

Frank XING

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Research Interests

Natural Language Processing
Knowledge Engineering
Information Systems Design
Financial Forecasting and Optimization

Professional Appointments

Assistant Professor, National University of Singapore Conceived the "Financial Information & Knowledge Engineering" research group Developed a new course at the Department of Information Systems and Analytics	2021 - now
Presidential Postdoctoral Fellow, Nanyang Technological University Amongst 12 awardees selected from 894 cross-disciplinary applicants worldwide	2019 - 2021
Machine Learning Specialist, Continental AG Acted as a tech lead and mentored innovation projects in NLP and machine learning	2018 - 2019

Academic Qualifications

PhD in Computing and Data Science, Nanyang Technological University Thesis: Textual knowledge integration for financial asset management	2016 - 2019
BSc in Information Systems / BA in Economics, Peking University Thesis: Weakly supervised image semantic segmentation with conditional random field	2011 - 2015

Awards and Honors

Presidential Postdoctoral Fellowship, Nanyang Technological University	2019
Temasek Research Scholarship, Nanyang Technological University	2016
May Fourth Scholarship, Peking University	2013
Wang Jin-Yun Scholarship, Wuhan No.2 Middle School	2011

Research Grants

Advancing Information-intensive Financial Modeling with NLP Solutions, Role: PI Singapore Ministry of Education AcRF Tier 1, SGD 180,000	2021 - 2024
Innovative Approaches to Portfolio Optimization, Role: PI NTU Presidential Postdoctoral Fellowship Research Grant, SGD 200,000	2019 - 2021
Conti+ Service Chatbot, Role: Staff Continental Internal R&D Project, EUR 30,070	2018
Irony Detection on the Internet, Role: PI PKU President's Undergraduate Research Fellowship, CNY 2,000	2013

Citations

Web of Science	count: 1080	h-index: 11
Scopus	count: 1499	h-index: 14
Google Scholar	count: 2232	h-index: 15

Books and Chapters

1. **Xing, F.**; Cambria, E.; Welsch, R. E. (2019). Intelligent Asset Management. **Springer International Publishing**. In Series "Socio-Affective Computing", ISBN: 978-3-030-30262-7.

Journal Papers

12. **Xing, F.** (2025). Designing heterogeneous LLM agents for financial sentiment analysis. *ACM Transactions on Management Information Systems*. forthcoming.
11. Cesarini, M.; Malandri, L.; Pallucchini, F.; Seveso, A.; and **Xing, F.** (2024). Explainable AI for text classification: Lessons from a comprehensive evaluation of post hoc methods. *Cognitive Computation*.
10. Du, K.; **Xing, F.**; Mao, R.; and Cambria, E. (2024). Financial sentiment analysis: Techniques and applications. *ACM Computing Surveys*. 56(9), art 220, pp 1-42.
9. **Xing, F.** (2024). Financial risk tolerance profiling from text. *Information Processing & Management*. 61(4), 103704.
8. Du, K.; **Xing, F.**; and Cambria, E. (2023). Incorporating multiple knowledge sources for targeted aspect-based financial sentiment analysis. *ACM Transactions on Management Information Systems*. 14(3), art 23, pp 1-24.
7. Ma, Y.; Nguyen, K. L.; **Xing, F.**; and Cambria, E. (2020). A survey on empathetic dialogue systems. *Information Fusion*. 64, pp 50-70.
6. **Xing, F.**; Cambria, E.; and Zhang, Y. (2019). Sentiment-aware volatility forecasting. *Knowledge-Based Systems*. 176, pp 68-76.
5. **Xing, F.**; Cambria, E.; and Welsch, R. E. (2019). Growing semantic vines for robust asset allocation. *Knowledge-Based Systems*. 165, pp 297-305.
4. **Xing, F.**; Pallucchini, F.; and Cambria, E. (2019). Cognitive-inspired domain adaptation of sentiment lexicons. *Information Processing & Management*. 56(3), pp 554-564.
3. Malandri, L.; **Xing, F.**; Orsenigo, C.; Vercellis, C.; and Cambria, E. (2018). Public mood-driven asset allocation: The importance of financial sentiment in portfolio management. *Cognitive Computation*. 10(6), pp 1167-1176.
2. **Xing, F. Z.**; Cambria, E.; and Welsch, R.E. (2018). Intelligent asset allocation via market sentiment views. *IEEE Computational Intelligence Magazine*. 13(4), pp 25-34.
1. **Xing, F. Z.**; Cambria, E.; and Welsch, R.E. (2018). Natural language based financial forecasting: A survey. *Artificial Intelligence Review*. 50(1), pp 49-73.

Conference Papers

17. Du, K.; **Xing, F.**; Mao, R.; and Cambria, E. (2024). Explainable stock price movement prediction using contrastive learning. *CIKM*. Boise, USA.
16. Du, K.; Mao, R.; **Xing, F.**; and Cambria, E. (2024). A dynamic dual-graph neural network for stock price movement prediction. *IJCNN*. Yokohama, Japan.

