

YUNRUI LU

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EDUCATION

Dartmouth College

MS in Health Data Science, research advisor Dr. Joshua Levy

Hanover, NH

Sep. 2021–Nov. 2022

Xiamen University

B.S. in Mathematical Economics, GPA: 3.68/4.0 (Ranked 1/11), thesis advisor Dr. Yue Yang

Xiamen, China

Sep. 2017–Jun. 2021

B.A. in German Language and Literature, thesis advisor Dr. Xueqin Mao

Honors: Dartmouth QBS Graduate Student Fellowship; Wang Yanan Institute for Studies in Economics Dean's List of All Semesters; Wang Yanan Institute for Studies in Economics Top Students Scholarship; Wang Yanan Institute for Studies in Economics Outstanding Graduates

PUBLICATIONS

- [1] M. Fatemi*, **Yunrui Lu***, C. Sharma, E. Feng, Z. Azher, A. Diallo, G. Srinivasan, G. Rosner, K. Pointer, B. Christensen, L. Salas, et al. Feasibility of inferring spatial transcriptomics from single-cell histological patterns for studying colon cancer tumor heterogeneity. *bioRxiv*, pages 2023–07, 2023
- [2] **Yunrui Lu**, G. Srinivasan, S. Preum, J. Pettus, M. Davis, J. Greenburg, L. Vaickus, and J. Levy. Comparison of nlp algorithms' performance under different tasks using pathology reports. *bioRxiv*, pages 2023–07, 2023
- [3] **Yunrui Lu***, R. Hamilton*, J. Greenberg, G. Srinivasan, P. Shah, S. Preum, J. Pettus, L. Vaickus, and J. Levy. Dendrite: A structured, accessible, and queryable pathology search database for streamlined experiment planning. *bioRxiv*, pages 2023–07, 2023
- [4] Z. Azher, M. Fatemi, **Yunrui Lu**, G. Srinivasan, A. Diallo, B. Christensen, L. Salas, F. Kolling IV, L. Perreard, S. Palisoul, et al. Spatial omics driven crossmodal pretraining applied to graph-based deep learning for cancer pathology analysis. *bioRxiv*, pages 2023–07, 2023
- [5] A. Suvana, R. Vempati, R. Chacko, G. Srinivasan, **Yunrui Lu**, B. Hunt, V. Torres, K. Samkoe, M. Davis, L. Fu, et al. Deltaai: Semi-autonomous tissue grossing measurements and recommendations using neural radiance fields for rapid, complete intraoperative histological assessment of tumor margins. *bioRxiv*, pages 2023–08, 2023
- [6] G. Srinivasan, M. Davis, M. LeBoeuf, M. Fatemi, Z. Azher, **Yunrui Lu**, A. Diallo, M. Montivero, F. Kolling IV, L. Perrard, et al. Potential to enhance large scale molecular assessments of skin photoaging through virtual inference of spatial transcriptomics from routine staining. *bioRxiv*, pages 2023–07, 2023
- [7] Z. Zhang, **Yunrui Lu**, S. Vosoughi, J. J. Levy, B. C. Christensen, and L. A. Salas. Hitaic: hierarchical tumor artificial intelligence classifier traces tissue of origin and tumor type in primary and metastasized tumors using dna methylation. *NAR cancer*, 5(2):zcad017, 2023
- [8] J. Greenburg, **Yunrui Lu**, S. Lu, U. Kamau, R. Hamilton, J. Pettus, S. Preum, L. Vaickus, and J. Levy. Development of an interactive web dashboard to facilitate the reexamination of pathology reports for instances of underbilling of cpt codes. *Journal of Pathology Informatics*, page 100187, 2023

* Equal Contribution

- [9] J. Levy, **Yunrui Lu**, M. Montivero, O. Ramwala, J. McFadden, C. Miles, A. G. Diamond, R. Reddy, R. Reddy, T. Hudson, et al. Artificial intelligence, bioinformatics, and pathology: Emerging trends part i—an introduction to machine learning technologies. *Advances in Molecular Pathology*, 2023
- [10] J. Levy, **Yunrui Lu**, M. Montivero, O. Ramwala, J. McFadden, C. Miles, A. G. Diamond, R. Reddy, R. Reddy, T. Hudson, et al. Artificial intelligence, bioinformatics, and pathology: Emerging trends part ii—current applications in anatomic and molecular pathology. *Advances in Molecular Pathology*, 2023

