Pranjal Kandhari

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Education

University of Konstanz — Konstanz, Germany
M.Sc. in Computer and Information Science (Specialization: Algorithmics) — *Oct 2023 – Present*

Master's Thesis: Algorithm Engineering for k-Center on Sparse Dynamic Graphs
Designed and implemented dynamic variants of k-center algorithms for node-update dynamic graphs, extending classical static approaches to incremental, decremental, and fully dynamic models.

Master's Project: Approximation Algorithms for k-Center in Sparse Graphs
Implemented and experimentally evaluated the Maximal Distance-r Independent Set, Gonzalez, and α-approximate Gonzalez algorithms. **Project Grade:** 1.0 (Top Grade)

Advisor (Thesis & Project): Prof. Dr. Sabine Storandt

Selected Coursework: Randomized Algorithms; Algorithm Engineering; Efficient Route Planning Techniques; Distributed Systems; Introduction to Machine Learning; Machine Learning and Optimization Seminar.

Bharati Vidyapeeth's College of Engineering — New Delhi, India
B.Tech. in Computer Science and Engineering — *Aug 2017 – Jun 2021*

Experience

Department of Computer and Information Science, University of Konstanz — Konstanz, Germany
Student Research Assistant (HiWi) — *Apr 2024 – Present*

- Teaching Assistant for the course *Algorithm Engineering*; graded assignments and provided feedback on topics including parallelization, memory-aware algorithms, and parameterized complexity.
- Developing a web application to visualize routes in Konstanz for accessibility analysis, enabling users with mobility constraints to assess path suitability between source and destination points. Implemented 3D terrain rendering in R, integrated the Google Street View API, and applied preprocessing techniques to optimize data handling and improve response time.

Max Planck Institute of Animal Behavior — Konstanz, Germany
Student Research Assistant (HiWi) — *Jan 2024 – Mar 2024*

- Designed and implemented interactive behavioral analysis games using the oTree framework in Python to study human and AI decision-making patterns.
- Deployed the games on Heroku, enabling scalable access for hundreds of online players and collecting interaction data for detailed analysis.
- Programmed ChatGPT powered agents to participate in games and conducted comparative studies evaluating performance differences between human players, AI agents, and intra-AI interactions.

International Institute of Information Technology, Hyderabad — Hyderabad, India
Research Associate — *Feb 2023 – Jun 2023*

- Worked under Dr. Ponnurangam Kumaraguru at Precog Lab on analyzing support dynamics in online communities during the COVID-19 pandemic. Utilised Cox regression, BERT topic modelling and Reddit data extraction via Pushshift and PRAW APIs to study support duration and patterns.
- Built a time-series dataset of Indian crime statistics through large-scale web scraping with Scrapy and data extraction with Camelot, followed by data cleaning in Python.

Amazon — Hyderabad, India
Software Development Engineer I — *Jul 2022 – Jan 2023*

- Fixed ten anomalies in a newly created API to ensure backward compatibility with an existing API using Java.
- Created availability and latency alarms and email notifications for critical endpoints using iGraph to monitor API health and trigger alerts when thresholds were breached.
- Developed a "Plan Document Comparator" feature by performing Depth-first search on graph database schemas to compare two plans and highlight anomalies.

Goldman Sachs Bangalore, India
Software Engineer *Aug 2021 – Jul 2022*

- Automated over 200 quality management test scenarios for the Marcus product using Cypress (JavaScript) and Cucumber.
- Developed additional test cases aligned with evolving product features and created Bash scripts to automate the generation of test case tables.
- Configured GitLab CI/CD pipelines for executing test suites.

Goldman Sachs Bangalore, India
Software Engineering Intern *May 2020 – Jun 2020*

- Created automation tests for fifteen scenarios on the Marcus quality management team using JUnit and Serenity BDD, significantly reducing engineering effort and testing time.
- Parallelised tests to shorten execution time from minutes to seconds.

Publications

Jangid, H., Pandey, T., Singhal, S., **Kandhari, P.**, Tomar, A., Kumaraguru, P.
Together Apart: Decoding Support Dynamics in Online COVID-19 Communities.
Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), 2023.
DOI: 10.1145/3625007.3627297

Projects

Feedback Vertex Set (FVS) – Algorithm Engineering | *GitHub*

- Implemented and analyzed exact (parameterized), approximation, and heuristic algorithms for the NP-complete Feedback Vertex Set problem.
- Integrated parallelization techniques to improve scalability and experimentally evaluated performance across multiple graph instances. **Grade:** 1.0 (Top Grade).

Smart Traffic Light Management System | *Publication*

- Designed a smart traffic light management system to reduce waiting time for emergency vehicles by leveraging drivers' mobile GPS data. The system dynamically adjusts signal timings based on real-time vehicle positions and is published via Springer (DOI: 10.1007/978-981-15-9712-1_40).

Skills

Programming: C++ (STL, C++17/20), Python (NumPy, Pandas, Matplotlib), Java

Research & Algorithms: Algorithm Design and Analysis, Approximation Algorithms, Dynamic Graph Algorithms, Graph Theory, Optimization, Data Structures, Empirical Algorithmics

Awards

1st Prize – Rajasthan Hackathon (Digifest 2018): Won 1st place among 700 teams; awarded $20,000 in government funding for further research. (Jul 2018)