15. Du, K.; **Xing, F.**; Mao, R.; and Cambria, E. (2024). An evaluation of reasoning capabilities of large language models in financial sentiment analysis. *IEEE CAI*. Singapore, Singapore.
14. Qi, Q. and **Xing, F.** (2023). Leveraging interactions for stationary and dynamic financial distress prediction: A spatio-temporal financial graph attention network. *ICIS*. Hyderabad, India.
13. Chen, S. and **Xing, F.** (2023). Understanding emojis for financial sentiment analysis. *ICIS*. Hyderabad, India.
12. Du K.; **Xing, F.**; Mao, R.; and Cambria, E. (2023). FinSenticNet: A Concept-Level Lexicon for Financial Sentiment Analysis. *SSCI*. Mexico City, Mexico.
11. Saha, J.; Patel, S.; **Xing, F.**; and Cambria, E. (2022). Does social media sentiment predict Bitcoin trading volume? *ICIS*. Copenhagen, Denmark.
10. Cambria, E.; Liu, Q.; Decherchi, S.; **Xing, F.**; and Kwok, K. (2022). SenticNet 7: A commonsense-based neuro-symbolic AI framework for explainable sentiment analysis. *LREC*. Marseille, France.
9. Young, T.; **Xing, F.**; Pandelea, V.; Ni, J.; and Cambria, E. (2022). Fusing task-oriented and open-domain dialogues in conversational agents. *AAAI*. Vancouver, Canada.
8. **Xing, F.**; Hoang, D.-H.; and Vo, D.-V. (2021). High-frequency news sentiment and its application to forex market prediction. *HICSS*. Online.
7. **Xing, F.**; Malandri, L.; Zhang, Y.; and Cambria, E. (2020). Financial sentiment analysis: An investigation into common mistakes and silver bullets. *COLING*. Online.
6. Cambria, E.; Li, Y.; **Xing, F.**; Poria, S.; and Kwok, K. (2020). SenticNet 6: Ensemble application of symbolic and subsymbolic AI for sentiment analysis. *CIKM*. Online.
5. Bai, H.; **Xing, F.**; Cambria, E.; and Huang, W.-B. (2019). Business taxonomy construction using concept-level hierarchical clustering. *FinNLP@IJCAI*. Macao, China.
4. **Xing, F. Z.**; Cambria, E.; Malandri, L.; and Vercellis, C. (2018). Discovering Bayesian market views for intelligent asset allocation. *ECML-PKDD*. Dublin, Ireland.
3. **Xing, F. Z.**; Cambria, E.; and Zou, X. (2017). Predicting evolving chaotic time series with fuzzy neural networks. *IJCNN*. Anchorage, USA.
2. **Xing, F. Z.**; Cambria, E.; Huang, W.-B.; and Xu, Y. (2016). Weakly supervised semantic segmentation with superpixel embedding. *ICIP*. Phoenix, USA.
1. **Xing, F. Z.** and Xu, Y. (2015). A logistic regression model of irony detection in Chinese internet texts. *CICLing*. Cairo, Egypt.

Guest Editorials

4. **Xing, F.**; Schuller, B.; Chaturvedi, I.; Cambria, E.; and Hussain, A. (2023). Neurosymbolic AI for sentiment analysis. *IEEE Transactions on Affective Computing*. 14(3), pp 1711-1715.
3. Cambria, E.; **Xing, F.**; Thelwall, M.; and Welsch, R. (2022). Sentiment analysis as a multidisciplinary research area. *IEEE Transactions on Artificial Intelligence*. 3(5), pp 638-641.
2. Malandri, L.; Porcel, C.; **Xing, F.**; Serrano-Guerrero, J.; and Cambria, E. (2022). Soft computing for recommender systems and sentiment analysis. *Applied Soft Computing*. 118, 108246.
1. **Xing, F.**; Poria, S.; Cambria, E.; and Welsch, R. (2020). Social media marketing and financial forecasting. *Information Processing & Management*. 57(5), 102314.

Preprints

3. Xing, F. (2024). The financial effects of ESG Content. *Under review*.
2. Wu, X.; Li, L.; Tao, X.; Xing, F.; and Yuan, J. (2024). Ordinal Factor Consistency as Domain Knowledge for Trustworthy Machine Learning. *Under review*.
1. Xing, F. and Wang, C. (2023). Managing Sentiment Analysis: A Method Selection Framework. *Under review*.

