Aadesh Tikhe

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About Me!

I'm obsessively curious. I can't see a mathematical pattern without wanting to pull it apart and see if it connects to something else. My work is a mix of rigorous research (published on OEIS, presented at conferences) and experimental coding projects where I just try things. I think with whatever knowledge I have, recombine ideas in weird ways, and occasionally stumble onto something that works. I'm not just interested in solving known problems. I want to find the problems no one's asking yet. My north star is building things that are both mathematically elegant and practically useful.
Goal: Advance interpretability in deep learning by applying insights from number theory and algorithmic analysis to neural network behavior. I aspire to build ethical, human-centered systems that simplify complexity and deepen understanding.

Education & Academic Achievements

Amity University, Mumbai *Aug 2023 – Present*
Bachelor of Computer Applications (BCA) *(Expected May 2026)*

- CGPA: 8.47 / 10.0 (till date)
- **Key Coursework:** Operating Systems, Theory of Computation, Comparative Learning Algorithms, Linear Algebra for ML

Wockhardt Global School (IB), Chhatrapati Sambhajinagar *May 2017 – May 2022*
IB Diploma Programme (DP), 2020–2022 — Final Grade: 30 / 45
IB Middle Years Programme (MYP), 2017–2020 — Final Grade: 85%
Head Boy & Leadership Roles

- **Extended Essay:** Analyzed the time complexity of the NegaMax algorithm (Strazilla) vs. Alpha-Beta Pruning (NNUE Stockfish)
- **Main Subjects:** Computer Science HL, Mathematics: AA HL, Business Management HL
- Led school initiatives as **Head Boy**, including playground renovation and MUN 2020 organization
- **Chaired UNICEF at WGS MUN** 2021; facilitated engaging agendas and resolutions
- Served on the **Board of Directors, Rotaract Club Aurangabad**, fostering leadership and collaboration
- Led **Stage Management Team at TEDxYouth@WGS**; oversaw technical execution and speaker coordination
- Initiated **Stevia The Developer** (2019–2020): Researched and promoted Stevia farming in Marathwada; grew and tested plants independently, raised awareness among farmers, and overcame stage fear by addressing diverse audiences on health and economic benefits

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Publications and Conferences

Probability in Regular 2-Polytopes *Aug 2022 - Dec 2024*

- Independently conducted research from 2022–2024 on a novel spatial probability model within regular 2D polytopes
- Proposed a Periodic Cotangent Function to model the probability distribution of a 0 polytope relative to the centroid and boundary
- Presented this work at the **Indian Mathematical Society Conference** (MIT-WPU, Pune) on **25 December 2024**, gaining valuable feedback and insights
- Publication currently in process; preview available at youtu.be/Vwe1ojJnU_A

Discrete Square Residual Structures (DSRS): A Framework Where Every Integer Reveals Its Own Connection to π *June 2025 - Sept 2025*

- Introduced a purely arithmetic framework extracting either π or 1 from floor and ceiling operations on perfect squares, reframing π as a dominant attractor within a hidden combinatorial dynamical system in the integers
- Developed discrete layer sequences $U(n) = \lceil n^2/\mu \rceil$ and $L(n) = \lfloor n^2/\mu \rfloor$ with residual representations α, β, generating infinite products $P(\mu) = \prod_{n=n_0}^{\infty} \frac{\Delta_L(n)}{\Delta_U(n)}$
- Proved approximately 75% of integers μ drive products toward π (accurate to six decimal places at $n = 10^6$), while multiples of 4 converge to 1, establishing a binary partition with entropy-driven convergence patterns
- Demonstrated residual cleaning mechanism showing all non-multiples of 4 structurally reduce to $\mu = 2$ case (Wallis product), with increasing entropy for larger μ values requiring more terms to stabilize
- Extended analysis to μ values up to 70,000 with systematic validation across 200 consecutive integers, revealing deterministic pathways connecting individual integers to transcendental constants through discrete arithmetic alone
- Preprint archived on Zenodo with DOI: 10.5281/zenodo.17144469
- Complete open-source implementation and documentation available at GitHub Repository

É. Lucas Approach to Fibonacci Computation *Dec 2024 – Apr 2025*

- Independent research analyzing **Édouard Lucas's Pascal Triangle Method** for calculating the exact n^{th} Fibonacci number without recursion.
- Compared Lucas's combinatorial approach to classical methods in terms of **computational complexity and performance efficiency**.
- Paper titled *"Analyzing the Computational Complexity and Performance Efficiency of Édouard Lucas Pascal's Triangle Method vs. Other Fibonacci Computation Approaches"*.
- Demonstrated the feasibility of Lucas's method in resource-constrained environments.
- Publication currently in process; preview available at Medium Blog.
- Code implementation available at GitHub Repository.

