NGHIA NGUYEN-TRUNG

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PROFESSIONAL SUMMARY

Ph.D. candidate in **Statistics and Operations Research** (expected May 2027) specializing in **scalable optimization algorithms**, stochastic methods, and mathematical programming. Develops and benchmarks **Python-based optimization solvers** for challenging decision problems, including robust transportation planning, workforce allocation, and machine learning. Research combines **provable convergence guarantees** with numerical implementation, including accelerated, variance-reduced, and distributed methods.

EDUCATION

University of North Carolina at Chapel Hill — *Chapel Hill, NC*
Ph.D. in Statistics and Operations Research — *Expected May 2027*
M.S. in Statistics, Analytics and Data Science — *Dec 2025*

Hanoi University of Science and Technology (HUST) — *Hanoi, Vietnam*
Engineer in Mathematics and Informatics (5-year program) — *May 2022*
GPA: 3.70/4.00 · **Valedictorian, School of Applied Mathematics and Informatics** · Highest Honors

TECHNICAL SKILLS

- **Programming & Scientific Computing:** Python (NumPy, SciPy, Pandas, PyTorch, CuPy), MATLAB, R; numerical simulation, benchmarking, GPU/HPC workflows.
- **Optimization & Operations Research:** Robust and Stochastic Optimization, Mathematical Programming, Convex/Nonconvex Optimization, Minimax/Saddle-Point Methods, Mixed-Integer Linear Programming, Semidefinite Programming.
- **Scalable Algorithms:** First-Order Methods, Variance Reduction, Randomized Coordinate Methods, Distributed/Decentralized Optimization, Inexact and Delayed Computation.
- **Software & Modeling Tools:** Gurobi, CVXPY, CVXOPT, AMPL, GAMS; SLURM.

SELECTED OPTIMIZATION PROJECTS

Robust Middle-Mile Capacity Planning under Demand Uncertainty | *Python, NumPy, SciPy, Pandas, Matplotlib*

- Built a **scenario-based transportation capacity-planning model** under correlated freight-demand uncertainty, comparing nominal, expected-value, and robust reservation policies on independently generated synthetic test scenarios.
- Formulated robust planning as a **convex–concave saddle-point problem**; implemented projected Extragradient and Gradient Descent-Ascent from scratch and validated the optimization objective against an independent SciPy reference formulation.
- In simulated high-uncertainty stress tests, robust planning **reduced worst-case cost by 11.8%** relative to expected-value planning while reserving only **4.1% more capacity**, quantifying the capacity–reliability tradeoff.

Robust Fulfillment-Center Labor Allocation under Workload Uncertainty | *Python, NumPy, SciPy, Pandas, Matplotlib*

- Developed a **scenario-based staffing model** for a synthetic fulfillment center with 4 operational processes and 12 hourly periods, incorporating uncertain workloads, staffing constraints, and labor budgets.
- Implemented a **projected Extragradient solver** with workforce-budget and probability-simplex projections; cross-validated solutions against an independent SciPy optimization formulation.
- Across six simulated stress regimes, robust staffing **reduced average shortages by 52.1%** and **worst-case total loss by 31.2%** versus nominal planning, at a **14.6% increase in labor cost**; demonstrated service–cost tradeoffs under operational uncertainty.

RESEARCH EXPERIENCE

University of North Carolina at Chapel Hill · *Graduate Research Assistant* — *Sep 2023 – Present*

- Developed **accelerated first-order and operator-splitting algorithms** for nonlinear and saddle-point problems; proved convergence under conditions weaker than **monotonicity** (the operator counterpart of convexity), extending guarantees to classes of nonmonotone problems such as some nonconvex–nonconcave minimax models.
- Designed **variance-reduced stochastic algorithms** for composite problems with large finite-sum or expectation structure; derived oracle-complexity bounds and proved $O(1/k^2)$ and $o(1/k^2)$ rates for specified squared-residual measures in accelerated settings, providing quantitative convergence guarantees.
- Developed **accelerated methods tolerating delayed and inexact computations**; proved $O(1/k^2)$ and $o(1/k^2)$ convergence guarantees and analyzed the effect of stale operator evaluations, supporting algorithm design for parallel and distributed computing.

- Developed **decentralized optimization methods** using peer-to-peer communication without a central server; established $O(1/k^2)$ and $o(1/k^2)$ theoretical bounds for the analyzed convergence measures in networked problems.
- **Implemented and benchmarked algorithms** in Python (NumPy, PyTorch, CuPy), including GPU/HPC numerical experiments on Markov decision processes, minimax optimization, machine learning, and stochastic optimization models.

