

# Zexun Chen

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Homepage: [gauss.world](http://gauss.world)  
GitHub: [Magica-Chen](https://github.com/Magica-Chen)

## ACADEMIC APPOINTMENTS

- 2021– University of Edinburgh Business School, Edinburgh, UK  
Lecturer/Assistant Professor in Predictive Analytics
- 2019–21 Department of Computer Science, College of Engineering, Mathematics and Physical Sciences, University of Exeter, UK  
Postdoctoral Research Associate in US Army project "Identification of Human Mobility Modes using Socio-Spatio-Temporal Predictive Models"
- 2020 –20 Department of Computer Science, College of Engineering, Mathematics and Physical Sciences, University of Exeter, UK  
Lecturer in Computer Science
- 2017–19 Department of Informatics, University of Sussex, UK  
Research Fellow in EPSRC project " EthicalML: Injecting Ethical and Legal Constraints into Machine Learning Models"

## EDUCATION

- PhD Mathematics, thesis: "Gaussian Process and its Extensions for Machine Learning and Financial Time Series Analysis", University of Leicester, UK, 2017.  
Supervisors: Prof Alexander Gorban, Dr Bo Wang.
- BSc Mathematics and Applied Mathematics, thesis: "The study of Fourth-order Sturm-Liouville Eigenvalue Problems with Dirichlet Boundary Condition", Shandong University, China, 2013.

## RESEARCH AREAS

Probabilistic machine learning, Bayesian non-parametric predictive models and their applications, e.g. Gaussian Process and its extensions and applications

Time series forecasting, financial data analysis, quantitative risk management

Ethical machine learning, fairness, privacy and transparency in machine learning

Complex network modelling, e.g., social network, human mobility and urban planning

AI applications, e.g., machine learning in engineering, credit scoring, risk modelling

## PUBLICATIONS

### Articles in Peer-Reviewed Journals

- 2023 Zexun Chen, Jun Fan, and Kuo Wang. Multivariate Gaussian processes: definitions, examples and applications. *METRON*, pages 1–11, 2023. URL <https://doi.org/10.1007/s40300-023-00238-3>
- 2022 Zexun Chen, Sean Kelty, Alexandre G Evsukoff, Brooke Foucault Welles, James Bagrow, Ronaldo Menezes, and Gourab Ghoshal. Contrasting social and non-social sources of predictability in human mobility. *Nature Communications*, 13(1):1–9, 2022. URL <https://doi.org/10.1038/s41467-022-29592-y>
- 2021 Yangtao Li, Tengfei Bao, Zexun Chen, Zhixin Gao, Xiaosong Shu, and Kang Zhang. A missing sensor measurement data reconstruction framework powered by multi-task Gaussian process regression for dam structural health monitoring systems. *Measurement*, 186:110085, 2021a. ISSN 0263-2241. URL <https://doi.org/10.1016/j.measurement.2021.110085>
- 2021 Yangtao Li, Tengfei Bao, Hao Chen, Kang Zhang, Xiaosong Shu, Zexun Chen, and Yuhan Hu. A large-scale sensor missing data imputation framework for dams using deep learning and transfer learning strategy. *Measurement*, 178:109377, 2021b. ISSN 0263-2241. URL <https://doi.org/10.1016/j.measurement.2021.109377>
- 2020 Yangtao Li, Tengfei Bao, Xiaosong Shu, Zexun Chen, Zhixin Gao, and Kang Zhang. A hybrid model integrating principal component analysis, fuzzy C-means and Gaussian process regression for dam deformation prediction. *Arabian Journal for Science and Engineering*, pages 1–14, 2020. URL <https://doi.org/10.1007/s13369-020-04923-7>
- 2020 Thomas Kehrenberg, Zexun Chen, and Novi Quadrianto. Tuning fairness by balancing target labels. *Frontiers in Artificial Intelligence*, 3:33, 2020. URL <https://doi.org/10.3389/frai.2020.00033>
- 2019 Zexun Chen, Bo Wang, and Alexander N Gorban. Multivariate Gaussian and Student-t process regression for multi-output prediction. *Neural Computing and Applications*, pages 1–24, 2019. URL <https://doi.org/10.1007/s00521-019-04687-8>
- 2018 Zexun Chen and Bo Wang. How priors of initial hyperparameters affect Gaussian process regression models. *Neurocomputing*, 275:1702–1710, 2018. ISSN 0925-2312. URL <https://doi.org/10.1016/j.neucom.2017.10.028>

### Open-Source Libraries

- Python Location: PyPI/GitHub; Name: “Co-locationship”; Link: <https://github.com/Magica-Chen/co-locationship>  
A simple library to build co-location network to leverage information transfer in social and co-location networks to improve predictability in human mobility.
- Python (PyTorch) Location: GitHub; Name: “fairness-comparison”; Link: <https://github.com/predictive-analytics-lab/fairness-comparison>  
This repository is meant to facilitate the benchmarking of fairness-aware machine learning algorithms.

Python (TensorFlow)

Location: GitHub; Name: "UniversalGP"; Link:

<https://github.com/predictive-analytics-lab/UniversalGP>

A basic generic (GPU-based) implementation for Gaussian process models.

Matlab Location: GitHub; Name: "gptp-multi-output"; Link:

[https://github.com/Magica-Chen/gptp\\_multi\\_output](https://github.com/Magica-Chen/gptp_multi_output)

A light library for multivariate Gaussian process regression (MV-GPR) and multivariate Student-t process regression (MV-TPR).

