct, 2013-Sep, 2015: Software Engineer at Trek 2000 International Ltd. Singapore**

· Software developer of Cloudstringers Media Broadcasting Ecosystem with Wifi-enabled SD Card project

· Role: chief software developer in charge of Cloudstringers web server application design and development, developing Linux shell script to automate backend media files conversion/uploading/downloading, and MySQL database update process

➢ **Jul, 2008－Dec, 2010 (part time)**: **Assistant Engineer at Computer Vision Lab, National Center for High-Performance Computing** (NCHC), **Taiwan, R.O.C.**

· Developed OpenGL Graphical User Interface (GLGUI) applications (using C++) for rich text display, image display used by National center for high performance computing (NCHC)

➢ **Aug, 2008－Jul, 2009 (part time): Assistant Engineer of Safety and Health Technology Center (SAHTECH), Industrial Technology Research Institute (ITRI), Taiwan, R.O.C.**

· Role: in charge of developing and maintaining four of SAHTECH's project websites including council of labor affair (CLA), Taiwan Occupational Safety & Health Management System (TOSHMS), SAHTECH official website, and internal employee website

TECHNICAL SKILLS :

➢ Programming: JavaScript, TypeScript, ActioinScript, Python, R, Java, C#, SQL, OpenGL

➢ Frameworks: Cola.js, D3.js, Processing, Observable Notebook, Angular platform, Node.js, Prolific Academic, Entity framework

➢ Servers: VMWare ESXI, Red Hat Enterprise Linux

PUBLICATIONS :

➢ **Kun-Ting Chen**, Tim Dwyer, Yalong Yang, Benjamin Bach, and Kim Marriott. "GAN'SDA Wrap: Geographic And Network Structured DAta on surfaces that Wrap around," ACM CHI Conference on Human Factors in Computing Systems (**CHI 2022**)

➢ **Kun-Ting Chen**, Tim Dwyer, Benjamin Bach, and Kim Marriott. "Rotate or Wrap: Interactive Visualisations of Cyclical Data on Cylindrical or Toroidal Topologies." IEEE Transactions on Visualization and Computer Graphics (**VIS 2021**)

➢ **Kun-Ting Chen**, Tim Dwyer, Benjamin Bach, and Kim Marriott. "It's a Wrap: Toroidal Wrapping of Network Visualisations Supports Cluster Understanding Tasks." ACM CHI Conference on Human Factors in Computing Systems (**CHI 2021**)

➢ Florian 'Floyd' Mueller, Rohit Khot, Tim Dwyer, Sarah Goodwin, Kim Marriott, Jialin Deng, Han Phan, Jionghao Lin, **Kun-Ting Chen**, Yan Wang. "Data as Delight: Eating data". ACM CHI Conference on Human Factors in Computing Systems (**CHI 2021**)

➢ **Kun-Ting Chen**, Tim Dwyer, Kim Marriott, and Benjamin Bach. "DoughNets: Visualising Networks Using Torus Wrapping". ACM CHI Conference on Human Factors in Computing Systems (**CHI 2020**). p1–11

➢ **Kun-Ting Chen**, Chien Chen, and Po-Hsiang Wang, "Network Aware Load-Balancing via Parallel VM Migration for Data Centers," in Proc. of the 23rd International Conference on Communications and Networks (**ICCCN 2014**)

➢ Shin-Shiang Lan, **Kun-Ting Chen**, Chien Chen, Jing-Ying Chen, and Rong-Hong Jan, "An Integrated Bus and Taxi Routes for a Mobile Trip Planning System," in Proc. of the IEEE International Conference on e-Business Engineering (**ICEBE 2010**)

➢ Chih-Chiang Yang, **Kun-Ting Chen**, Chien Chen and Jing-Ying Chen, "Market-based Load Balancing for Distributed Heterogeneous Multi-Resource Servers," in Proc. of the 15th IEEE International conference on parallel and distributed systems (**ICPADS 2009**)

➢ **Kun-Ting Chen,** Jing-Ying Chen, "A Token-based approach of Heterogeneous multi-resource Systems," master's thesis, National Chiao Tung University Library, 2009

AWARDS :

➢ Dec 2021: Global Talent Program for a permanent residency in Australia

➢ Nov 2021: **Special Recognitions for one Outstanding Review** at **ACM CHI 2022**