Institute of Mathematics, Vietnam Academy of Science and Technology · *Visiting Researcher* *Feb 2022 – Jul 2022*

- Developed projection-based algorithms for constrained variational-inequality and equilibrium models, with applications to **constrained optimal control**.

Institute of Mathematics, Vietnam Academy of Science and Technology · *Research Intern* *Apr 2021 – Jul 2021*

- Investigated **semidefinite-programming relaxations** for graph-theoretic and combinatorial optimization problems.

Hanoi University of Science and Technology · *Undergraduate Research Assistant* *Aug 2020 – Jul 2022*

- Developed **self-adaptive and inertial optimization algorithms** that avoid requiring global operator-norm estimates, Lipschitz constants, or line searches, reducing dependence on problem parameters that may be difficult to estimate.
- Implemented **parallel numerical methods** and tested them on high-dimensional sparse recovery, LASSO/Elastic Net, and constrained optimal-control models.

SELECTED PUBLICATIONS & RESEARCH

Selected papers; full publication list available via Google Scholar.

1. **Nghia Nguyen-Trung**, Ion Necoara, Quoc Tran-Dinh. *Optimistic Gradient Algorithms with Randomized Coordinate and Variance Reduction Strategies for Composite Inclusions*. Preprint, 2026. doi:10.13140/RG.2.2.26234.86726 (INFORMS 2026 contributed talk).
2. **Nghia Nguyen-Trung**, Quoc Tran-Dinh. *A Class of Accelerated Fixed-Point-Based Methods with Delayed Inexact Oracles and Its Applications*. arXiv:2512.13547, 2025.
3. **Nghia Nguyen-Trung**, Ion Necoara, Quoc Tran-Dinh. *Distributed Fast Fixed-Point Algorithms for Composite Monotone Inclusions over Networks*. arXiv:2609.14953, 2026.
4. Quoc Tran-Dinh, **Nghia Nguyen-Trung**. *Unbiased and Biased Variance-Reduced Forward-Reflected-Backward Splitting Methods for Stochastic Composite Inclusions*. arXiv:2603.15576, 2026. Under revision at **Computational Optimization and Applications**.
5. Quoc Tran-Dinh, **Nghia Nguyen-Trung**. *New Accelerated Past-Extragradient Methods with Variance Reduction for Generalized Equations*. arXiv:2508.16791, 2025. Under revision at **Mathematics of Operations Research**.
6. Quoc Tran-Dinh, **Nghia Nguyen-Trung**. *Revisiting Extragradient-Type Methods – Part 1: Generalizations and Sublinear Convergence Rates*. **Computational Optimization and Applications**, 2026. doi:10.1007/s10589-025-00727-3.
7. Quoc Tran-Dinh, **Nghia Nguyen-Trung**. *Revisiting Extragradient-type Methods – Part 2: Generalization and Unified Convergence Analysis of Anchored Extragradient-type Variants*. **Computational Optimization and Applications**, 2026, to appear. doi:10.1007/s10589-026-00851-8.

TECHNICAL COMMUNICATION & LEADERSHIP

- **INFORMS Annual Meeting 2026**: contributed talk on randomized-coordinate and variance-reduced optimistic-gradient algorithms and **session chair** for "First-order, proximal, and interior-point algorithms" (Session TE34, Nov 3).
- **SIAM Mathematics of Data Science 2026**: scheduled poster on accelerated fixed-point methods with delayed inexact computation.
- **Undergraduate Research Mentor, UNC–Chapel Hill (2026–Present):** mentoring two students as they begin a research project on robust optimization, from problem formulation and literature review to implementation.
- **Instructor of Record, UNC–Chapel Hill (2024–2026):** independently taught decision-modeling and data-modeling courses; received departmental teaching excellence recognition in 2024 and 2025.
- **Graduate Teaching Assistant, UNC–Chapel Hill:** supported graduate Foundations of Optimization and Optimization for Machine Learning courses, explaining mathematical and computational methods.
- Peer reviewer for **ICML, NeurIPS**, the *Journal of Optimization Theory and Applications*, and other optimization journals; recognized with the **ICML 2026 Silver Reviewer Award**.

SELECTED HONORS

ICML 2026 Silver Reviewer Award · **SIAM Travel Award, 2026** · **STOR Raj Chandra Bose Travel Award, 2026**

Valedictorian, HUST School of Applied Mathematics and Informatics, 2022 · National Mathematics Development Program Fellowship (VIASM, 2020–2021) · HUST Academic Excellence Scholarship, Type A (2018–2022)