POSTERS

- [1] **Yunrui Lu**, M. Fatemi, R. Reddy, R. Reddy, C. Sharma, E. Feng, Z. Azher, F. W. Kolling, B. C. Christensen, L. A. Salas, R. E. Barney, S. M. Palisoul, G. J. Tsongalis, L. J. Vaickus, and J. J. Levy. Virtualrna and virtualprotein: Virtual staining tools to infer spatial molecular information from h&e wsi. In *Computational Quantitative Biology Annual Meeting Poster Session 2023*
- [2] M. Chan, S. Han, **Yunrui Lu**, F. Kolling, R. Steiner, T. Punshon, B. Jackson, L. Vadhat, and J. J. Levy. Cell-type specific spatial molecular, elemental and histological signatures associated with tumor metastasis. In *Computational Quantitative Biology Annual Meeting Poster Session 2023*
- [3] Z. Azher, A. Suvarna, M. Fatemi, J.-Q. Chen, Z. Zhang, B. Christensen, L. Salas, **Yunrui Lu**, L. Vaickus, and J. Levy. Interpretable multimodal and crossmodal deep learning for improved cancer pathology analysis. In *Computational Quantitative Biology Annual Meeting Poster Session 2023*

GUEST LECTURES AND TEACHING EXPERIENCE

- QBS177 Methods for Statistical Learning for Big Data**, Guest lecture: Introduction to Neural Networks – 2022
- EDIT Summer National Research Intern Program**, Guest Lecture: Cell Type Specific Spatial Molecular, Elemental, Histological Signatures Associated with Tumor Metastasis – 2023
- EDIT Summer National Research Intern Program**, Guest Lecture: Deep Learning, Image Processing and Natural Language Processing – 2023
- EDIT Summer National Research Intern Program**, Guest Lecture: Introduction to Natural Language Processing – 2022
- QBS181 Data Wrangling**: Teaching Assistant – 2022

RESEARCH EXPERIENCE

- EDIT Lab** Sep. 2021 – Nov. 2022
Dartmouth College Hanover, NH
- Participated in NLP group, comparing performances of different Deep Learning models on medical text data with Huggingface transformer
 - Analysis of Spatial Transcriptomics with cell based Graph Neural Network
- Persist Lab** Feb. 2022 – Nov. 2022
Dartmouth College Hanover, NH
- The reddit related 12,000 data points was obtained by API, and the data pre-processing and data filtering were done by using NLP related packages. There are 8,000 filtered data points
 - Participated in individual entity sentiment classification project, help team implemented machine learning and NLP models, including SVM and Bert
- The Wang Yanan Institute for Studies in Economic** Oct. 2019 - Apr. 2020
Xiamen University Hanover, NH
- Used Python to capture of more than 23,000 NBA players data and contract specific information from 2000 to 2019
 - Completed data mining, explored contract effects, and completed data visualization
 - Performed cluster analysis on players in different positions, explored the impact of player positions on contracts, and performed difference regression analysis to independently complete the research

WORK EXPERIENCE

- Clinical Research Coordinator @ Dartmouth Health** Dec. 2022 – Present
Dartmouth Health Lebanon, NH
- Participated in NLP-related research and utilized large-scale language models to classify pathological reports
 - Engaged in spatial transcriptomics research and employed an RCNN model for cell identification, as well as a graph neural network for predicting gene expression levels
 - Designed and implemented a pathology database for operational use
- Research Intern @ Deep Wisdom** Oct. 2020 – Jan. 2021
Deep Wisdom Xiamen, China

