

# Lingyu Li

🔗 [lingyuli.netlify.app/](https://lingyuli.netlify.app/)    [github.com/LingyuLi-math](https://github.com/LingyuLi-math)    [linkedin.com/in/lingyu-li-838783207](https://www.linkedin.com/in/lingyu-li-838783207)

📄 <https://scholar.google.com/citations?hl=zh-CN&user=aAmUccYAAAAJ>

☎ (+86) 18366138024   📞 (+852) 59186313   ✉ [sdnully2012@163.com](mailto:sdnully2012@163.com)   ✉ [lingyuli@mail.sdu.edu.cn](mailto:lingyuli@mail.sdu.edu.cn)

📍 No. 17923, Jingshi Road, Lixia District, Jinan, Shandong, China

📅 1 Jun 1992, Dong'e, Shandong, China



## CV of Miss Lingyu Li

**Bio.** I am currently a 4th-year PhD candidate at School of Control Science and Engineering, Shandong University, China, working with Prof. Zhi-Ping Liu on **Research on Biomarker Discovery Methods Based on Regularized Feature Selection**.

**Research interests.** Bioinformatics, Biomarker discovery, Sparse statistical learning, Data mining, Feature selection.

## Educations

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|----------------------------------|--|
| Sep 2019–<br>Jun 2023 (expected) | <b>PhD Candidate in Biomedical Engineering</b> , <i>Shandong University</i> (SDU), Jinan<br><b>PhD thesis</b> : Research on biomarker discovery methods based on regularized feature selection<br><i>Advisor: Prof. Zhi-Ping Liu, GPA: 94.80/100   Rank: 1/44</i>                        |
| Dec 2021–Dec 2022                | <b>Joint training PhD</b> , <i>The University of Hong Kong</i> (HKU), Hong Kong, China<br><b>Collaborations</b> : Application of Boolean Networks and Optimization Algorithms in Bioinformatics<br><i>Advisor: Prof. Wai-Ki Ching, Topics: Mathematical Programming and Optimization</i> |
| Sep 2016–Jun 2019                | <b>Master of Computational Mathematics</b> , <i>Shandong Normal University</i> (SDNU), Jinan<br><b>Master thesis</b> : Numerical methods and theoretical analysis of a class of groundwater pollution problems<br><i>Advisor: Prof. Ziwen Jiang, GPA: 3.98/5.0   Rank: 1/8</i>           |
| Sep 2012–Jun 2016                | <b>Bachelor of Mathematics and Applied Mathematics</b> , <i>Shandong Normal University</i> (SDNU), Jinan<br><b>Bachelor thesis</b> : Uniform convergence of function term series and its application<br><i>Advisor: Prof. Jinjun Fan, GPA: 3.51/5.0   Rank: 26/204</i>                   |

## Researches

- Bioinformatics**: Biomarker discovery, Machine learning, Feature selection, Boolean network, Gene expression data
- Mathematics**: Sparse statistical learning, Network-constrained regularization, Inverse problem, Numerical solution of PDEs
- Main Courses**: Data Mining, Biomedical Big Data, Applied Statistical Analysis, Differential Method, Functional Analysis, Finite Element Method, Modern Partial Differential Equation Theory, Application Software and Programming

