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Summary

PhD-level Research Scientist with 7+ years of experience bridging computational biology and modern AI. My background spans scalable high-performance computing at IBM and the CDC, doctoral research at WSU, and current leadership in cutting-edge agentic AI at HARMONI Lab. During a planned career break, I maintained active professional development through freelance data science consulting and independent research, specifically upskilling in Large Language Models (LLMs) and multi-agent systems. I have now fully returned to the workforce to apply this synthesized expertise combining rigorous scientific methodology with state-of-the-art AI to close critical data gaps in women's health.

Educational Qualifications

PhD, Washington State University, 2014
Program: **Computer Science,** High performance Computational Biology, Supervisor: Prof. Ananth Kalyanaraman

Dissertation title: Parallel Algorithms for Large-Scale Graph Clustering on Distributed Memory Architectures

MS, Mississippi Valley State University, 2010
Program: **Bioinformatics,** Supervisor: Prof. Abigail Newsome

Thesis title: Integration of DIYA (Do-It-Yourself Annotator) output with the Generic Model Organism Database Project (GMOD) standards

BS, Amur State University, Russia, 2008
Major: Computer Science – IT Systems and Technologies

Work Experience

Principal Investigator & Founder   January 2025 – Present
HARMONI Lab

- Established an independent research initiative focused on the intersection of neuroendocrine health and AI, designing data-driven systems to analyze the impact of hormonal transitions on mental well-being.

- Engineered multi-agent AI ecosystems utilizing Google's Agent Development Kit (ADK) and Gemini models to advance clinical decision support. Integrated Retrieval-Augmented Generation (RAG) pipelines to synthesize peer-reviewed research, deploying autonomous agents to simulate clinical consultations and rigorously detect bias in healthcare interactions.
- Grant Strategy & Leadership: Spearheaded grant acquisition efforts for fiscal sponsorship, defining project roadmaps and securing resources for computational infrastructure.

AI Model Evaluation Specialist   February 2025 – Present
Outlier.ai – Freelance PhD-level Expert – RLHF & RLAIF

- Conducted high-skill evaluation for Reinforcement Learning with Human Feedback (RLHF) and Reinforcement Learning from AI Feedback (RLAIF)
- Compared and ranked outputs from different models or fine-tuning stages based on clarity, helpfulness, correctness, and tone
- Simulated real-world user scenarios to mimic target domain interactions and stress-tested model responses

Independent Research & Consulting   March 2017 – December 2025

Provided data science consulting services to clients, utilizing technical expertise and the ability to work independently

Selected projects involving data analysis, visualization, and digital strategy:

Food Insecurity Survey Analysis

- Analyzed free-text survey responses using Python and basic NLP to identify drivers of food insecurity and perceptions of government support
- Built and visualized weighted network graphs with NetworkX and Gephi to explore co-occurring themes and central influencing factors
- Disaggregated data by demographics (e.g., education, location) to uncover subgroup-specific patterns and health disparities

Immune Scientific Board Game – Digital Marketing & Analytics Campaign
- Managed advertising strategy for a scientific board game Immune Kickstarter campaign, utilizing Google Analytics and Facebook Ads to optimize engagement and conversion rates successfully raising required funds to bring the project to life.

Data Scientist   May 2015 – February 2017
IBM -The Weather Company, Atlanta, GA

- Created personalized weather alert systems utilizing location data from mobile applications for 6M users

- Conducted performance analysis to identify areas of improvement in data-driven decision-making processes
- Developed and optimized feature engineering strategies to enhance predictive modeling and data visualization outcomes
- Applied machine learning models to optimize prediction and location accuracy
- Developed and deployed predictive models to drive business growth and revenue increase
- Designed and implemented data models using SQL and NoSQL databases on AWS, incorporating Git version control for data integrity
- Collaborated with cross-functional teams to establish data infrastructure standards, ensuring data consistency and integrity across projects to design and deploy data-driven solutions, leveraging the ability to mentor and train stakeholders on data analysis and interpretation

Research Scientist   September 2014 – May 2015
Centers for Disease Control and Prevention CDC, Atlanta, GA