### Journal Article Manuscripts Under Review

- 2024 Diogo Pacheco, Marcos Oliveira, Zexun Chen, Hugo Barbosa, Brooke Foucault-Welles, Gourab Ghoshal, and Ronaldo Menezes. Predictability states in human mobility. *arXiv preprint arXiv:2201.01376*, 2022. URL <https://doi.org/10.48550/arXiv.2201.01376>

### Working Paper

- 2024 Multivariate Gaussian Process Model with Heterotopic and Heteroscedastic Data  
2024 Peer-induced Fairness: A Simple Causal Approach for Algorithmic Discrimination Discovery in Credit Approval  
2024 Term Structure of Risk Metrics: A Firm-level Perspective

### INVITED TALKS AND POSTERS

- 2024/03 Invited Talk, 'Are we predictable? – Information transfer in co-location networks.' Wuhan University of Technology, Wuhan, China.  
2024/03 Invited Talk, 'Generic inference for Gaussian process models.' Central South University, Changsha, China.  
2023/07 Poster, 'Contrasting social and non-social sources of predictability in human mobility.' Conference on Network Science (NetSci2023), Vienna, Austria.  
2023/07 Poster, 'Information Transfer in co-location networks.' 9th International Conference on Computational Social Science, Copenhagen, Denmark.  
2023/06 Invited Talk, 'Are we predictable? – Information transfer in co-location networks.' The Beijing University of Technology, Beijing, China.  
2023/04 Invited Talk, 'Information transfer in co-location networks.' Silesian University in Opava, School of Business Administration in Karvina, Karvina, Czech Republic.  
2020/06 Invited Talk, 'Probabilistic modelling: Gaussian Process for Machine Learning.' The 3rd DUT Xinghai International Forum for Young Scholars, Dalian University of Technology (DUT), online webinar, China.  
2019/12 Invited Talk, 'Gaussian Process for Machine Learning.' Shandong University, Weihai, China.

## GRANTS AND AWARDS

### Awards and Honours

- 2018      **Exceptional Promise**, endorsed by Tech Nation and issued Tier 1 Exceptional Visa (UK)  
2014      **Outstanding Bachelor Thesis**, Shandong Provincial Education Department, China

### Grants and Fellowships

- 2023      "Levelling up in AI-powered Smart City" (GBP 10,000). CAHSS Challenge Investment Fund: Round 17, College of Arts, Humanities and Social Sciences, The University of Edinburgh, PI.  
2022      "Determinants of Collaboration level on GitHub" (USD 6, 000). Open-Source Complex Ecosystems and Networks (OCEAN) Award, Vermont Complex Systems Center at the University of Vermont, Co-PI with Dr Tong Wang.  
2021      "Interpretable and Scalable Data-Driven Models in Financial Time Series Analysis" (GBP 5,086). First Grant Venture Fund, University of Edinburgh Business School, PI.  
2020      "Bank Credit Management towards Small and Micro Enterprises using Financial Big Data" (CNY 200,000). Industrial Grant, Bank of Rizhao, Shandong, China, Co-PI.

## TEACHING EXPERIENCE

### The University of Edinburgh, UK

Postgraduate: [CMSE11206 Business Statistics](#)

Postgraduate: [CMSE11427 Web and Social Network Analytics](#)

Postgraduate (Online): [CMSE11615 Data Analysis and Statistics for Business](#)

Postgraduate: [CMSE11624 Statistics for Analytics](#)

### University of Exeter, UK

Undergraduate: ECM1400 Programming

Undergraduate: ECM1407 Social and Professional Issues of the Information Age

Undergraduate: ECM1413 Computer and Internet

### edX.org, online

MicroMasters Program in Predictive Analytics using Python

## PROFESSIONAL SERVICE AND MEMBERSHIP

### Journal Peer Review

*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*

*Pattern Recognition*

*Technometrics*

*Engineering with Computers*  
*Environmental Modelling & Software*  
*Transportation Research Part C: Emerging Technologies*  
*Neural Computing and Applications*  
*Applied Sciences*  
*Journal of Forecasting*  
*Sustainability*  
*International Journal of Geo-Information*  
*The European Journal of Finance*

### **Conference Review**

*Association for the Advancement of Artificial Intelligence (AAAI)*

### **Service to Field**

Research Seminar Organiser of Management Science and Business Economics group, University of Edinburgh Business School

Committee Member of Royal Statistical Society Young Statisticians Section.

Funding reviewer of U.S-Israel Binational Science Foundation

### **Membership**

Member of London Mathematical Society (IMS)

Member of Institute of Mathematics and its Applications (MIMA)

Data Analyst / Fellow of Royal Statistical Society (RSS)

Fellow of Higher Education Academy (FHEA)

## **TECHNICAL SKILLS**

### **IT Skill**

*Programming Languages:* Matlab, C++, Python (TensorFlow, PyTorch), R, Lingo, Maple, Mathematica, Origin, etc

*Version Control:* SVN, Git

*Cloud Platform:* AWS EC2

*Office Software:* Word, Latex

### **Data Skill**

*Data Visualisation:* Excel, R, Plotly, Tableau, etc

*Data Analysis:* Excel (VBA), R, Matlab, SPSS, etc.

### **Language**

Fluent English user and native speaker of Chinese (Mandarin and Shanghaiese)

Updated May 2024