Invited Talks and Presentations

6. **Sustainability reporting: behaviors, textual clues, and financial effects**
A*STAR CI Research Seminar, Singapore, Sep 2023
NUS-DISA Summer Research Workshop, Singapore, Jul 2022
University of Milano-Bicocca Research Seminar, Milan, Italy, Jun 2022
5. **Financial sentiment analysis: a neurosymbolic approach**
University of Essex Research Seminar, Colchester, UK, Nov 2021
4. **Financial sentiment analysis and sentiment time series**
Singapore Symposium on Sentiment Analysis, Singapore, Mar 2021
Wuhan University of Technology Research Forum, Wuhan, China, Mar 2019
3. **Three interfaces between NLP and asset allocation**
International Conference on Computational and Methodological Statistics, Virtual, Dec 2020
Knut Wicksell Centre for Financial Studies Workshop, Lund, Sweden, Jan 2020
2. **Managing your finances with AI**
NTU Institute of Advanced Studies Webinar, Virtual, May 2020
1. **Stock market prediction meets uncertainty and high-dimension**
Westlake University Research Seminar, Hangzhou, China, Oct 2019

Teaching

2. **National University of Singapore**
BT4016: Risk Analytics for Financial Services (Spring 2023, Spring 2024)
IS3107: Data Engineering [New] (Spring 2022, Fall 2022, Fall 2023, Fall 2024)
IS6000: Topics in Information Systems and Analytics Research (Fall 2021)
1. **Nanyang Technological University**
CZ 4034 (TA): Introduction to Information Retrieval (Spring 2021, Spring 2016)
CZ 2002 (TA): Object Oriented Design & Programming in Java (Spring 2016))

Supervision and Placement

Doctoral Students

K. Du (2022-2025), co-advised, Research Title: financial sentiment analysis

Notable Master/Bachelor Students

I. Koh (2023-2024), Research Title: Predictive text analytics of company innovation outcomes
J. Sun (2023-2024), Research Title: High-freq dependence structure of crypto returns, Placement: NUS
S. Chen (2022-2023), Research Title: Effects of emojis in sentiment analysis, Placement: BYBIT
T. Wee (2022-2023), Research Title: Mapping ESG trends across equity markets, Placement: RSAF
F. Pallucchini (2018-2019), Research Title: Domain adaptation of sentiment lexicons, Placement: UNIMIB

Research Assitants

C. Wang (2023-2024), Placement: University of Connecticut
X. Chen (2020-2021), Placement: University of Hong Kong

Academic and Departmental Services

Journal Guest Editor

IEEE Transactions on Affective Computing, special issue 14(4)	2023
IEEE Transactions on Artificial Intelligence, special issue 3(5)	2022
Applied Soft Computing, special issue 118	2022
Information Processing & Management, special issue 57(5)	2020

Conference Chair / AE

Associate Editor, Pacific Asia Conference on Information Systems	2024
Session Chair, International Conference on Computational Linguistics	2020

Journal and Conference Reviewer

Information Fusion (InfFus) - <i>Outstanding Contribution Award</i>	2019
Knowledge-Based Systems (KBS) - <i>Outstanding Contribution Award</i>	2018
ACM Transactions on Management Information Systems (TMIS)	2024
Decision Support Systems (DSS)	2023
IEEE Transactions on Affective Computing (TAC)	2019 - 2023
IEEE Transactions on Engineering Management (TEM)	2020
IEEE Computational Intelligence Magazine (CIM)	2019
Information Processing & Management (IPM)	2018 - 2023
Information Systems Frontiers (ISFI)	2022
International Journal of Forecasting (IJF)	2020

AAAI Conference on Artificial Intelligence (AAAI)	2021 - 2022
International Joint Conference on Artificial Intelligence (IJCAI)	2021 - 2022
International Conference on Artificial Intelligence and Statistics (AISTATS)	2021
Annual Meeting of the Association for Computational Linguistics (ACL)	2021 - 2022
Economics and Natural Language Processing Workshop (ECONLP)	2021, 2024
International Conference on Information Systems (ICIS)	2022, 2024
Hawaii International Conference on System Sciences (HICSS)	2021 - 2022
Pacific Asia Conference on Information Systems (PACIS)	2023

Grant Proposal Reviewer

The Czech Science Foundation: Standard & Lead Projects	2021 - 2024
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Professional Society Membership

ACM (Association for Computing Machinery)	2023 - 2024
AIS (Association for Information Systems)	2021 - 2024
INFORMS (Institute for Operations Research and Management Sciences)	2020 - 2023
IEEE (Institute of Electrical and Electronics Engineers)	2016 - 2017

Administrative Services

Interviewer, UG Aptitude Based Admissions, NUS School of Computing	2022
Interviewer, Faculty Candidate Evaluation, NUS School of Computing	2021 - 2023
Interviewer, Discretionary Admission and Scholarship Selection, NUS School of Computing	2021 - 2022
Member, Publication Ranking Committee, NUS School of Computing	2021 - 2024
Final Year Project Evaluator, NUS School of Computing	2021 - 2024
PhD Thesis Proposal Examiner, NUS School of Computing	2022 - 2023