- Developed novel algorithms for Next-Generation Sequencing (NGS) data analysis in Hepatitis C research
- Developed and implemented experiments to test hypotheses and optimize data pipelines, leading to increased data quality and accuracy
- Optimized and adapted serial algorithms for high-performance computing (HPC) platforms
- Designed and developed back-end processing for the GHOST (Global Hepatitis Outbreak and Surveillance Technology), reducing turnaround time from weeks to ≤ 48 hours and cutting costs by >50% ($250/sample vs. $500-800/sample).
- Applied data analysis techniques to large-scale molecular biology datasets to identify trends and insights, informing high-precision data-driven decisions for healthcare providers and relying on strong communication skills to convey complex information to non-technical audiences

Research Assistant   January 2010 – December 2014
Washington State University, High Performance Computational Biology Lab, Pullman, WA

- Developed parallel clustering algorithms for large-scale biological graphs
- Applied graph-theoretic algorithms for metagenomics clustering of 10.3M amino acid sequences (640M connections).
- Created multi-graph representations to identify and analyze complex biological data

Summer Intern   Summer 2012, Fall 2013
VMWare Inc, Palo Alto, CA
- Developed lock contention analysis tools via pattern mining and log data clustering.
- Delivered automation tools improving system diagnostics for large-scale distributed systems.

Bioinformatics Specialist – Summer Intern Summer 2009
Dow AgroSciences, Indianapolis, IN

- Deployed Generic Model Organism Database project (GMOD) in a centralized location in the company intranet

- Linked the genome browser to company major internal bioinformatics databases

- Provided integration tests to ensure the transparency of the data among the different systems with a focus on efficient troubleshooting and data quality improvement

- Presented to other scientists to raise awareness of capability

- Completed written documentation of project development, implementation, and continued maintenance.

Teaching Experience

Automata and Formal Languages, Washington State University, Teaching Assistant, Spring 2011
Level: Undergraduate ~100 students

Bioinformatics Summer Institute, Mississippi Valley State University, Counselor, May – June 2010
Level: Undergraduate ~30 students

Unix, Mississippi Valley State University, Tutor, Fall 2009
Level: MSc ~20 students

Computer for seniors, Mississippi Valley State University, Instructor, Spring 2009
Level: Adults | ~20 students

Russian language, Mississippi Valley State University, After-school Enrichment Program, Instructor, Spring 2009
Level: Elementary School ~15 students

Academic Citizenship

Collegiality and University Tasks

Leadership Roles

- Women in Data Science Worldwide (WiDS), Ambassador Atlanta, 2018

- Society of Electrical Engineering and Computer Science Graduate Students, 2011 – 2014, Founding Officer, Career Development Coordinator (Washington State University)

Invited Presentations / Reviews / Lectures

- International Women's Day Panel of Data Science Industry Leaders, Women in Data Science, Data Science ATL MeetUp 2018, Organizer

- How The Weather Company leverages billions of data points & predictive analytics, Data Science ATL MeetUp 2016, Presenter

- Big Data Solutions at the Weather Channel Analytics Team, Georgia State University, ACM talk series, 2015, Presenter

Utilization of Research and Outreach

- 2013 Grace Hopper Celebration of Women in Computing, Minneapolis, MN, 2013 – Poster "Parallel Algorithms for Large-Scale Graph Clustering on Distributed Memory Architectures"

- 3rd IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS), New Orleans, 2013 – Presentation "Scalable heuristics for clustering biological graphs"

- WSU 2012 Dr. William R. Wiley Research Exposition, February, 2012, Pullman, WA Presentation "An efficient MapReduce algorithm for parallelizing large-scale graph clustering"

- ASME 2012 International Design Engineering Technical Conferences (IDETC) and Computers and Information in Engineering Conference (CIE), Chicago, 2012 – Presentation "Evaluating socio-technical coordination in open-source communities: A cluster-based approach"

- Mississippi Academy of Sciences (MAC) 74th annual meeting, Hattiesburg, MS, 2010 – Presentation "Integration of DIYA (Do-It-Yourself Annotator) output with the Generic Model Organism Database Project (GMOD) standards"

Patents

1. Song, J., Pan, Z., & Rytsareva, I.. (2019). Graphical lock analysis (US10394682B2).
2. Song, J., Pan, Z., & Rytsareva, I.. (2018). Hyperlink-induced topic search algorithm lock analysis (US9898382B2).
3. Song, J., Pan, Z., & Rytsareva, I.. (2017). Using pagerank algorithm-based lock analysis to identify key processes for improving computing system efficiency (US9552235B2).

