

Sisi Qu

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PERSONAL PROFILE

A fervent liking towards data analysis and algorithms design. Always eager to learn and driven by the action of deriving meaningful insights out of large amounts of data, with a specific interest in biological/medical data. I am interested in the nexus of life sciences, mathematics, and computer sciences, including the following: Bioinformatics and Biostatistics, Machine Learning and Deep Learning, Graph Data Mining, Cancer Genomics, AI in medicine.

SKILLS

- Python/R/Matlab (C++/Java)
- Pytorch/Tensorflow
- Bioinformatics Analysis
- Latex/Linux/HTML

EDUCATION

Georgia Institute of Technology <i>M.S. in Computer Science, OMSCS, GPA: 4.0/4.0</i>	Altanta, USA <i>2020 - Present</i>
King Abdullah University of Science and Technology (KAUST) <i>M.S. in Bioinformatics and Machine Learning, Bioengineering, GPA: 3.96/4.0</i>	Makka, KSA <i>2019 - Present</i>
China Pharmaceutical University (CPU) <i>B.S. in Pharmacology (Ranking 1st in China), Rank: 1st/93, Major GPA: 4.0/4.0</i>	Jiangsu, CN <i>2014 - 2018</i>

PROJECTS

Bioinformatics, Systems Biology and Deep Learning(Single Cell Data) *2018 - Present*
Supervisor: Prof. Jesper Tegner, KAUST

Graph Neural Networks (GNN) for Single Cell Data Analysis *Ongoing*

- To develop GNN-based models for automated annotation, clustering, and integration of single cell RNAseq data
- To devise better learning-based models for the integration of data from different modalities

Towards Reconstruction of Large-scale Cell-type specific Single Cell Networks

- Used high-quality large scRNAseq datasets to reconstruct individual networks in single cells
- Built a large scale atlas of cell type protein-protein-interaction networks corresponding to the gene-gene-correlation networks
- Established by mutual information and computed network distances to recover the ordering of cell types

Deep Tools for Aligning and Projecting Single Cell Transcriptomic Data across Studies, and Protocols

- Developed a deep learning framework which performed integration, analysis and visualization of single cell data
- Applied to 3 published mouse brain datasets to obtain a universal representation of the molecular diversity of the mouse brain
- Our generative model is able to simulate realistic scRNA-seq data that covers the full diversity of cell types

Exploration of Marker Genes and Cell-types for Human Neuromesodermal Progenitor Cells(NMPs)

- Intern at Prof. Guangdun Peng's Lab, Chinese Academy of Sciences, 2019
- Analyzed RNAseq data of collected D0-D4 cells developed from hESCs to find marker genes for the maintenance of hNMPs
- Conducted WGCNA analysis of the exploration the developmental stages of hESCs and every stage's marker genes

Computer Vision(Image), Graph Learning, Deep Learning *2019 - Present*
Supervisor: Prof. Jesper Tegner, Prof. Bernard Ghanem, KAUST

VLG-Net: Video-Language Graph Matching Networks for Video Grounding *Ongoing*

- Leveraged graph convolutional networks (GCN) to learn the local and global interactions between natural languages with videos
- Designed a novel Video-Language Graph Matching Networks (VLG) to match language graphs from queries and video graphs
- Achieved state-of-the-art results on three benchmark datasets, ActivityNet Captions, Charades STA and TACoS

Learning Heat Diffusion for Network Alignment

- Devised a novel learning algorithm called evolutionary heat diffusion based network alignment (EDNA)
- Achieved the most accurate alignments, increased robustness against noise, and superior scaling capacity

RSNA Intracranial Hemorrhage Detection - Kaggle

- Deployed knowledge distillation for semi-supervised learning and utilized multi-channel CT images with various window sizes
- Developed transfer learning and tested different neural network architectures (ResNeXt, SENESt, EfficientNet, etc)
- Achieved 65th/1345 on the Private Leaderboard

Semantic Part RCNN for Real-World Pedestrian Detection

- Introduced the semantic part information for learning the pedestrian detector
- Detected key points of each pedestrian proposal and then extracted six semantic parts according to the predicted key points
- The padded images containing semantic part information are passed through CNN for further classification

Supervisor: Prof. Bin Li, Shanghai Jiao Tong University, Prof. Haiyan Chen, CPU

The stability of FOXP3+ Regulatory T(Treg) cells & The feasibility of USP21 as a target for Colorectal Cancer

- Revealed that USP21 prevents FOXP3 depletion in Treg cells through deubiquitination
- Tested the anti-tumor effect of a USP21 inhibitor gallic acid on Flag-FOXP3-Jurkat cells and on primary Treg cells

iGEM: CAR-CD20 and On-Switch Controlled Syn-Notch-IL17A Engineered Regulatory T cell Immunotherapy

