Natalie Cao (she/her/hers)

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EDUCATION

Stanford University **Stanford, CA**
*Master of Science in **Management Science & Engineering*** Sep 2023 - May 2025

- GPA: **3.93/4.00**; Major GPA: **4.00/4.00**
- **Relevant Courses:** CS224: Natural Language Processing, CS229: Machine Learning, Stats200: Causal Inference, MS&E 252: Decision Analysis, MS&E 220: Probabilistic Analysis, MS&E 211&214: Optimization (advanced)

Duke Kunshan University & Duke University **Kunshan, China & Durham, NC**
*Bachelor of Science in **Applied Mathematics*** Aug 2018 - May 2022

- GPA: **3.85/4.00**; Major GPA: **3.90/4.00**
- **Relevant Courses:** Ordinary Differential Equations (ODE), Partial Differential Equations (PDE), Dynamical Systems, Numerical Analysis, Math Modeling, Econometrics, and Micro/Macroeconomics
- **Honors & Awards**: Scholarship Recipient (**top 5%**); Dean's List (awarded every semester)

PUBLICATIONS & MANUSCRIPTS

- Cao, N., et al. (2024). "Deep Learning-Based Consumption and Production Management in Circular Economy for Effective Business Models." *Under Review*.
- Cao, N., et al. (2023). "Improving Generalization of Reinforcement Learning via VRVO." *Under Review.*
- Cao, N. (2024). "A Financial Decision Support Optimization System Based on Artificial Intelligence and Data Mining Algorithms." *IEEE 3rd International Conference on Electrical Engineering, Big Data and Algorithms (EEBDA)*. DOI:10.1109/EEBDA60612.2024.10485835
- Contributing Author. (2023). "The Application of AI Large Models." ISBN: 9787111738787.

RESEARCH EXPERIENCE

Deep Learning for Consumption and Production Management in the Circular Economy **Stanford, CA**
Advisor: Professor Yu Ding, Stanford Graduate School of Business Apr 2024 - Jul 2024
Methods and Tools: NLP, BERT, GPT, Deep Learning, Literature Review, Data Analysis, Python (TensorFlow/PyTorch)

- Built an NLP pipeline with BERT and GPT models for semantic analysis of product descriptions and applied transformer-based architectures to quantify their impact on sales performance through regression techniques.
- Performed in-depth literature reviews, implemented statistical techniques to evaluate AI-driven consumption models, and synthesized findings from top-tier academic journals in artificial intelligence and circular economy.
- Applied LSTM networks and transfer learning with TensorFlow and PyTorch to optimize consumption and production management models within a circular economy framework and enhance business model effectiveness.

Improving Generalization of Reinforcement Learning via VRVO **Singapore**
Advisor: Professor: Professor Yang You, Dept. of Computing, National University of Singapore Apr 2023 - Sep 2023
Methods and Tools: Reinforcement Learning, PPO, PPG, Project Management, AI Model Deployment, Python

- Developed a plug-and-play Variance-Regularized Value Optimization (VRVO) method to enhance RL generalization; improved the performance of popular RL algorithms (PPO, PPG) on the Procgen benchmark.
- Contributed to the writing and publication of *The Application of AI Large Models* within the NUS HPC-AI Lab. Published in Nov. 2023, ISBN: 9787111738787; currently a bestseller on JD.com.
- Oversaw the management of the professor's startup by leading projects focused on AI model training.

RCT on the Influence of Breastfeeding on Infant Wellness **Zürich, Switzerland**
Advisor: Professor Anne Bronze, Dept. of Economics, University of Zürich Mar 2021 - Jul 2021
Methods and Tools: Data Analysis, Survey Design, Statistical Modeling, R, SPSS

- Built a health index model for infants to identify factors influencing wellness during the lactation period.
- Engineered an eighteen-month longitudinal survey for tracking breastfeeding patterns and mother-infant interaction, utilizing advanced data processing techniques for time-series analysis.

PROFESSIONAL EXPERIENCE

Sahara AI *(decentralized AI blockchain platform)* **San Francisco, CA**
Machine Learning Engineer Summer Intern Jun 2024 - Present

- Architected and implemented a NLP pipeline for real-time Twitter sentiment analysis, leveraging BERT and transformers, achieving 92 % accuracy in fine-grained emotion recognition.
- Applied A/B testing to optimize model hyperparameters, resulting in a 53% reduction in inference time without sacrificing accuracy.

