Abhimanyu Pallavi Sudhir

AI and game theory researcher.

Formal education

- University of Warwick · PhD Computer Science · 2022-26 – supervisor: Long-Tran-Thanh
- Imperial College London · MSci Mathematics · 2018-22 – 1st class honors
- Dhirubhai Ambani International School, Mumbai · IB Diploma · 2013-18 – 44/45
- NUS High School, Singapore · 2012-13
- Bukit View Primary School, Singapore · 2006-11

Internships

- Goldman Sachs · AI Research Intern · Jan-Aug 2021, London – Developed and implemented novel methods in NLP and recurrent neural networks for financial forecasting
- Jane Street · Spring Week · 14-17 Apr 2020 – [cancelled due to COVID-19 lockdowns]
- Schroders · Spring Week · 12-13 Aug 2020 – [held virtually due to COVID-19 lockdowns]
- Jane Street · Fall Insight Day · 30 Oct 2018

Research

Markets and AI (PhD work)

My current work focuses on building an algorithmic model of market dynamics to design AI agents with a market-based structure, and developing prediction market mechanisms to elicit beliefs about latent space variables to boost interpretability.

- Abhimanyu Pallavi Sudhir and Long-Tran Thanh (2024), "Betting on what is neither verifiable nor falsifiable", arxiv.org/abs/2402.14021
- Abhimanyu Pallavi Sudhir (2021), "A mathematical definition of property rights in a Debreu economy", arxiv.org/abs/2107.09651

> *Related write-ups and talks.*
>
> — Blog posts
>
> – "Betting on what is un-falsifiable and un-verifiable" (2023) on LessWrong
> – "Meaningful things are those the universe possesses a semantics for" (2022) on LessWrong
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> — PhD formal reports and presentations
>
> – Year 1 Annual Report abhimanyu.io/legacy_writing/PhD_reports/y1_annual_report.pdf
> – PhD proposal abhimanyu.io/legacy_writing/PhD_reports/y0_proposal.pdf
>
> — Miscellaneous presentations
>
> – "Mechanism design for AI alignment" [poster at the Co-operative AI Foundation (CAIF) summer workshop, 2023]: abhimanyu.io/legacy_writing/PhD_presentations/caif.pdf
> – "Betting on what is neither verifiable nor falsifiable" [Warwick Postgraduate colloquium (Dec 2023) & Warwick Cake Talk (Nov 2023)]: abhimanu.io/legacy_writing/PhD_presentations/betting_nonvf.pdf
> – "Algorithmic information is at the root of all our problems" [Warwick Postgraduate colloquium (Mar 2023)]: abhimanyu.io/legacy_writing/PhD_presentations/algorithmic_info.pdf
> – "Incompleteness theorems and firing philosophers" [Warwick Cake Talk (Feb 2023)]: abhimanyu.io/legacy_writing/PhD_presentations/incompleteness.pdf
> – "A mathematical definition of property rights" [Imperial Undergraduate Colloquium (Feb

2022), Sheffield SIAM-IMA Applied Math Conference (Jul 2021)]:
abhimanyu.io/legacy_writing/Imperial_presentations/property_rights.pdf

AI Debate with OpenMath (Berkeley SPAR – summer 2024)

Ongoing collaboration with a team supervised by Arjun Panickssery and Nima Rimsky to use NVIDIA's OpenMath dataset to train AI debaters, as part of the Berkeley Supervised Program for Alignment Research.

Consistency checks and forecasting (Berkeley SPAR – spring 2024)

Ongoing collaboration with an ETH Zurich team supervised by Daniel Paleka to develop a consistency benchmark for LLM forecasters, as part of the Berkeley Supervised Program for Alignment Research.