Fibonacci Numbers from Pascal Rows: A Ternary Coefficient Approach *Feb 2025 – Present*

- Established novel algebraic framework for transforming Pascal triangle rows into Fibonacci numbers through systematic coefficient selection where $c_i \in \{-1, 0, 1\}$
- Developed six complete enumeration strategies with CUDA GPU acceleration, achieving exhaustive analysis up to computational limit 3^{22} (31.4 billion combinations)
- Designed polynomial-time greedy algorithm leveraging palindromic symmetry and center-dominance properties, achieving $O(n)$ complexity for exponential $O(3^n)$ problems
- Demonstrated perfect success rate across all Fibonacci numbers F_1 through F_{1000}, transcending brute force computational barriers and enabling exploration of previously inaccessible mathematical territories
- Proved convergence properties and established theoretical bounds on solution existence, providing first systematic computational framework for Pascal-Fibonacci coefficient analysis
- Preprint archived on Zenodo with DOI: 10.5281/zenodo.17412193
- Code implementation available at GitHub Repository

Projects and Contributions

OEIS Contributor – Integer Sequence Research *oeis.org/wiki/User:Aadesh*

- **Authored closed-form formula for OEIS** A259569, now cited globally by mathematicians and computational researchers.
- **Corrected mathematical inaccuracies in** A130823, improving sequence integrity and documentation
- Active contributor on the OEIS Wiki — a globally recognized encyclopedia of integer sequences

myBash – Bash & Linux Commands Repository (Shell) *Ongoing*

- A collection of useful Bash commands, Linux one-liners, and `.bashrc` customizations. Includes a cron job for auto-updating Homebrew monthly. Personal notes and hands-on summaries from tutorials.
- GitHub Repository

Manim Codes for Math Research Presentation (Python [Manim], C++) *Ongoing*

- Built 10+ Manim animations to visualize novel mathematical concepts (Fibonacci methods, probability distributions), garnering 500+ views on YouTube.
- Used in YouTube presentation: Watch here.
- GitHub Repository

Django-POL_Agro Web Platform (Python, HTML, CSS) *2021 – 2022*

- Built for a client during IBDP; developed a full-stack Django-based CRUD platform.
- Connects fertilizer wholesalers with farmers to streamline queries and product access.
- Hosted on localhost for demo; source code: GitHub Repository.

Uncertainty-Stability Quotient (USQ) (C++ [iomanip, and gmpxx.h]) *2024 – 2025*

- Proposed a novel power-ratio function modeling the transition from instability to asymptotic certainty.
- Applications span algorithm analysis, numerical methods, fractals, ML feature scaling, quantum transitions, and financial modeling.
- Detailed write-up: Medium; source code: GitHub.

Key Skills

Languages: C++, C, Java, Python, SQL, Bash, Cuda
Libraries & Frameworks: Django, Manim, Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, Pygame
Tools & Platforms: Git, Docker, Jenkins, Maven, Google Cloud, AWS, Google Colab, LaTeX.
Core Strengths: Mathematics, Data Structures & Algorithms, Artificial Intelligence, Machine Learning, C Programming, Operating Systems (incl. Bash Shell), and Computational Theory
Hobbies & Interests

- Painting – Creative expression through various mediums.
- Cycling & Hiking – Fitness and nature exploration.
- Piano – Self-taught music composition.
- Meditation – Vipassana practice for mindfulness.
- Mathematical Puzzles – Exploring number theory and logic.

Languages: English, Hindi, Marathi, German (A1 level)

Specialised Courses & Certifications

- **Domestic Data Entry Operator** – English Course (Govt. recognized)
- **Vipassana Meditation Courses:** Completed 3 residential courses and served in 1, reflecting strong commitment to mindfulness and discipline.
- **Youth India Expressed Summit** – Participated in national-level youth leadership event.
- **Harvard Model United Nations (HMUN) 2018** – Represented school in international MUN.
- **Certified Lean Six Sigma (White Belt):** Gained process improvement experience using Minitab, Excel, Python, Lucidchart, PowerPoint, and Microsoft Project.