# Kechun Liu

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## Research Interest

I am a fourth-year Ph.D. student in the GRAIL lab at the University of Washington, Seattle, advised by Prof. Linda Shapiro. My research interests are in the area of generative models, representation learning, real-world computer vision tasks, and medical image analysis.

## Education

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|---|---|---|
| 2019 – present | ◇ | **Ph.D. student**, Computer Science & Engineering, University of Washington. Advisor: Linda Shapiro |
| 2019 – 2021 | ◇ | **M.S.**, Computer Science & Engineering, University of Washington. Overall GPA: 3.87/4.0 |
| 2015 – 2019 | ◇ | **B.Eng.**, Electronic Engineering, Tsinghua University. Overall GPA: 3.73/4.0 (Rank 20/216) |

## Publications

**1** **Liu**, **K.**, Li, B., Wu, W., May, C., Chang, O., Knezevich, S., … Shapiro, L. (2023). Vsgd-net: Virtual staining guided melanocyte detection on histopathological images. In *Proceedings of the ieee/cvf winter conference on applications of computer vision* (pp. 1918–1927).

**2** Nofallah, S., Shapiro, L. G., Wu, W., **Liu**, **K.**, Ghezloo, F., & Elmore, J. (2022). Automated analysis of whole slide digital skin biopsy images. *Frontiers in Artificial Intelligence*, 209.

**3** **Liu**, **K.**, Mokhtari, M., Li, B., Nofallah, S., May, C., Chang, O., … Shapiro, L. (2021). Learning melanocytic proliferation segmentation in histopathology images from imperfect annotations. In *Proceedings of the ieee/cvf conference on computer vision and pattern recognition* (pp. 3766–3775).

**4** Zong, Z., Feng, J., **Liu**, **K.**, Shi, H., & Li, Y. (2019). Deepdpm: Dynamic population mapping via deep neural network. In *Proceedings of the aaai conference on artificial intelligence* (Vol. 33, pp. 1294–1301).

## Research Experience

### Ongoing Research

| | | |
|---|---|---|
| 2022.6 – 2022.12 | ◇ | **Research Intern** *Sensebrain Technology, Advisor: Inchang Choi, Jinwei Gu* ● **Low-light Portrait Enhancement on Mobile Devices**: Design and train models to enhance low-light portrait images in Bayer and RGB formats. Integrate the models to mobile device camera pipeline. ● **Real-World Blind Super-Resolution**: Work on blind image super-resolution with GAN-priors and adaptive codebooks. Design and train the model. Perform thorough data and model analysis. (Aiming at a first-author publication in ICCV2023) |

## Research Experience (continued)

2019.7 – present  ◇ **Research Assistant**
*Paul G. Allen School of Computer Science and Engineering, Advisor: Linda Shapiro*
In-depth knowledge in deep learning (DL) and statistical machine learning (ML). Expertise in delivering ML technologies and image processing skills in curating medical image dataset based on domain knowledge. I'm currently pursuing 3 directions:
● **Melanocyte Detection on Skin Biopsy Images**: Propose a GAN-based detection model to detect certain types of cells on histopathological images. The model can produce reliable virtual staining and cell detection results which achieves the state-of-the-art performance. [paper]
● **Segmenting Melanocytic Proliferations on Skin Biopsy Images**: Propose a melanocytic proliferation segmentation framework by leveraging noisy and sparse labels. Achieved state-of-the-art performance on this specific task. [paper]
● **Graph-based Learning in Melanoma Diagnosis**: Build hierarchical cell-to-tissue graph using melanocytes and non-melanocytes features. Train a graph convolutional network to learn melanoma diagnosis. (Ongoing)

## Previous Research

2020.7 – 2020.9  ◇ **Sedeen Viewer Plugins for Cancer Diagnosis**
*Paul G. Allen School of Computer Science and Engineering, Advisor: Linda Shapiro*
Built plugins in Sedeen Viewer, a whole slide image viewer, for cancer diagnosis. The backend and frontend are Python and C++ respectively. [website] [github]

2018.11 – 2019.5  ◇ **Unsupervised Multimodal MRI Segmentation of Stroke Lesion**
*MMDP Lab, Advisor: Weibei Dou*
Proposed an unsupervised segmentation method based on multimodal brain magnetic resonance images (MRI) of chronic stroke patients to segment stroke lesions including both ischemic and chronic stroke.

2018.7 – 2018.9  ◇ **Conronary Calcium Segmentation on Dual Energy CT Images**
*The Li Laboratory at Cedars-Sinai and UCLA, Advisor: Debiao Li, and Yibin Xie*
Worked on the segmentation and sub-voxel resolution algorithms to extract coronary calcified plaques in dual-energy CT images.

2017.11 – 2018.7  ◇ **DeepDPM: Dynamic Population Mapping via Deep Neural Network**
*The FIB Lab at Tsinghua University, Advisor: Yong Li*
Proposed the idea to generate dynamic population distributions in full-time series. Designed DeepDPM, an overall model that describes both spatial and temporal patterns based on coarse data and point of interest information. [paper][4]

# Teaching Experience

2023  ◇ **CSE 473 Artificial Intelligence**, TA, University of Washington, Seattle
2021  ◇ **CSE 576 Computer Vision**, TA, University of Washington, Seattle

# Academic Service

2022  ◇ **Reviewer**, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)

# Awards

2019  ◇ **Excellent Honors Graduate**, Tsinghua University.
2018  ◇ **Outstanding Student Award**, Electronic Engineering, Tsinghua University.
      ◇ **ICBC Scholarship**, Industrial and Commercial Bank of China.
2017  ◇ **Jiang Nanxiang Scholarship**, Tsinghua University.
2016  ◇ **National Scholarship**, the government of China.

## Skills

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|---|---|---|
| Languages | ◇ | English, Mandarin Chinese. |
| Programing | ◇ | Python, C/C++, MATLAB, shell scripts, JavaScript, R, Verilog |
| Technology | ◇ | PyTorch, LaTeX, Tensorflow, OpenCV |
| Relevant Coursework | ◇ | Computer Vision, Deep Learning, Image Processing, Data Visualization, Statistical Learning, Data Structure, Stochastic Modeling, Machine Learning, Probability, Linear Algebra, Calculus. |

|  |  |  |
|---|---|---|
| Languages | ◇ | English, Mandarin Chinese. |
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