CatchLight Capital Partners *(AI venture capital)* **San Francisco, CA**
Investment Analyst Intern Jun 2024 - Aug 2024

- Developed a comprehensive AI-driven evaluation system for venture capital investment analysis.
- Implemented advanced NLP and machine learning techniques to automate due diligence processes.
- Achieved a 30% improvement in deal flow efficiency and a 40% reduction in research time.

Ping An Technology *(fintech and AI solutions provider)* **Beijing, China**
AI Data Operation Intern (Part-time) Aug 2022 - Aug 2023

- Collaborated on the "FinRisk Classifier," a robust predictive model for financial risk assessment, improving loan default prediction accuracy by 12.38%; utilized advanced feature selection techniques, including SHAP values, to identify key predictors in the financial risk models.
- Implemented a novel time series forecasting model using LSTM and attention mechanisms for early loan repayment prediction, achieving an AUC of 0.85; created data visualizations for stakeholders.

Sequoia Capital China **Beijing, China**
Investment Research Intern Oct 2022 - Apr 2023

- Developed a proprietary analytical model integrating regional economic data (1992-2020) with reinforcement learning algorithms to optimize dynamic asset allocation strategies.
- Presented findings to senior management, demonstrating a 12% improvement in portfolio performance compared to traditional allocation methods, influencing strategic investment decisions.

RELEVANT PROJECTS

SENTINEL: Sophisticated Ensemble for Tracing and Identifying Non-Authentic Language **Stanford, CA**
Custom Project for CS 224n: Natural Language Processing with Deep Learning Apr 2024 - June 2024

- Developed SENTINEL, a heterogeneous ensemble framework integrating deep learning models (BERT, RoBERTa) with classical algorithms (MNB, SGD, LightGBM, CatBoost) for AI-generated text detection, achieving 94.98% accuracy and 0.9685 AUC-ROC on the Kaggle dataset.
- Engineered a custom preprocessing pipeline and hybrid feature extraction method combining RoBERTa embeddings with TF-IDF n-grams, enhancing model performance across diverse text types and styles.

TEACHING EXPERIENCE

MS&E 252: Decision Analysis I: Foundations of Decision Analysis **Stanford, CA**
Teaching Assistant Aug 2024 - Present

- Conducted problem sessions and office hours, reinforcing concepts in decision analysis and probability theory.
- Designed assignments and guided student groups on projects applying decision analysis to real-world scenarios.

MS&E 180: Organizations: Theory and Management **Stanford, CA**
Teaching Assistant Aug 2024 - Present

- Facilitated discussion panels and tracked student participation in organizational theory and management practices.
- Graded papers and group projects, providing feedback on organizational behavior concepts and their applications.

ENTREPRENEURIAL EXPERIENCE

Yummy Ninjia *(decentralized food delivery platform; yummy.ninja/)* **San Francisco, CA**
Cofounder & Chief Marketing Officer Jun 2023 - May 2024

- Secured $200,000 in seed funding through successful pitch presentations to early-stage investors.
- Designed a decentralized marketing strategy utilizing NFT-based incentives and tokenized engagement models and coordinated integration with DoorDash through smart contract automation and API collaboration.

ADDITIONAL INFORMATION

- **Languages:** Cantonese (native), Mandarin (native), English (fluent, **GRE:** verbal 163/170; quantitative: 170/170)
- **Skills:**
  - Programming Languages: Python (TensorFlow, PyTorch), R, SPSS
  - Machine Learning & AI: Reinforcement Learning (PPO, PPG, LSTM), NLP, Transformers (BERT, GPT, DistilBERT), Predictive Modeling, Time Series Forecasting
  - Data Analysis & Visualization: Statistical Modeling, Feature Selection (SHAP values), A/B Testing
- **Certificates:** Kaggle Competition - Silver Medal in LLM Detection; Udemy Certificate - Databases: The Ultimate MySQL Bootcamp); AWS Web Services - Machine Learning Foundations
- **Leadership:** Vice President, Association of Chinese Students and Scholars at Stanford (ACSSS)
- **Hobbies:** strategy games (Go, Chinese chess, gomoku), hulusi (Chinese wind instrument), skiing, writing fiction