Giorgos Kritikakis

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Summary

Giorgos (George) Kritikakis is an computer science professional with a proven track record in both research and commercial product development. He has successfully led initiatives that span cutting-edge research projects—pushing the boundaries of innovation—as well as the design, development, and deployment of commercial software solutions.

Professional Experience

Product Developer
Tom Sawyer Software Mar 2023 - Present

In this role, he was responsible for designing, developing, and testing key product features. Among other contributions, he developed the visual query builders and query generation tools for graph databases. These tools enable end users to retrieve data and explore patterns without needing to understand query languages or the underlying complex technologies. His most recent addition to these tools includes AI-powered text-to-query capabilities.

Associate researcher
University of Crete - Graph and Information Visualization Laboratory 2020 - 2024

In this role, he introduced advanced algorithms that provide solutions to fundamental open problems, resulting in several publications and distinctions. The corresponding papers are available in the publications section. See the updated corresponding papers in the publication section. This work includes:

- Path/Chain decomposition graph techniques.
  Path/chain decomposition approach that is applicable, fast, and produces results very close to the optimum. This technique is the currently fastest way, theoretically and practically, to produce a chain decomposition. Extensive experiments have been conducted on these algorithms. Additionally, an optimization of the Fulkerson method for minimum chain decomposition using an indexing scheme (see next bullet) is included. Updated versions are available in the publications section.
- Transitive closure, and reachability query solutions.
  Utilizing fast chain decomposition a new linear time sparsification technique is introduced that allows us to offer new bounds in transitive closure solutions. Furthermore, have been presented a methodology to build an indexing scheme. The experiments shed light on the behavior and expose the factors that affect transitive closure algorithms. Updated versions are available in the publications section.
- PBF (Path Based Framework).
  PBF is a new general-purpose hierarchical graph drawing framework. Early results of the Path-Based Framework were presented as a poster in gd2020 and the extended work in IEEE Access. PBF was extensively evaluated, comparing it with the most recent state-of-the-art solution and running a user study.

IT support
Greek Army - SEAP Heraklion Mar 2022 - Dec 2022

Maintain all the systems, the servers, and the networks in the camp.

Teaching Assistant
University of Crete 2020 - 2022

– CS-484 Complex Network Dynamics [Spring 2021]
– CS-380 Algorithms and Complexity [Fall 2021, Fall 2020]
– CS-486 Principles of Distributed Computing [Spring 2020]

Associate Researcher
Institute of Computer Science (ICS), CARV Laboratory 2019 - 2020

Extension of the SCOOP compiler source-to-source C code transformations. SCOOP produces output for the PARTEE runtime system, a project developed at the Computer Architecture and VLSI Systems (CARV) Laboratory of the Institute of Computer Science (ICS) of the Foundation of Research and Technology Hellas (FORTH). PARTEE runtime uses annotations to specify tasks and their memory footprints. Scoop enables us to use pragma directives for the task annotation.

Education

2022 M.Sc. (Computer Science) at **University of Crete**
Thesis: Analysis and Visualization of Hierarchical Graphs.
Area of Study: *a*) Algorithms and Systems Analysis, *b*) Parallel and Distributed Systems.
2020 B.Sc. (Computer Science) at **University of Crete**
Thesis: Extension of the PARTEE runtime system with support for dynamic memory allocation.
Area of Study: Software Systems and Applications..

Technical Skills

- **Programming & Software Development:** Java, C++, C, Python, JavaScript, TypeScript, OCaml, SQL, HTML, HTML5, CSS; Object-Oriented Programming (OOP), Software Design Patterns, Systems Design, Distributed Systems, Multithreading, Parallel Programming, Compilers, Algorithms, Data Structures; Software Development, Problem Solving
- **Frameworks, Libraries & APIs:** Spring Boot, Spring Framework, Hibernate, JPA, React.js; REST, LLM Integration, ChatGPT, Prompt Engineering & Response Parsing
- **Databases & Data Skills:** Neo4j, Gremlin Query Language, Cypher Query Language, SQL; Data Analysis, Data Visualization
- **Testing, Tools & DevOps:** JUnit, Mockito, Selenium, Regression Testing; Git, Bitbucket, Jira, Maven, Docker Products, Shell Scripting, Windows, Linux
- **Professional & Interpersonal Skills:** Agile Methodologies, Project Management, Product Road Mapping, Communication, Intercultural Skills, Teaching Assistant, Research Skills

Publications

- Parameterized Linear Time Transitive Closure. Giorgos Kritikakis, and Ioannis G. Tollis. (ArXiv Apr 2024).
- Fast Reachability Using DAG Decomposition. Giorgos Kritikakis, and Ioannis G. Tollis. 21st International Symposium on Experimental Algorithms (SEA 2023).
- Experiments and a User Study for Hierarchical Drawings of Graphs. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis. IEEE Access. May 29, 2023
- Fast and Practical DAG Decomposition with Reachability Applications. Giorgos Kritikakis, and Ioannis G. Tollis (ArXiv Dec 2022).

- Experiments and a User Study for Hierarchical Drawings of Graphs. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis (ArXiv Sep 2022).
- Algorithms and Experiments using the Path-Based Hierarchical Drawing Framework. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis.
  This work has been presented as a poster at 28th International Symposium on Graph Drawing and Network Visualization, GD 2020).

Additional Info

He has completed more than 200 hours of training through online platforms and seminars on topics including Spring Boot, IoT, wireless communication, Arduino, Raspberry Pi, ESP boards, version control systems (Git/GitHub), Linux inter-process communication, and web development.

In addition to his technical development, he has been a certified professional lifeguard since 2015 and expanded his qualifications in October 2023 by earning the SSI Open Water Diver certification. His residence on the island of Crete, close to the Mediterranean Sea, inspired his interest in water safety.

Several Projects

- **Top-down (2, 3, 4) tree with fine-grained synchronization.**
- **QBert 2D game.** Allegro library and C++ were used.
- **2D card game.** Java, Model–view–controller architectural pattern was used.
- **Liquid Democracy.** Voting web app built with Java CGI, servlets, sessions, cookies, and frontend tech (HTML, CSS, JS, AJAX, JSON). Users can vote or delegate votes. Apache server hosted.
- **Iperf imitation.** Socket programming.
- **Micro TCP protocol.** Reliable UDP-based protocol, using socket programming with TCP-like behavior.
- **Barnes-Hut, Sudoku, Game of Life.** Implemented with Pthreads, Java threads, OpenMP.
- **Linux C shell.** Implemented process control, pipes, shell vars, redirection, system calls.
- **Alpha language compiler.** Lex/yacc, intermediate code (quads), virtual machine execution.
- **Device monitoring system.** Full-stack IoT project with Raspberry Pi, Arduino.