

RESEARCH EXPERTISE

Deep Learning, Image Processing, Computer Vision, Computer Graphics and Visualization

EDUCATION

- **Stony Brook University** New York, US
PhD Candidate in Computer Science *Sep. 2017 – Feb. 2022 (Expected)*
- **Stony Brook University** New York, US
MS in Computer Science *Aug. 2015 – Aug. 2017*
- **Sharif University of Technology** Tehran, Iran
BSc in Computer Engineering *Sept. 2011 – Aug. 2015*

RESEARCH EXPERIENCE

- **Center for Visual Computing** Stony Brook University
PhD Candidate (Focus: Medical imaging and virtual reality) *June 2016 - Present*
 - **DeepLIIF: Deep-Learning Inferred Multiplex Immunofluorescence for IHC Image Quantification**
Python, PyTorch
 By creating a multitask deep learning framework called DeepLIIF, we present a single-step solution to stain deconvolution/separation, cell segmentation, and quantitative single-cell IHC scoring. Leveraging a unique de novo dataset of co-registered IHC and multiplex immunofluorescence (mpIF) staining of the same slides, we segment and translate low-cost and prevalent IHC slides to more expensive-yet-informative mpIF images, while simultaneously providing the essential ground truth for the superimposed brightfield IHC channels.
 - **NeuroConstruct: 3D Reconstruction and Visualization of Neurites in Optical Microscopy Brain Images**
Python, C++, Keras, Tensorflow, FluoRender, ImageJ, Matlab
 In this project, we reconstruct and visualize 3D neuronal structures in wide-field microscopic images. NeuroConstruct offers a Segmentation Toolbox to precisely annotate micrometer resolution neurites. It also offers an automatic neurites segmentation using 2D and 3D CNNs trained by the Toolbox annotations. To visualize neurites in a given volume, NeuroConstruct offers a hybrid rendering by combining iso-surface rendering of high-confidence classified neurites, along with real-time rendering of raw volume. It also introduces a Registration Toolbox for automatic coarse-to-fine alignment of serially sectioned samples.
 - **CrowdDeep: nuclei detection and segmentation using crowdsourcing and deep learning**
Python, Keras, Tensorflow, Amazon Mechanical Turk, JavaScript (D3 visualization)
 In this project, we designed a crowdsourcing framework for nuclei segmentation in pathology slides, and after tiling the slides, published tiles on Amazon Mechanical Turk to be annotated by the crowd. Then, the crowd annotated images are used for training a convolutional neural network to detect and segment nuclei in pathology slides.
 - **Exploration of Large Omnidirectional Images in Immersive Environments**
C#, Unity®Game Engine, R
 We focused on visualizing and navigating large omnidirectional or panoramic images with application to GIS visualization as an inside-out omnidirectional image of the earth using Unity®Game Engine, HTC Vive headset and controllers. Then, we conducted two user studies involving 40 people and 185 individual cases, to evaluate our techniques over a search and comparison task. Our results illustrate the advantages of our techniques for navigation and exploration of omnidirectional images in an immersive environment such as less mental load and greater flexibility.
- **Data Storage Systems and Networks Lab** Sharif University of Technology
Undergraduate Research Assistant (Focus: Operating Systems) *Sept. 2014 - Aug. 2015*
 - **B.Sc. Thesis:** Workload characterization of buffer cache layer in Linux operating system
 In this work, we proposed an efficient data migration scheme at the Operating System level in a hybrid DRAM-NVM memory architecture by preventing unnecessary migrations and only allowing migrations with benefits to the system in terms of power and performance. The experimental results show that the proposed scheme reduces the hit ratio in NVM and improves the endurance of NVM resulting in significantly higher performance and less power consumption.
- **Bioinformatics Group Research** Sharif University of Technology
Undergraduate Research Assistant (Focus: Simulation) *Feb. 2014 – Aug. 2015*
 - **Cancer Simulation**
 We implemented a system in Java which simulates DCIS Cancer cells growth. At the first part of this project, an agent-based model of tumor growth driving from Macklin's model is implemented. At the next part, evolutionary game theory (EGT) is applied to model the interactions between adjacent cancer cells via gap junctions. This system was used in the paper "Integrating Evolutionary Game Theory into an Agent-Based Model of Ductal Carcinoma in Situ: Role of Gap Junctions in Cancer Progression" published in *Computer Methods and Programs in Biomedicine*.

PUBLICATIONS

- **Parmida Ghahremani**, and Arie Kaufman,
"CrowDeep: Deep Learning from the Crowd for Nuclei Segmentation", *Under Review at SPIE Medical Imaging, 2022*.
- **Parmida Ghahremani**, Yanyun Li, Arie Kaufman, Rami Vanguri,
Noah Greenwald, Michael Angelo, Travis J. Hollmann, and Saad Nadeem, "DeepLIIF: Deep Learning-Inferred Multiplex ImmunoFluorescence for IHC Image Quantification", *Under Review at Nature Machine Intelligence, 2021*.
- **Parmida Ghahremani**, Saeed Boorboor, Pooya Mirhosseini, Chetan Gudisagar, Mala Ananth,
David Talmage, Lorna W. Role, and Arie E. Kaufman, "NeuroConstruct: 3D Reconstruction and Visualization of Neurites in Optical Microscopy Brain Images", *IEEE Transactions on Visualization and Computer Graphics, 2021*.
- S. Mirhosseini, **P. Ghahremani**, S. Ojal, J. