

Bo Li

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RESEARCH INTERESTS

● Biomedical Image Analysis | Bioinformatics | Spatial Transcriptomics

EDUCATION

Beijing University of Technology (BJUT) Beijing, China
● Master of Science in Electronic Information | GPA: 87.5 / 100 (Top 10%) 09.2021–06.2024
Beijing Information Science & Technology University (BISTU) Beijing, China
● Bachelor of Science in Robotics Engineering | GPA: 84.5 / 100 (Top 20%) 09.2017–06.2021

SELECTED PUBLICATIONS

- ⊕ Li B, Qianqian Song, et al. Gene Expression Prediction from Histology Images via Hypergraph Neural Networks[J]. Briefings in Bioinformatics, 2024. [[Under Review](#)]
- ⊕ Li B, Qianqian Song, et al. SpaIM: Single-cell Spatial Transcriptomics Imputation via Style Transfer[J]. [[Awaiting Submission](#)]
- 📄 Li B, Zhang Y, et al. Multi-scale Hypergraph-based Feature Alignment Network for Cell Localization[J]. Pattern Recognition, 2024. (JCR Q1, IF: 8.0). [[Paper](#)]
- 📄 Li B, Chen J, et al. Exponential Distance Transform Maps for Cell Localization[J]. Engineering Applications of Artificial Intelligence, 2024. (JCR Q1, IF: 8.0). [[Paper](#)]
- 📄 Li B, Zhang Y, et al. Lite-UNet: A Lightweight and Efficient Network for Cell Localization[J]. Engineering Applications of Artificial Intelligence, 2024. (JCR Q1, IF: 8.0). [[Paper](#)]
- 📄 Li B, Zhang Y, et al. Hypergraph Association Weakly Supervised Crowd Counting[J]. ACM Transactions on Multimedia Computing, Communications and Applications, 2023. (JCR Q1, IF: 5.1). [[Paper](#)]
- 📄 Li B, Huang H, Zhang A, et al. Approaches on crowd counting and density estimation: a review[J]. Pattern Analysis and Applications, 2021. (JCR Q2, IF: 3.9). [[Paper](#)]
- 📄 Li B, Zhang Y, Xu H, et al. CCST: crowd counting with swin transformer[J]. The Visual Computer, 2022. (JCR Q2, IF: 3.5). [[Paper](#)]

SELECTED PATENTS

- ⊕ A difference convolution-based cell localization method, system and storage medium. China invention patent: CN202211043054.7. Application date: 2022.08.29.
- ⊕ A method, system and storage medium for generating a density map of cell images. China invention patent: CN202211043046.2. Application date: 2022.08.29.

RESEARCH EXPERIENCE

- **Spatial Transcriptomics:** Gene Expression Prediction and Imputation **University of Florida**
Advisors: Prof. Qianqian Song and Zhang Yong *08.2023 – Now*
 - ◆ **Aim:** Insight into histology image, gene expression, and single-cell spatial transcriptomics.
 - ◆ **Contribution:**
 - 1) A gradient enhancement module is proposed to enhance the ability of the model to establish the relationship between cell morphology and gene expression, thereby improving gene prediction performance;

- 2) A hypergraph association module is proposed to capture the association between multiple stage latent features extracted from an image, thus significantly improving the prediction performance;
- 3) Given the limited number of genes measured by single-cell spatial transcriptomics techniques, we utilized a style transfer model to impute gene expression in single-cell RNA-seq data.

- **Biomedical Image Analysis: Automating Cell Localization and Counting** **West China Hospital**
Advisors: Prof. Bu Hong and Chen Jie *05.2022 – 07.2023*

- ◆ **Aim:** To tackle challenges in cell localization and counting, such as variations in cell size, shape, and color.

- ◆ **Contribution:**

- 1) To solve the challenge that existing density maps lose cell location information in dense regions, a new exponential distance transform map is proposed, which can provide accurate cell location information with reasonable gradients;
- 2) To address the variations in cell color in histology images, a multi-scale gradient aggregation module based on difference convolution is proposed to improve the robustness of the model to cell color;
- 3) For the first time, we reframed these challenges (variations in cell size, shape, and color) as a feature misalignment problem between histology images and location maps, transforming cell localization into a feature alignment task that enables simultaneous treatment of the above problems;
- 4) To achieve feature alignment, a novel multi-scale hypergraph module is proposed, which can adaptively aggregate features of different scale ranges to achieve feature alignment between cell images and location maps.

- **Crowd Counting with Hypergraph** **Beijing Institute of Artificial Intelligence**
Advisors: Prof. Zhang Yong and Yin Baocai *05.2021 – 09.2022*

- ◆ **Aim:** Solving the issue of reduced counting accuracy caused by uneven distribution of crowd density in counting scenarios.

- ◆ **Contribution:**

- 1) Nearly 150+ articles were reviewed and organized from a problem-solving perspective, and their network structure was statistically analyzed;
- 2) To tackle this challenge, a novel hypergraph association module is proposed to jointly describe local individuals by modeling Euclidean distances and learnable cosine similarity associations among features for scene understanding, achieving state-of-the-art counting performance.

SELECTED HONOR & AWARDS

- **National Scholarship, BJUT, Top 1%** *10.2022*
- **Xiaomi Scholarship, BJUT, Top 5%** *10.2023*
- **The First Prize Scholarship, BJUT, Top 10%** *10.2022 & 10.2023*
- **Merit student, BJUT** *10.2022*
- **Excellent graduate of Beijing, BISTU** *09.2021*
- **The Second Prize of National Mathematics Competition, BISTU** *12.2020*

OTHER INFORMATION

- **Journal Reviewer:** BMC Biology, Engineering Applications of Artificial Intelligence, IET Image Processing.
- **Language:** Mandarin (Native), English (IELTS 6.0).
- **Personality:** Self-motivated, Active, Passionate, Dedicated.