- Abhimanyu Pallavi Sudhir, Alejandro Alvarez, Adam Shen, and Daniel Paleka (2024), "Consistency Checks for Language Model Forecasters" *Workshop paper, accepted to:* Agentic Markets Workshop at ICML 2024; NextGenAISafety Workshop at ICML 2024; Oxford ELLIS Robust LLMs Workshop 2024

General mathematics (Undergraduate work and prior)

- Abhimanyu Pallavi Sudhir (2019), "Infinitesimal translations and a multivariate Grünwald-Letnikov calculus", arxiv.org/abs/1904.02710
- Abhimanyu Pallavi Sudhir (2018), "The generalized Cauchy derivative as a principal value of the Grünwald-Letnikov fractional derivative for divergent expansions," arxiv.org/abs/1809.08051
- Abhimanyu Pallavi Sudhir (2019), "Generalisations of the determinant to interdimensional transformations: a review," arxiv.org/abs/1904.08097
- ~~Abhimanyu Pallavi Sudhir (2014), "On the Determinant-like function and the Vector Determinant," *Advances in Applied Clifford Algebras* (24-3: 805-807), doi:10.1007/s00006-014-0455-3~~
- ~~Abhimanyu Pallavi Sudhir (2014), "On the Properties of the Determinant-like function," (presented at International Conferences on Mathematical Sciences, Chennai, July 17-19, 2014).~~
- ~~Abhimanyu Pallavi Sudhir (2013), "Defining the Determinant-like function for m by n matrices using the exterior algebra," *Advances in Applied Clifford Algebras* (23-4: 787-792), doi:10.1007/s00006-013-0416-2~~
- ~~Abhimanyu Pallavi Sudhir (2012), "The Representation of Matrices in unit vector notation," *Journal of Mathematics Research* (4-4: 86-91), doi:10.5539/jmr.v4n4p86~~
- ~~All of the crank stuff I posted to PhysicsForums as a kid~~

Related write-ups and talks.

— Fractional calculus presentation [IMA Tomorrow's Mathematicians Today (Feb 2019), Imperial Undergraduate Colloquium (Nov 2018)]:
abhimanyu.io/legacy_writing/Imperial_presentations/fractional_calculus.pdf

— Intel ISEF (May 2015) [received AMS Karl Menger Award]

Academic service

- *Reviewer for NextGenAISafety Workshop at ICML 2024* · 2024
- *Teaching Assistant for CS141: Functional Programming (Warwick)* · 2023
- *Reviewer for Advances in Applied Clifford Algebras (Springer)* · 2020-present

Workshops and courses

- *Co-operative AI Foundation* · Jul 2023 · workshop on AI and cooperative game theory
- *Machine Learning and Applied Statistics* · Jul 2019 · summer course at Imperial College Business School; 7.5 ECTS, score: 97.5%

Other projects

Equivariant learning (2021-22)

Final-year MSci project with Professor Jeroen Lamb at Imperial College London exploring equivariant learning and causal DAGs.

Report: abhimanyu.io/legacy_writing/Imperial_reports/m4r.pdf

Local normal forms of analytical maps near fixed points (2020)

Second-year MSci project with Professor Davoud Cheraghi at Imperial College London.

Report: abhimanyu.io/legacy_writing/Imperial_reports/m2r.pdf
Presentation: abhimanyu.io/legacy_writing/Imperial_reports/m2r_presentation.pdf

Lie theory (2019)

Undergraduate research project with Professor Richard Thomas at Imperial College London on Lie groups and algebras.

Report: abhimanyu.io/legacy_writing/Imperial_reports/urop.pdf
Presentation: abhimanyu.io/legacy_writing/Imperial_presentations/lie_theory.pdf

> *Related write-ups and talks.*
>
> — Warwick-Imperial Autumn Meeting (Mar 2022) [cancelled due to COVID-19 lockdowns]
> — Imperial Undergraduate Colloquium (Oct 2019)
> — Imperial 3-minute thesis competition (Oct 2019)

Lean (2018-19)

Computerized formal proving in Lean with Professor Kevin Buzzard at Imperial College London.

- Wrote the FilterProduct.lean and Hyperreal.lean modules for the Lean math library
- Imperial first-year project poster: abhimanyu.io/legacy_writing/Imperial_reports/m1r.pdf
- Formalized the first-year "Foundations of Analysis" module exam Blog post: xenaproject.wordpress.com/2019/05/06/m1f-imperial-undergraduates-and-lean/

PhysicsOverflow (2014-15)

Co-founded PhysicsOverflow, a postgraduate-level physics Q&A site and open peer review system. See en.wikipedia.org/wiki/PhysicsOverflow for more details.