- Participated in the design of a new generation of feature search framework, using Monte Carlo tree search combined with a genetic algorithm; improved the new feature search process, and greatly reduced the search space and time complexity
- Responsible for a company named Rookie's dynamic price adjustment strategy; used greedy algorithms, Bayesian optimization and recursive strategies to implement price simulation mechanisms and build a basic simulation model, while also promoting Deep Wisdom's successful cooperation with Rookie
- Organized tutorial reference documents for the aforementioned statistical methods used
- Learned the code of Autoserious, a machine learning framework independently developed by the company, and compared the scores of Autoserious and a variety of mainstream machine learning models for stock time series forecasting

Data Scientist Intern, Youdao Dictionary Overseas Edition @ Netease

Jun. 2020 – Oct. 2020

Netease

Guangzhou, China

- Made weekly data report production fully automated with automated SQL database crawling and data cleaning, reducing the production time from 4-5 hours to 5 minutes, greatly improving work efficiency
- Regularly analyzed push articles by topic text, country, language, and time
- Analyzed the relationship between the user's comment text and the trend of scoring changes, and predicted the clicks of related articles through machine learning models; cooperated with group members to conduct A/B testing to further verify the conclusions of the analysis
- The number of clicks on articles pushed according to the predicted results of the model increased by 30%
- Used NLP and logistic regression, Bayesian and other methods to perform text sentiment analysis on user review text data
- Combined results from the text sentiment analysis with product version update information to calculate text semantic similarity and analyze the actual effect of version update; used Tableau to visualize the results
- Fed function improvements that did not achieve results back to the project team for optimization to make the version update direction closer to the actual users' ideas
- Crawled past cover image data and accessed Baidu image and text recognition API to combine the click data and train the model to construct the cover image scoring prediction mechanism

Business-to-Business (B2B) Data Analysis Intern @ Baidu

Feb. 2020 – May. 2020

Baidu

Beijing, China

- Participated in the process design of Baidu search for B2B related products; conducted product-related research and data analysis; completed the product scheme design and product cycle iteration in the B2B search scenario
- Designed selenium crawler scripts through Python, and worked with the team to overcome the anti-crawling measures using nearly 100,000 high-quality crawling data points
- Used Python for data analysis, investigating the actual product situation on the website
- Participated in the completion of product design and related reports, and collaborated with the team to promote the complete operation of the project

LEADERSHIP AND COMMUNITY ACTIVITIES

Leader of the Teaching Team and Member of the Turtle Conservation Team

Aug. 2018 – Sep. 2028

Galle

Galle, Sri Lanka

- Organized team members to bring small English games to kindergartens
- Supervised local kindergarten and primary school children for 4 weeks
- Led and planned primary school English teaching plans, teaching English writing and speaking
- Supported the Sea Turtle Conservation Center in the transportation of sea turtles twice a week

Head of the Teaching Department and German Teacher @ XMU

Sep. 2017 – Aug. 2018

Xiamen University

Xiamen, China

- Organized university students' innovation and entrepreneurship project
- Led Xiamen University's language teaching program, teaching basic grammar, vocabulary, and national culture in multiple languages
- Led a team of over 30 people, planned the teaching content and the use of classroom locations for the language program, which had more than 300 participants
- Responsible for the vocabulary and cultural components of German teaching, completing a 12-class teaching plan in one semester of volunteer teaching activities

Foreign Languages College Student Union @ XMU

Sep. 2017 – Jul. 2018

Xiamen University

Xiamen, China

- Assisted in hosting school sports games, "Super Cup" school basketball league, school football league and many other school level events

- Promoted the training of students in the department's history one month before the first sports meeting, planned to execute the pre-match training activities of nearly 80 people in the undergraduate and graduate schools, found and planned the training content and the work plan of the responsible personnel, and finally obtained the school-level sports meeting foreign language college Historical best award
- Promoted the organization of large-scale school-level activities led by the student union of the college, e.g. "The God of Achievement", the competition attracted more than 150 teams, making this event a traditional college activity

AWARDS

Dartmouth **Fellowship** – 2022

Dartmouth **Fellowship** – 2021

Undergraduate Honor Graduated Student

Undergraduate High Honor Thesis

Undergraduate Top Student **Scholarship** – 2020

Undergraduate Top Student **Scholarship** – 2019

Undergraduate Top Student **Scholarship** – 2018