## Publications

- Yaohua Chang, **Lingyu Li**, Liangjie Sun, Wai-Ki Ching, and Zhi-Ping Liu\*. “GO4Cancer: Revealing function changes from rewiring regulations by network ontology analysis”, In preparing.  
Gene ontology (GO) Function enrichment analysis Endometrial cancer Difference molecular networks Precision medicine
- **Lingyu Li**, Liangjie Sun, Guangyi Chen, Chi-Wing Wong, Wai-Ki Ching\*, and Zhi-Ping Liu\*. “LogBTF: Gene regulatory network inference using Boolean threshold network model from single-cell gene expression data”, *Briefings in Bioinformatics* (**SCI, JCR: Q1, IF: 13.994**), Submitted.  
Gene regulatory network inference Boolean threshold network model Logistic regression Regularization scRNA-seq data
- **Lingyu Li**, Zhi-Ping Liu\*, and Yousif A. Algabri. “Identifying diagnostic biomarkers of breast cancer based on gene expression data and ensemble feature selection”, *Current Bioinformatics* (**SCI, JCR: Q1, IF: 4.850**), Submitted.  
Biomarker machine learning Ensemble feature selection Gene expression data Breast cancer
- **Lingyu Li**, Zhi-Ping Liu\*, “Biomarker discovery from gene expression data by connected network-constrained support vector machine”, *Expert Systems with Applications* (**SCI, JCR: Q1, IF: 8.665**), Submitted.  
Network-constrained support vector machine Biomarker discovery Connectivity Feature selection High-throughput data Breast cancer
- Yousif A. Algabri, **Lingyu Li**, and Zhi-Ping Liu\*, “scGENA: A single-cell gene co-expression network analysis framework for clustering cell types and revealing biological mechanisms”, *Bioengineering* (**SCI, JCR: Q2, IF: 5.046**), vol.9, Jun 2022.  
scRNA-seq Cell heterogeneity Gene co-expression network analysis Gene modules Biological mechanisms Human diabetic pancreas
- **Lingyu Li**, Wai-Ki Ching, Zhi-Ping Liu\*, “Robust biomarker screening from gene expression data by stable machine learning-recursive feature elimination methods”, *Computational Biology and Chemistry* (**SCI, JCR: Q2, IF: 3.737**), vol.100, Jul 2022.  
Robust biomarker discovery Machine learning Recursive feature elimination Stable feature selection High-grade serous ovarian cancer
- **Lingyu Li**, Zhi-Ping Liu\*, “A connected network-regularized logistic regression model for feature selection”, *Applied Intelligence* (**SCI, JCR: Q2, IF: 5.086**), vol.52, Jan 2022.  
Regularized logistic regression Feature selection Network-based sparse penalty Network connectivity Biomarker discovery

- **Lingyu Li**, Zhi-Ping Liu\*, “*Detecting prognostic biomarkers of breast cancer by regularized Cox proportional hazards models*”, *Journal of Translational Medicine* (SCI, JCR : Q1, IF : 8.459), vol.19, Dec 2021.  
Breast cancer Regularized Cox proportional hazards model Feature selection Biomarker Prognostic risk score
- **Lingyu Li**, Zhi-Ping Liu\*, “Discovery of spontaneous preterm birth biomarkers based on machine learning”, *Journal of Nanjing University(Natural Sciences)* (In Chinese), vol.57, no.5, Sep 2021.  
Biomarkers Spontaneous preterm birth Machine learning Feature selection Bioinformatics
- **Lingyu Li**, Zhi-Ping Liu\*, “*Biomarker discovery for predicting spontaneous preterm birth from gene expression data by regularized logistic regression*”, *Computational and Structural Biotechnology Journal* (SCI, JCR : Q1, IF : 7.271), vol.18, pp.3434-3446, Nov 2020.  
Biomarker discovery Spontaneous preterm birth Gene expression data Regularized logistic regression Feature selection Preterm risk score
- **Lingyu Li**, Ziwen Jiang\*, and Zhe Yin\*, “*Compact finite-difference method for 2D time-fractional convection–diffusion equation of groundwater pollution problems*”, *Computational and Applied Mathematics* (SCI, JCR : Q2, IF : 2.239), vol.39, no.3, May 2020.  
Compact finite-difference method Time-fractional convection–diffusion equation Stability and convergence Numerical examples
- **Lingyu Li**, Ziwen Jiang\*, and Zhe Yin, “*Fourth-order compact finite difference method for solving two-dimensional convection–diffusion equation*”, *Advances in Difference Equations* (SCI, JCR : Q1, IF : 2.803), vol.2018, no.1, Jul 2018.  
Convection–diffusion equation Compact finite difference method Fourth-order accuracy Numerical experiments
- **Lingyu Li**, Zhe Yin\*, “*Numerical simulation of groundwater pollution problems based on convection diffusion equation*”, *American Journal of Computational Mathematics* (In English), vol.7, no.3, pp.350–370, Sep 2017.  
Groundwater pollution Two-dimensional convection diffusion equation Finite difference method Visualization Numerical simulation
- **Lingyu Li**, Jinjun Fan\*, “Uniform convergence of function term series and its application”, *Journal of Shandong Normal University (Natural Science Edition)* (In Chinese), vol.31, no.4, Dec 2016.  
Function term series Uniform convergence Programming realization Application MATLAB