- Modified Notch protein to activate the gene expression of USP7 in inflammatory conditions with the presence of IL17A and meantime designed a CAR system enabling Tregs to target CD20+ B cells

Thermosensitive Drug-loading System Based on Copper Sulfide Nanoparticles for Photothermal- and Chemo-therapy

- Designed and synthesized CuS-DOX-MBA-NPs as an imaging-guided photothermal therapy
- Confirmed the clinical potential of the thermosensitive drug-loading system in combined chemo-photothermal cancer therapy

PUBLICATIONS/POSTERS

- VLG-Net: Video-Language Graph Matching Networks for Video Grounding** **2021**
Sisi Qu, Mattia Soldan, Mengmeng Xu, Jesper N. Tegner, Bernard Ghanem *CVPR Submission*
- Learning Heat Diffusion for Network Alignment** **2020**
Sisi Qu, Mengmeng Xu, Bernard Ghanem, Jesper N. Tegner *ICML Workshop*
- Towards Reconstruction of Large-scale Cell-type Specific Single Cell Networks** **2019**
Sisi Qu, Jin Ye, ... , David Gomez-Cabrero, Jesper N. Tegner *Cell Symposia, Single Cells: Technology to Biology*
- Semantic Part RCNN for Real-World Pedestrian Detection** **2019**
Mengmeng Xu, Yancheng Bai, Sisi Qu, Bernard Ghanem *CVPR Workshop*
- Deep Tools for Aligning and Projecting Single Cell Transcriptomic Data across Studies, and Protocols** **2019**
A. Labarga, M. Thimma, X. Martinez, S. Qu, ... , J. Tegner *Cell Symposia, Single Cells: Technology to Biology*
- GSH-Activated Light-Up Near-Infrared Fluorescent Probe ... for Precise Early Tumor Identification** **2019**
Yuan, Z., Gui, L., Zheng, J., Chen, Y., Qu, S., ... , Chen, H. *ACS applied materials and interfaces*
- Thermosensitive Drug-loading System ... for Combined Photothermal Therapy and Chemotherapy In Vivo** **2018**
*Yuan, Z. *, Qu, S. *, ... , Chen, H* *Biomaterials Science*

RELATED STUDY

- o Summer School, Best Poster Award, Otto Warburg International Summer School and Research Symposium on Cell-Type Heterogeneity and Single-Cell Analysis, Chinese Academy of Science and Max Planck Institute for Molecular Genetics, 2019
- o Wellcome Genome Campus Advanced Course, Systems Biology: From Large Datasets to Biological Insight Hands-on training in using large-scale multi-omics data and machine learning to infer biological models, Cambridge, UK, July 2019
- o Summer School, STATegra NGS and Data Integration, NAVARRABIOMED Center of Biomedical Research, Spain, Sep. 2018
- o Udacity Nanodegree: Natural Language Processing; Coursera: Bayesian Statistics (UCSD), Machine Learning (Stanford), Deep Learning Specialization (deeplearning.ai), Algorithms on Graphs (UCSD); Stanford CS224W Machine Learning with Graphs.
- o Course Projects:
 1. mini AlphaFold for Protein Structure Prediction; 2. DC-GAN and Conditional DC-GAN for face Image Generation; 3. Self-defined NN for Image Classification; 4. VGG/ResNet18 for Style Transfer and Texture Synthesis; 5. U-net like network for Depth Estimation; 6. PointNet and PointNet++ for Object Classification and Part Segmentation for Point Cloud data.

ACADEMIC ACTIVITIES

- o Single Cell Biology, Wellcome Genome Campus Scientific Conference, Virtual, 2020
- o Emerging Technologies in Single Cell Research, VIB Conference, Virtual, 2020
- o Thirty-seventh International Conference on Machine Learning(ICML), Virtual, Presenter, 2020
- o International Conference on Intelligent Systems for Molecular Biology (ISMB), Virtual, 2020
- o International Joint Conferences on Artificial Intelligence(IJCAI), Macau, China, 2019
- o Cell Symposia, Single Cells: Technology to Biology, Singapore, Presenter, 2019

AWARDS/HONORS

- **Silver Medal**, RSNA Intracranial Hemorrhage Detection Challenge, Kaggle, Nov. 2019
- Outstanding Graduates, *Top 5%*, CPU, June 2018
- **The President Scholarship, Highest honor at CPU**, CPU, Dec. 2017
- **Gold Medal, International Genetically Engineered Machine Competition (iGEM)**, Boston, USA, Nov. 2017
- First-Class Scholarship for Outstanding Students, (*Three times*), CPU, 2014 - 2017
- **Silver Medal, National Olympic Competition of Biology**, China, Aug. 2013
- **First Prize of Olympic Competition of Biology**, Hunan Province, China, May 2013