- Abhimanyu Pallavi Sudhir and Rahel Knoepfel (2015), "PhysicsOverflow: A postgraduate-level physics Q&A site and open peer review system," *Asia-Pacific Physics Newsletter* (4-1: 53-55), doi:10.1142/S2251158X15000193

~~The Mathematics and Physics Encyclopedia (2010-14)~~

- ~~psiepsilon.wikia.com~~
- ~~psiepsilon.wordpress.com~~
- ~~youtube.com/user/abhi99ps~~

Awards

- Scholarships
  - Warwick PhD (2022-26) – departmental full scholarship
  - ICBS Machine Learning Summer course (2019) – departmental full scholarship
- Conferences and science fairs
  - IMA TMT, London (2019) – among 4 shortlisted for GCHQ prize
  - Intel ISEF, Pittsburgh (2015) – AMS Karl Menger Award
  - ~~International Conference on Mathematical Sciences 2014 – Best Paper Award~~
  - IRIS National Science Fair (2014) – Gold; Amul Top 3; GUJCOST Merit Award
  - IRIS National Science Fair (2013) – Silver; Special Physics Prize
- Problem-solving and olympiads
  - Imperial Mathematics Competition (2019) – nationwide finalist
  - IIT Math Olympiad (2017) – sixth place nationally in India
  - Regional Mathematical Olympiad (2016) – Merit
- Kid competitions
  - 2012 Bukit Panjang High School Mathematics and Science Challenge – Team 1st
  - 2012 American Mathematics Contest – Certificate of Achievement
  - 2012 Rio Tinto Science Contest – High Dist
  - 2011 Singapore Mathematical Olympiad Junior – Honorable Mention
  - 2011 Singapore Mathematical Olympiad for Primary Schools – Gold
  - 2011 Singapore and ASEAN Schools' Math Olympiad – Gold
  - 2011 Anglo-Chinese Young Whizzes' Challenge – Gold; Team Round – Team 2nd
  - 2011 River Valley Math Comp – Individual 1st; Team 1st; Team round – 2nd; Platinum
  - 2011 St. Andrew's Math and Science Comp – Individual 1st; Team 1st; Team round – 1st
  - 2011 Mathematical Olympiad Talent Quest – Bronze; Team Round – Team 3rd
  - 2011 Australian Mathematics Competition – High Dist
  - 2011 Rio Tinto Science Contest – Credit
  - 2011 UNSW ICAS – Math/Sci/English (Dist) Computers (Credit)
  - 2010 NUSHS Singapore Primary Science Olympiad – Gold
  - 2010 NUSHS National Math Olympiad of Singapore – Bronze
  - 2010 Anglo-Chinese Mathlympics – Individual 3rd; Gold
  - 2010 Anglo-Chinese Young Whizzes' Challenge – Gold
  - 2010 Singapore and ASEAN Schools' Math Olympiad – Gold
  - 2010 Australian Mathematics Competition – Dist
  - 2010 UNSW ICAS – Math (HighDist) Science (Dist) English/Writing/Computers (Credit)
  - 2009 UNSW ICAS – Math (HighDist) Science (Dist) English (Credit)
  - 2009 Australian Mathematics Competition (Dist)

– 2008 UNSW ICAS – Math/Science/English (Dist)
– 2008 Australian Mathematics Competition (Credit)

Links

- Email: abhimanyupallavisudhir@gmail.com
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- Website: abhimanyu.io
- Blog: TheWindingNumber.blogspot.com
- Google Scholar: scholar.google.com/citations?user=lb38BjYAAAAJ
- Github: github.com/abhimanyupallavisudhir
- LessWrong: lesswrong.com/users/abhimanyu-pallavi-sudhir
- StackExchange: math.stackexchange.com/users/78451/abhimanyu-pallavi-sudhir
- PhysicsOverflow: physicsoverflow.org/user/dimension10

Key: Regular, Archived, ~~Disowned~~