## Projects

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| Nov 2020 | <b>Research on Mathematical Models and Algorithms in Breast Cancer Precision Medicine, National Key R&amp;D Program, Participant</b> <ul style="list-style-type: none"> <li>– Combine Multi-omics data to develop optimization models and corresponding algorithms.<br/>Multi-omics data Regulatory network Mathematical model Precision medicine</li> </ul>   |
| Jan 2020 | <b>Research on Bioinformatics Methods for Integrating Multi-level Omics Data to Discover Complex Disease Biomarkers, National Natural Science Foundation of China (NSFC), Participant</b> <ul style="list-style-type: none"> <li>– Apply regularized regression models to select potential disease biomarkers.<br/>Complex disease Regularization Feature selection External verification R</li> </ul> |
| Jul 2019 | <b>Generalized Fractional Equation of Surface Growth : Modeling, Calculation, Analysis and Application, Shandong Provincial Natural Science Foundation of China, Participant</b> <ul style="list-style-type: none"> <li>– Use numerical methods to solve fractional equation, and perform numerical experiments.<br/>Numerical methods Theoretical analysis Numerical examples MATLAB</li> </ul>       |

## </> Competitions

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| Dec 2021 | <b>The 18th, Huawei Cup Chian Postgraduate Mathematic Contest in Modeling (GMCM), Participation</b> <ul style="list-style-type: none"> <li>– Submitted paper : Optimal modeling of anti-breast cancer drug candidates<br/>Breast cancer Compound similarity Random forests Game theory SVM Graph convolutional neural networks</li> </ul> |
| Dec 2019 | <b>The 16th, Huawei Cup GMCM, Third Prize</b> <ul style="list-style-type: none"> <li>– Submitted paper : Rapid path planning of intelligent aircraft under multiple constraints<br/>Intelligent aircraft Trajectory planning Multiple constraints Improved ant colony algorithm Algorithm complexity</li> </ul>                           |
| Dec 2017 | <b>The 14th, Huawei Cup GMCM, Third Prize</b> <ul style="list-style-type: none"> <li>– Submitted paper : Flight recovery problem<br/>Flight recovery Column generation algorithm Multi-commodity network flow model Passenger flow recovery model</li> </ul>  |
| Dec 2016 | <b>The 13th Huawei Cup GMCM, , Second Prize</b> <ul style="list-style-type: none"> <li>– Submitted paper : Analysis of genetic locus with inherited diseases and traits<br/>Genetic statistics Genome-wide association analysis (GWAS) Numerical coding Particle swarm optimization</li> </ul>  |

## ♥ Honors & Awards

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Aug 2022	HUST summer school on “Clinical Application of Epidemiology” and “Genetic and Molecular Epidemiology”
Jun 2022	HEU summer school on “Data and modeling in Biomathematics”, Obtained the achievement award
Dec 2021	SDU 2021 Outstanding Postgraduate Cadre Award, The Scholarship under SDU’s Exchange Program
Jul 2021	FDU summer school on “Application and Innovation of Data Science”, Obtained the graduation certificate
2021-2022	SDU advanced individuals in innovation & entrepreneurship (twice), outstanding communist youth league member
2020-2022	SDU first-class academic scholarship for PhD (three times), SDU outstanding graduate student (three times)
2020 & 2021	PKU 2&3rd summer school on “Biostatistics”, Completed the course and obtained the graduation certificate
Dec 2019	SDU graduate innovation competition award
Jan 2019	SDNU 2019 outstanding graduates
2013-2018	SDNU excellent student first-class scholarship (twice), second-class scholarship (three times)
Oct 2017	Shandong province 2017 excellent bachelor degree thesis
2014 & 2015	Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM) “Second prize” (twice)
Nov 2013	The 15th Chinese Student Mathematics Competition (CMC, Mathematics) “Third prize”
Oct 2013	National Encouragement Scholarship

## ⚙ Skills

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**Programming Skills :** R, Matlab, Python, C,  $\text{\LaTeX}$ , Spass, Linux

## 🗣 Languages

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English :	Reading	● ● ● ● ●	CET-4 : 514
	Listening	● ● ● ● ○	CET-6 : 467
	Speaking	● ● ● ○ ○	

(last update : 5 OCT. 2022)