➢ Jun 2019 - current: Faculty of Information Technology Research Scholarship

➢ Jun 2019 - current: Faculty of Information Technology International Postgraduate Research Scholarship

➢ Apr 2015: Oracle Certified Professional - Java SE 7 Programmer

SUPERVISION :

➢ Jul., 2021-current: Co-supervising Monash Faculty of Information Technology research project: "Visual Software for Eye Tracking Data Analysis"

➢ Jun., 2011: Co-supervise undergraduate project in Department of Computer Science & Engineering, National Chiao Tung University: Travel Web server/Android mobile applications of Fleet system using Trip planner web services. The project was entered in European Satellite Navigation Competition (ESNC, 2011)

CHAIRING & ORGANISING CONFERENCE EVENTS :

➢ IEEE Visualization Conference (VIS) Student Volunteers Organising Co-chairs (VIS 2022-2023)

SERVICES

➢ IEEE Visualization Conference (VIS) Student Volunteer/Captains (VIS 2019-2022)

➢ EuroVIS Conference 2021 Student Volunteer Captain

➢ ACM CHI Conference 2021 Student Volunteer Captain

➢ Convener of Monash Faculty of Information Technology Data Visualisation & Immersive Analytics (DVIA) Lab PhD group meeting (2020-2021)

JOURNAL/CONFERENCE PAPER REVIEWER :

➢ ACM CHI Conference on Human Factors in Computing Systems (CHI) – 2022, (CHI Late breaking work) – 2021, 2022

➢ IEEE Transactions on Visualization and Computer Graphics (TVCG/journal) – 2021, 2022

➢ IEEE Visualization Conference (VIS) – 2021, 2022

➢ IEEE Pacific Visualization Symposium (PacificVis) – 2022

➢ International Symposium on Graph Drawing and Network Visualization (GD) - 2021

➢ ACM Symposium on Eye Tracking Research & Application (ETRA) – 2022

➢ ACM International Conference on Mobile Human-Computer Interaction (MobileHCI) – 2022

➢ China Visualization and Visual Analytics Conference (ChinaVis) – 2021, 2022

➢ IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR) - 2022

➢ IEEE International Symposium on Mixed and Augmented Reality (ISMAR) – 2021, 2022

➢ Visual Informatics (Elsevier journal)- 2021

➢ Visualization in Data Science (VDS) - 2021

RESEARCH TALKS :

➢ Sep, 2022: Presenting my research: It's a Wrap: Visualisations that Wrap Around Cylindrical, Toroidal, or Spherical Topologies at Visualisation Community within the Defence Science and Technology Group

➢ May, 2022: Presenting author at ACM CHI 2022 conference

➢ Oct, 2021: Presenting author at IEEE VIS 2021 conference
➢ Oct, 2021: Guest speaker for FIT5147 (S2) Data Exploration and Visualisation
➢ Jun., 2021: Monash Faculty of Information Technology - Three Minute Thesis (3MT 2021)
➢ May, 2021: Guest speaker for FIT5147 (S1) Data Exploration and Visualisation
➢ May, 2021: Presenting author at ACM CHI 2021 conference
➢ Jan, 2021: Invited seminar talk at Monash Software Engineering Lunch & Learn Seminar Series
➢ Jul., 2020: Monash Faculty of Information Technology - Three Minute Thesis (3MT 2020)
➢ May, 2020: Presenting author at ACM CHI 2020 (CHI Down Under 2020)

TEACHING :

➢ 2022: Information Visualisation & Visual Analytics (teaching & tutoring)
➢ 2011: Vehicular Mobile Commerce with Android Platform: Information and Communication technology (ICT) project in National Chiao Tung University, sponsored by **Ministry of Education**, Taiwan: Provide lab tutorials of software development of Android mobile applications, Java web server applications, Java Servlet, JDBC, XML, JQuery, AJAX, and Google API using Trip planner web services to provide better routes in Taipei city based on criteria of traveling time, budget, and walk distance,
➢ 2010: VLSI programming (National Chiao Tung University, Taiwan)
➢ 2009: C++ Programming (National Chiao Tung University, Taiwan)
➢ 2008: C Programming (National Chiao Tung University, Taiwan)