

# 33rd International Symposium on Algorithms and Computation

ISAAC 2022, December 19–21, 2022, Seoul, Korea

Edited by

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## ■ Preface

This volume contains the papers presented at the 33rd International Symposium on Algorithms and Computation (ISAAC 2022). ISAAC 2022 was held in a hybrid manner on December 19–21, 2022 and was organized by Hanyang University, Korea. ISAAC 2022 provided a forum for researchers working in the areas of algorithms, theory of computation, and computational complexity. The technical program of the conference included 65 contributed papers. We received 177 submissions in response to the call for papers. Each submission received at least three reviews. The program committee held electronic meetings using EasyChair. In the end, the Program Committee selected 65 of the submissions for presentation at the symposium.

The program committee selected the following paper as the winner of the ISAAC 2022 Best Paper Award:

- On Maximizing Sums of Non-Monotone Submodular and Linear Functions by Benjamin Qi.

Since Benjamin Qi is a student, there is no winner of the Best Student Paper Award. The conference included two invited presentations, delivered by Jeff Erickson (University of Illinois Urbana-Champaign) and Kunihiko Sadakane (The University of Tokyo). Abstracts of their talks are included in this volume. We wish to thank all the authors who submitted extended abstracts for consideration, the program committee members for their scholarly efforts, and all external reviewers who assisted in the evaluation process.

We are grateful to Hanyang University for financial support and the local organizers of ISAAC 2022. Finally, we acknowledge the endorsement from Special Interest Group on Theoretical Computer Science of KIISE.

December 2022

Sang Won Bae and Heejin Park







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## ■ Obituary

### Takao Nishizeki 1947–2022

Takao Nishizeki was born in Fukushima Prefecture Japan on February 11, 1947. He received his B.E., M. E., and Dr. Eng. from Tohoku University in 1969, 1971, and 1974, respectively, and became an assistant professor of Department of Communication Engineering, Tohoku University, Japan. He was promoted to associate professor and full professor in 1976 and 1988, respectively. He was the dean of Graduate School of Information Sciences, Tohoku University for two years from 2008. After his retirement from Tohoku University, he worked as a professor of Kwansei Gakuin University from 2010 to 2015.

Takao was a distinguished and influential researcher of theoretical computer science (TCS), and his main research area was graph algorithms. Most of combinatorial graph problems are NP-hard, and hence intractable in general. However, he thought there should be a theoretical framework to design efficient algorithms for graphs used in practical applications such as electrical circuits and VLSI design. Those graphs are often systematically constructed, and hence have special structures. In his seminal paper “Linear-time computability of combinatorial problems on series-parallel graphs (J. ACM 29-3, 1982, coauthored with Takamizawa and Saito)”, he developed a unified theory to design linear-time algorithms for several combinatorial problems on the series-parallel graph, which is a fundamental model for electrical circuits. He extended the theory to partial  $k$ -trees (i.e., graphs with bounded tree-width), which led to the fixed parameter complexity theory. He also gave pioneering works on graph drawing, and *Planar Graph Drawing* (Nishizeki and Rahman, 2004) is a popular textbook. He was honored with many awards including Commendation for Science and Technology by MEXT Japan, and named as Fellow of ACM, IEEE, IEICE, IPSJ, and Bangladesh Academy of Sciences.

Besides his research contributions, we appreciate his leadership to promote the research community of TCS. In particular, he contributed to the establishment of three major conference series: ISAAC, Graph Drawing and WALCOM.

Especially, we could consider him as the father of our ISAAC. In 1990, he organized with his colleagues the SIGAL International Symposium inviting many influential researchers. Takao proposed in that Symposium to continue it as an annual event held in Asia-Pacific region in order to promote world-wide collaboration of our TCS community, and it was the birth of the ISAAC series. He had taken responsibility to serve as the Chair of Advisory Committee for 17 years, and worked hard to make the long-term plan and selecting organizers, hosts and venues of future symposia. He attended every ISAAC to give an opening remark to thank organizers and participants. He also contributed as the symposium chair (1990 and 2007) and PC chair (1992) as well as coauthors of 24 research articles.

Takao passed away on January 30, 2022. We pray that his soul may rest in peace.



■ **Figure 1** Takao Nishizeki receiving the certificate of appreciation at the ISAAC 25th anniversary.

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## Kyung-Yong Chwa, 1946–2021

Professor Kyung-Yong Chwa was born in Seoul, Korea on February 4, 1946, and raised in Busan. He received his B.S. degree in electrical engineering from Seoul National University in 1971 and his M.S. and Ph.D. degrees in electrical engineering and computer science from Northwestern University in 1977 and 1980, respectively, under the supervision of Professor S. Louis Hakimi. He joined the Department of Computer Science at KAIST in 1980, and retired from KAIST in 2011 at his age of 65.

The main research area of Professor Chwa was graph theory and algorithms, while his interests covered many areas including parallel and distributed algorithms, online algorithms, approximation algorithms, computational geometry and computer graphics. In his seminal paper, “Schemes for fault-tolerant computing: a comparison of modularly redundant and  $t$ -diagnosable systems (Inform. Cont. 49(3), 1981),” he proposed a new comparison-based model of diagnosable systems for fault-tolerant computing and efficient algorithms under the model. His model is still being referenced for today as a theoretical base of fault-tolerant algorithms in distributed environments.

Professor Chwa is indeed the “father” of Theoretical Computer Science (TCS) in Korea. He was the frontier and a leader to establish the Algorithm community in Korea. He has successfully supervised 24 Ph.D.s and 74 masters at KAIST until his retirement, and they continue their career in academy and industry. In 1990, he founded Special Interest Group on TCS in Korea and served as the first chair. In 1997, he served as the President of the Korean Institute of Information Scientists and Engineers (KIISE). In particular, he was devoted to educating algorithmic thinking for young students, by hosting an annual Asia regional contest of ACM ICPC (Int. Collegiate Programming Contest) since 2000 and organizing the 14th IOI (Int. Olympiad on Informatics) in 2002. His dedicated leadership and achievements were recognized when he was honored the Order of Service Merit and a member of the Korean Academy of Science and Technology (KAST) in 2003.

Professor Chwa was one of the founding members who had initiated the conference ISAAC with Professor Takao Nishizeki and other colleagues. He greatly contributed to the success of ISAAC by hosting ISAAC in Daejeon, Korea (1998) and in Jeju, Korea (2010), publishing many papers in ISAAC, and serving as a Advisory Committee member of ISAAC.

Professor Chwa passed away on November 5, 2021. We wish he may rest in peace.



■ **Figure 2** Professor Chwa in his speech at the 3rd ISAAC in Nagoya and receiving the certificate of appreciation at the 25th anniversary of ISAAC.