# **JACKSON WALTERS**

Arlington VA | 703-915-6542 | jacksonwalters@gmail.com | Portfolio | LinkedIn

# SUMMARY

Ph.D.-level machine learning engineer, cryptography specialist, and applied mathematician with a robust background in scientific programming, data science, and postsecondary instruction. Adept in designing and implementing lattice-based cryptographic systems (ring-LWE, ML-KEM, NTT), conducting advanced data analytics, and building open-source tools using Rust, Python, and SageMath. Demonstrated expertise in MILP solver QA testing, modular DFTs, numerical optimization, NLP pipelines, and encryption protocol development. Published author in top-tier journals including *Annals of Statistics* and *Advances in Mathematics*, with extensive experience leading research, public speaking, and contributing to Crates.io and GitHub.

Combining technical proficiency with a research-driven mindset, I bring cross-functional strengths in machine learning (XGBoost, t-SNE, k-means, CNNs), cryptographic engineering, and higher education. Skilled in Python, SQL, Rust, Gurobi, cvxpy, and SageMath, with practical experience in data wrangling, QA automation, NLP tasks (text classification, named entity recognition), and data visualization. Proven success in collaborative academic-industry settings, producing reproducible code, CI-tested infrastructure, and educational content. Seeking roles that leverage both mathematical depth and software engineering expertise, particularly in data science, secure systems, QA, or instructional technology.

## SKILLS

- Python Programming
- Rust Development

**Cryptography Fellow** 

- Lattice-Based Cryptography (ring-LWE, module-LWE, ML-KEM)
- Machine Learning Algorithms and Pipelines
- Natural Language Processing (NLP)
- Data Analysis and Visualization
- Scientific Computing and High-Performance Algorithms
- Numerical Optimization (Gurobi, MILP, cvxpy)
- Continuous Integration / Continuous Deployment (CI/CD)
- Statistical Modeling and Inference

- Mathematical Research and Proof Writing
- Academic Teaching and Curriculum Development
- Discrete Fourier Transform over Finite Groups
- Open-Source Software Development
- Version Control (Git, GitHub)
- Unix/Linux Command Line and Shell Scripting
- SQL and Relational Databases
- Technical Writing and White Paper Publication
- Conference Presentation and Public Speaking
- Student Mentoring and Academic Advising

# EXPERIENCE

#### ZAIKU GROUP, LTD.

Washington, DC

11/2024 to Current

- Collaborated with mathematicians through the Homotopic Minds math-to-industry transition program, applying advanced number theory and lattice-based mathematics to real-world cryptographic problems; contributed to research translation and secure algorithm development for post-quantum cryptography (PQC).
- Engineered robust implementations of lattice-based encryption primitives (e.g., ring-LWE, module-LWE, NTT, ML-KEM) in Rust, utilizing constant-time operations, memory safety principles, and efficient modular arithmetic to ensure compliance with FIPS 203 and NIST PQC guidelines.
- Published multiple cryptographic libraries, ring-lwe, module-lwe, ntt, mlkem-fips203, to Crates.io, demonstrating expertise in open-source Rust development, secure coding practices, and reproducible builds for cryptographic software distribution.
- Conducted public technical presentations (live and recorded), authored detailed blog content, and created educational resources to promote awareness of lattice cryptography, open-source contributions, and applied cryptographic engineering, fostering community engagement and technology adoption.

# POWER AUCTIONS, LLC

Washington, DC

#### **QA Engineer**

- 10/2020 to 01/2021
- Conducted high-assurance testing and validation for FCC Auction 107, a national-scale auction system for 5G wireless licenses, contributing to a successful close totaling \$80 billion (clock phase) and \$300 million (combinatorial phase); ensured system correctness under extreme-scale economic simulations.
- Designed and executed complex stress test scenarios using synthetic bid data with high mean and standard deviation, uncovering subtle numerical stability issues in a Mixed-Integer Linear Programming (MILP) solver; led debugging efforts and collaborated with engineers to implement precision fixes and mitigation strategies.

- Built and maintained a continuous integration (CI) testing suite to automate verification of optimization routines under diverse edge cases; significantly increased test coverage, regression protection, and adherence to QA best practices in high-performance computation environments.
- Authored and presented a white paper addressing floating-point arithmetic limitations in the Gurobi solver, highlighting potential failure modes in optimization pipelines; influenced internal QA strategy for numerical software and advocated for stronger error tolerance and validation checks in embedded computation systems.