Memberships

- Women in Technology, since 2014
- IEEE and IEEE Women in Engineering, 2013-2014
- Bloomsbury Honor Society – Full Member – Highest Honor, since 2010
- Alpha Kappa Mu Honor Society – Mu Delta Chapter, since 2010

Other Merits

- Charles C. Shepard Science Award in the "Laboratory and Methods" Category, Centers for Disease Control and Prevention, Atlanta, GA, 2016
- The Art of AMD (Advanced Molecular Detection) Special Mention, Centers for Disease Control and Prevention, Atlanta, GA, 2016
- ACM Student Research Competition, Denver, CO, 2013 – Microsoft Research Travel Award
- SC'13 Supercomputing Conference, Denver, CO, 2013 – Student Volunteer Scholarship
- 2013 Grace Hopper Celebration of Women in Computing, Minneapolis, MN, 2013 – Palantir Technologies Scholarship
- 3rd IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS), New Orleans, 2013 – Travel Award
- SC'11 Supercomputing Conference, Seattle, 2011 – Student Volunteer Scholarship
- Outstanding Award in Bioinformatics for Academic Excellence, May 2009 (Mississippi Valley State University)
- The Gateway Leadership Ambassadors Program, 2009 – 2010 (Mississippi Valley State University)
- The Vladimir Potanin Foundation – Federal Scholarship, May 2005 – May 2006
- Dean List (Amur State University, Russia)

Publication List

Peer-reviewed Articles

1. Ramachandran, S., Thai, H., Forbi, J., Galang, R., Dimitrova, Z., Xia, G.l., Lin, Y., Punkova, L., Pontones, P., Rytsareva, I., & others (2018). A large HCV transmission network enabled a fast-growing HIV outbreak in rural Indiana, 2015. EBioMedicine (JCR Q1), 37, 374–381. – Algorithm development and deployment, Data analysis

2. Rytsareva, I., Campo, D., Zheng, Y., Sims, S., Thankachan, S., Tetik, C., Chirag, J., Chockalingam, S., Sue, A., Aluru, S., & others (2017). Efficient detection of viral transmissions with next-generation sequencing data. BMC genomics (JCR Q1/Q2), 18, 1–7. – Lead author

3. Longmire, A., Sims, S., Rytsareva, I., Campo, D., Skums, P., Dimitrova, Z., Ramachandran, S., Medrzycki, M., Thai, H., Ganova-Raeva, L., & others (2017). GHOST: global hepatitis outbreak and surveillance technology. BMC genomics (JCR Q1/Q2), 18, 21–32. – Algorithm development and deployment, data analysis

4. Campo, D., Xia, G.L., Dimitrova, Z., Lin, Y., Forbi, J., Ganova-Raeva, L., Punkova, L., Ramachandran, S., Thai, H., Rytsareva, I., & others (2016). Accurate genetic detection of hepatitis C virus transmissions in outbreak settings. The Journal of infectious diseases (JCR Q1), 213(6), 957–965. – Data analysis

5. Rytsareva, I., Chapman, T., & Kalyanaraman, A. (2014). Parallel algorithms for clustering biological graphs on distributed and shared memory architectures. International Journal of High Performance Computing and Networking (JCR Q3 in 2014), 7(4), 241–257. – Lead author

Conference Contributions

1. Rytsareva, I., Kalyanaraman, A., Konwar, K., & Hallam, S. (2013). Scalable heuristics for clustering biological graphs. In 2013 IEEE 3rd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) (pp. 1–6).

2. Rytsareva, I., Le, Q., Conner, E., Kalyanaraman, A., & Panchal, J. (2012). Evaluating socio-technical coordination in open-source communities: A cluster-based approach. In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (pp. 277–286).

3. Rytsareva, I., & Kalyanaraman, A. (2012). An efficient mapreduce algorithm for parallelizing large-scale graph clustering. In Washington State University Academic Showcase.

Bibliometric Summary

- Total Publications: 14

- Citations: 278, h-index: 6 (Source: Google Scholar)