Yang, Bing

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Research Interests

Interpretable machine learning and statistical modeling, cost-sensitive learning, prescriptive analytics, ensemble methods, high-dimensional variable selection, and non-convex optimization. Applications include credit scoring, fraud detection, customer churn prediction, and other business decision problems with asymmetric misclassification costs.

Education

KU Leuven, Department of Mathematics **Leuven, Belgium**
Section of Statistics and Data Science ***2023.02 – Present***

Ph.D. Researcher in Statistics

- Advisor: Prof. Stefan Van Aelst (ISI Elected Member, co-organizer of the Rousseeuw Prize for Statistics).
- Advisor: Prof. Tim Verdonck (Professor at University of Antwerp; BNP Paribas Fortis and Allianz Chair Professor).
- Dissertation: Interpretable ensemble decision models — theory, algorithms, and business applications.
- Institutional rankings: KU Leuven is ranked 46th in the Times Higher Education World University Rankings (2026) and 59th in the QS World University Rankings (2027); it ranked 1st in Reuters Europe's Most Innovative Universities for four consecutive years (2016–2019).

Peking University, Guanghua School of Management **Beijing, China**
Department of Business Statistics and Econometrics ***2016.09 – 2018.07***

M.Econ.

- Advisor: Songxi Chen (Member of the Chinese Academy of Sciences).
- Thesis: *The Application of Tree Models on $PM_{2.5}$*.
- Participated in a master's research project on statistical diagnostic models for air quality, National Key R&D Program of China, Ministry of Science and Technology, Grant No. 2016YFC0207700, 2016–2020.

Huazhong University of Science and Technology **Wuhan, China**
School of Mathematics and Statistics ***2012.09 – 2016.07***

B.Sc. in Statistics

- Undergraduate Outstanding Student, Qiming College (HUST undergraduate elite innovation talent program, featuring one-on-one faculty mentoring and individualized study plans).
- Mentor: Prof. Jinqiao Duan (Changjiang Scholar, Ministry of Education; Executive Dean of the School of Sciences, Great Bay University).

Publications

Published

[1] Yang, B., Van Aelst, S., & Verdonck, T. (2026). Diverse ensemble cost-sensitive logistic regression. *European Journal of Operational Research* (**ABS 4**), 328(1), 282–294. doi:10.1016/j.ejor.2025.07.028

We propose a cost-sensitive ensemble of logistic regressions that minimizes the expected decision cost while retaining the interpretability of logistic regression coefficients. A diversity penalty is incorporated into a non-convex

expected-cost objective to encourage complementary base learners. We develop a partial conservative convex separable quadratic approximation (PCCSQA) algorithm to efficiently solve this non-convex problem. On credit scoring and fraud detection benchmarks, the method achieves lower decision costs than existing approaches.

Under Revision

[2] Yang, B., Van Aelst, S., & Verdonck, T. Ensemble cost-sensitive logistic regression models with mixed-type penalty. Under revision at *Information Sciences* (**JCR Q1 / CAS Q1 Top**).

To tackle real-world datasets with mixed-type predictors (nominal, ordinal, and continuous), we propose an ensemble cost-sensitive logistic regression model incorporating a mixed-type regularization penalty. This approach enables flexible structured variable selection while preserving the full interpretability of logistic regression under asymmetric misclassification costs. Furthermore, we develop a dedicated optimization algorithm embedded within a partial conservative convex separable quadratic approximation (PCCSQA) framework to efficiently compute sparse solutions to this non-convex problem.

Work in Progress

[3] *Sparse Prescriptive Learning.*

Building on Bertsimas et al.'s framework for prescriptive analytics, we introduce sparse regularization to identify a parsimonious set of "prototypes" from historical data, replacing the use of all historical samples when generating new decisions. Each new decision therefore relies only on a small set of key reference cases, improving computational efficiency while preserving the flexibility of prescriptive analytics and strengthening the connection between the model's prescriptions and the human intuition of making decisions from representative past experiences.

Conference Presentations

- "Ensemble Cost-Sensitive Logistic Regression Models With Multi-Type Lasso Penalty." oral presentation, 15th Scientific Meeting of the Classification and Data Analysis Group, Naples, Italy, 2025/09.
- "Diverse Ensemble Cost-Sensitive Logistic Regression." oral presentation, 31st Annual Meeting of the Royal Statistical Society of Belgium, 2024/11.

Honors & Awards

- **National Scholarship** (Three consecutive years) 2013 – 2015
- **National First Prize**, Contemporary Undergraduate Mathematical Contest in Modeling 2014
- **National First Prize in the Finals**, Chinese Mathematics Competition (Mathematics Major) 2014
- **Lingrui Scholarship**, Guanghua School of Management, Peking University 2018
- **Peking University Excellent Teaching Assistant Award** (Probability & Statistics) 2017
- **"Pacesetter of Excellent Students"** (Highest undergraduate honor at HUST) 2016
- **Excellent Graduate**, HUST 2016
- **Samsung Scholarship** 2014

Teaching

Statistical Inference and Data Analysis **KU Leuven**

Teaching Assistant ***2023 – 2025***

- Led exercise sessions, designed assignments, graded coursework, and held office hours over three academic years.

Statistical Tools for Quantitative Risk Management **KU Leuven**

Teaching Assistant ***2023 – 2025***

- Assisted with lab sessions on statistical risk modeling and R-based data analysis over three academic years.

Statistical Data Analysis **KU Leuven**

Teaching Assistant ***2025 – 2026***

Probability and Statistics **Peking University**

Teaching Assistant ***2017***

Industry Experience

Shougang Fund **Beijing, China**

Post-Investment Management ***2018.07 – 2021.07***

- Supported the NASDAQ IPO of Li Auto (LI) and the STAR Market IPO of Beijing Bayi Space (688181), including subsequent equity dispositions.
- Managed portfolio companies: periodic financial and operational analysis, follow-on financing coordination, board matters, and exit timing assessment.
- The experience provided first-hand exposure to asymmetric risks in business decisions; a growing interest in research led me to return to academia, where these practical problems became the starting point of my doctoral work.

Skills

- Programming: R (primary research language), C++, Python, MATLAB, SQL, LaTeX.
- Languages: Mandarin (native), English (working proficiency, IELTS 6.5, CET-6 577).