# **BOSTON UNIVERSITY**

#### Boston, MA

#### **Teaching Fellow**

08/2013 to 05/2019

- Led five undergraduate mathematics discussion sections each semester and independently taught four full summer courses, delivering engaging instruction across foundational and advanced topics while applying best practices in curriculum design, active learning, and student assessment.
- Conducted original mathematical research resulting in two peer-reviewed publications in top-tier journals; presented findings at prestigious academic venues including the BU-KEIO conference and research retreats, enhancing institutional research visibility.
- Mentored undergraduate students in a guided machine learning reading course, bridging theory and applied AI concepts; provided individualized support on mathematical foundations, algorithmic thinking, and hands-on learning with ML frameworks.
- Wrote multiple graduate school recommendation letters for students, each leading to successful admission, demonstrating strong academic advising, commitment to student development, and ability to assess and advocate for student potential

EDUCATION	
DOCTORATE OF PHILOSOPHY: MATHEMATICS Boston University	05/2019
CERTIFICATE OF COMPLETION The Data Incubator	08/2018
BACHELOR OF SCIENCE: MATHEMATICS, PHYSICS. MINOR IN COMPUTER SCIENCE Virginia Tech	05/2013
STUDY ABROAD Victoria University of Wellington	07/2011
CERTIFICATIONS	

- Machine Learning Professional, IBM, 03/01/24
  - Advanced Data Science Specialization, IBM, 05/01/24
- Rust Fundamentals, Duke University, 05/01/24

#### PROJECTS

#### Lattice-Based Cryptography

GitHub · Nov 2024

- Implemented ring-LWE, module-LWE, ML-KEM encryption schemes and NTT in Rust, extended to composite moduli.
- Published production-ready crates to Crates.io: ring-lwe, module-lwe, ntt, mlkem-fips203.

#### **DFT over Finite Groups**

GitHub · Mar 2025

- Developed modular and unitary DFTs for symmetric groups over finite fields (PRs #38455, #37757).
- Submitted supporting preprint to arXiv for journal publication.

#### **Operations Research Examples**

GitHub · Oct 2024

- Built optimization models using Gurobi and cvxpy in Python.
- Focused on real-world scheduling and resource allocation problems.

# **Encrypted Messaging App**

GitHub · Sep 2024

- Developed full-stack prototype using lattice-based encryption (ring-LWE, module-LWE) in Python, PHP, and SQL.
- Implemented insecure public key encryption allowing key generation and encrypted message storage.

# Natural Language Processing Toolkit

# $\underline{\text{GitHub}} \cdot Sep \ 2024$

- Implemented over 10 NLP tasks including classification, summarization, keyword extraction, and topic modeling.
- Applied techniques such as hate speech detection, sentiment analysis, and named entity recognition.

## **General Cryptography Library**

GitHub · Aug 2024

- Developed cryptographic algorithms in Python including NTRU, ring-LWE, module-LWE, and elliptic curves.
- Designed for educational clarity and reproducibility of modern cryptographic methods.

# Machine Learning & Clustering

GitHub · Mar 2024

- Analyzed SAMHSA mental health data using t-SNE and k-means to explore diagnosis/lifestyle correlations.
- Built classification models with XGBoost, CNNs, and sklearn for IBM certification and Kaggle competitions.

# SCOTUS vs. Public Opinion Analysis

GitHub · Feb 2021

- Compared SCOTUS decisions with public sentiment using tf-idf and binary classification on opinion datasets.
- Built Flask web app to track and visualize political polarity over time.

## PUBLICATIONS

- Advances in Mathematics, Volume 386, 107799. Toroidal prefactorization algebras associated to holomorphic fibrations and a relationship to vertex algebras, 08/01/21
- Annals of Statistics, Volume 48, Number 1 (2020), 514-538. Averages of Unlabeled Networks: Geometric Characterization and Asymptotic Behavior, 02/01/20
- ArXiv Preprint, The Modular DFT of the Symmetric Group [https://arxiv.org/abs/2404.05796], 04/01/24