

Jiarong Gu

Research Summary

My research uses machine learning and data analytics to study the integrity of information systems: how AI-generated text can be detected, how assessment and institutional design hold up when such text becomes cheap to produce, and where the statistical guarantees behind detection methods break down. I currently develop detection metrics from white-box LLMs, and have shown why zero-shot statistical attribution tests admit no universally calibratable threshold. My related work spans AI-resistant question formats built from five semesters of quiz data, cross-country corruption detection across ten million European procurement records, and AIS-based data pipelines for port congestion monitoring. Going forward, I aim to work at the intersection of machine learning, human behaviour, and institutional integrity, building AI systems that are transparent, robust, and resistant to misuse.

Education

National University of Singapore (NUS), Institute of Operations Research and Analytics (IORA) <i>PhD in Operations Research and Analytics</i>	<i>Aug 2026 – Present</i>
National University of Singapore (NUS) <i>BBA in Business Analytics and Finance</i> ◦ GPA: 4.73/5.00 Highest Distinction, Dean's List	<i>Aug 2022 – Jun 2026</i>
University of Washington (UW) <i>Forster Exchange Programme</i> ◦ GPA: 3.7/4.0, Dean's List	<i>Sep 2024 – Dec 2024</i>
Peking University (PKU) <i>Student Summer Exchange Programme</i> ◦ GPA: 90/100	<i>Jul 2023 – Aug 2023</i>

Awards

- Graduate Research Scholarship (2026)
- George Lim Keow Ker Award (Best graduating Business analytics student in Business administration in NUS, 2026)
- Dean's List of NUS (2026)
- Dean's List of UW (2024)
- HKU economics & finance admission scholarship (2022)
- Outstanding graduate award (2021)
- Learner's achievement award (Scholarship, 2020)

Publications and Working Papers

1. **Gu, J.,** Tan, H. M. (2026). What question formats resist AI assistance? Evidence from five semesters of Canvas quiz data. *INFORMS Transactions on Education*. *[Under review]*
2. **Gu, J.** (2026). Mary Had a Little [What?]: The limits of zero-shot statistical tests for model-specific text attribution. *[Manuscript in preparation]*

Research Experience

Mary Had a Little [What?]: The Limits of Zero-Shot Statistical Test for Model-Specific Text Attribution <i>Undergraduate Final Year Project, NUS</i> ◦ Advisor: Feng Yifan, Assistant Professor at NUS business school, Data Analytics and Operation	<i>Singapore</i> <i>Apr 2025 – Jun 2026</i>
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- Critically evaluated the zero-shot statistical detection framework of Radvand et al. (2025), which grounds AI-text detection in the convergence of log-perplexity to cross-entropy under self-evaluation. Using six diverse LLM scorers and generators, I demonstrated that human-authored text produces liketropy scores systematically closer to zero than model A's own generations, directly inverting the theoretical separability assumption the test's threshold relies upon.
- Further showed that stochastic decoding strategies (top-k) applied to the same model displace its generated text's liketropy score away from zero, making the score a function of the decoding method rather than authorship, and exposing the practical impossibility of calibrating a universally valid detection threshold from the paper's theoretical guarantees alone.

A*STAR IHPC

Research Intern, under Dr Fu Xiuju

Singapore

Dec 2025 - Present

- Conducted maritime AI research focusing on shipping disruption assessment, port congestion monitoring, and predictive vessel maintenance using AIS (Automatic Identification System) tracking data. Designed and implemented a data pipeline to ingest, clean, and validate large-scale vessel arrival and departure records across 46 monitored ports, performing monthly comparative analysis spanning 2024 to 2026. Engineered a port berthing event detection algorithm to identify vessel dwell events and compute stay durations from entry and exit timestamps.
- Developed multi-dimensional visualisations including cumulative distribution functions, port-level duration comparisons, vessel traffic analyses, and an interactive global map comparing port-level berthing activity across the two primary maritime shipping corridors with percentile-based intensity classification to assess the impact of route disruptions on global port congestion. Integrated digital twin technology to support advanced predictive maintenance modelling and launch boat operational optimisation.

Tenders Electronic Daily (TED) database Research Project

Student Researcher, under Professor Alminas Zaldokas & Tatyana Deryugina

Singapore

Jul 2025 - Oct 2025

- Analyzed the distribution of 10 million rows of auction award records across European markets over 10 years, applying Neural Network models to classify and categorise procurement records by sector, and conducting 3 iterative rounds of Fuzzy Word Matching to standardise inconsistent company and vendor names across multiple languages and naming conventions.
- Performed in-depth data cleaning and analysis to address format irregularities, including inconsistent date formats, currency differences, and varying procurement code standards across countries, enabling reliable cross-country comparison for the detection of government corruption signals such as suspicious award patterns, single-bidder contracts, and repeat awardees with potential price irregularities.

Internship Experience

NUS / Singapore Governance and Transparency Index (SGTI) Project

Project Research Intern, NUS business school SGTI department

Singapore

Mar 2025 - Jun 2025

- Reviewed financial reports, SGX filings, and announcements for 643 publicly listed companies (PLCs) in Singapore. Conducted factor analysis on corporate disclosures and governance transparency across industries and assisted in grading governance scores for the official 2025 SGTI Report to be released in August.

ZheShang Securities Ltd

Summer Analyst, IPO Team

Hangzhou, China

Jun 2025 - Aug 2025

- Automated IPO analysis and valuation processes by developing Excel VBA solutions for data processing and issuance scoring, conducting financial research and peer benchmarking via institutional databases (Wind, iFinD), and building DCF/WACC models to support due diligence and pitch materials for IPO readiness evaluation.

CaiTong Securities Ltd

Summer Analyst, Fixed Income Team

Hangzhou, China

May 2024 - Aug 2024

- Led bond underwriting analysis by preparing bidding documents, assessing 8 issuers' governance and financial health, and designing a cash flow validation framework verifying 60%+ of post-issuance outflows.

Extracurricular Activities

J.P. Morgan Asset & Wealth Management Case Challenge

Singapore

Finalist of Singapore

Feb 2024 - Apr 2024

- Developed investment strategies by building Strategic and Tactical Asset Allocation frameworks through client profiling and market analysis, conducting stress testing, designing legacy planning for wealth transfer, and delivering tailored 20-minute client pitches with regional insights.

Corporate Banking Club

Seattle, USA

- Delivered Excel function tutorials during weekly meetings to enhance analytical efficiency for banking internships and projects. Facilitated connections between members and industry professionals by organizing access to exclusive career panels hosted by J.P. Morgan and Citi Bank.

TEDx Speaker

Singapore

- Delivered TEDx Youth keynote on behavioral finance to 600+ attendees, analyzing psychological biases and irrational decision-making in markets while advocating for integrating behavioral insights into financial models and policy using theory and real-world examples.

Skills & Interests

Languages: Native in Mandarin; Fluent in English (IELTS 7.0 with Speaking 7.0)

IT Skills: SQL, Python, R, VBA, LaTeX, Microsoft PowerPoint & Excel, Canva