DARBY HUYE

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EDUCATION

PhD Tufts University, Computer Science — Jan 2021 - Present
Advisor: Raja Sambasivan

MS Tufts University, Computer Science — Jan 2021
Advisor: Raja Sambasivan

BS Tufts University, Computer Science & Mathematics — May 2020
Advisors: Ming Chow & Misha Kilmer

RESEARCH INTERESTS

Distributed Systems, Visualization, Performance Debugging, Cloud

RESEARCH EXPERIENCE

Meta, New York City, NY — 2022-2023
Research Intern, Mentor: Yuri Shkuro

- Characterized Meta's microservice architecture by measuring the scale & complexity of their services and how request workflows traverse the system
- Investigated the quality of their distributed tracing data and the implications of inaccuracies

Tufts University, Medford, MA
Advisor: Raja Sambasivan

- **Utilizing holes in distributed traces** — Ongoing
  - Identifying emergent communication patterns in distributed traces using graph mining algorithms
  - Using the frequent emergent patterns as a basis for aggregate performance analysis
- **Trace abstractions for performance debugging** — Ongoing
  - Identifying emergent communication patterns in distributed traces using graph mining algorithms
  - Using the frequent emergent patterns as a basis for aggregate performance analysis
- **Correcting errors in Alibaba's open-sourced distributed traces** — 2023
  - Identified two categories of inconsistencies in the trace dataset that invalidate the assumptions provided by Alibaba
  - Designed an algorithm that remedies errors, prioritizing building only accurate (portions) of traces

- **Understanding microservice architectures**: 2021-2022
  - Interviewed industry practitioners to understand their perceptions of microservices
  - Analyzed academic microservice testbeds to uncover design decisions and implications
  - Highlighted mismatches between the academic testbeds' limited design space with the vast space of design decisions made industry
- **Experiments with academic microservice testbeds** 2020
  - Investigated the complexity DeathStarBench's architecture using distributed tracing
  - Found that traces collected via the provided HTTP workload generators were mostly homogeneous and did not capture the complete and expected functionality of the application

TEACHING & MENTORSHIP

MIT Primes Mentor 2021 – Present

- Advise high school students in computer science research

Students Advised

Adrita Samanta & Henry Han, "Visualizing Distributed Traces in Aggregate," 2023
Anshul Rastogi & Joey Dong, "Locating Regions of Uncertainty in Distributed Systems using Aggregate Trace Data," 2022
Anshul Rastogi & Tanmay Gupta, "Threshold-Based Inference of Dependencies in Distributed Systems," 2021

PUBLICATIONS

Conference Papers

Huye, D, Lan, L., Sambasivan, R., "Systemizing and mitigating topological inconsistencies in Alibaba's microservice call-graph datasets," 2024 ACM/SPEC ICPE 2024. DOI: TBD

Huye, D., Shkuro, Y., Sambasivan, R., "Lifting the veil on Meta's microservice architecture: Analyses of topology and request workflows," 2023 USENIX Annual Technical Conference (USENIX ATC 23). DOI: https://www.usenix.org/system/files/atc23-huye.pdf

Toslali, M., Ates, E., Ellis, A., Zhang, Z., Huye, D Liu, L., Puterman, S., Coskun, A., Sambasivan, R., "Automating instrumentation choices for performance problems in distributed applications with VAIF," Proceedings of the 12th ACM Symposium on Cloud Computing (SoCC'21). November 1st to November 3rd, 2021. DOI: https://doi.org/10.1145/3472883.3487000

Journal Publications

Huye, D.*, Seshagiri, V.*, Lan, L., Wildani, A., and Sambasivan, R., "Identifying mismatches between microservices testbeds and industrial perceptions of microservices," Journal of Systems Research, vol. 2, no. 1, 2022. DOI: https://doi.org/10.5070/SR32157839 *Contributed Equally

Toslali, M., Ates, E., Huye, D., Zhang, Z., Liu, L., Puterman, S., Coskun, A., Sambasivan, R., "VAIF: Variance-based Automated Instrumentation Framework," Operating Systems Review, vol. 56, no. 1, 2022, pp. 42-50. DOI: https://doi.org/10.1145/3544497.3544504

TALKS

Research Presentation, "Towards correcting incomplete observability data" to industry folks from Meta and Grafana. December 2023.

Conference Presentation, "Lifting the veil on Meta's microservice architecture: Analyses of topology and request workflows," USENIX ATC 23. July 2023.

Guest Lecture, "Intelligent trace sampling strategies" in Debugging Cloud Computing at Tufts University. March 2023.

Research Presentation, "Identifying mismatches between microservice testbeds and industrial perceptions of microservices," Distributed Systems & Networks Group at Tufts University. April 2022.

Guest Lecture, "Performance Debugging on Microservices with Distributed Tracing" in Debugging Cloud Computing at Tufts University. December 2021.

Research Presentation, "LeitMotif: a tool for discovering emergent communication patterns in microservice applications," to industry folks from RedHat, Meta, and Grafana. November 2021.

PROFESSIONAL AFFILIATIONS

ACM, 2021-Present

PC Member: ACM/SPEC ICPE 2024 Data Challenge Track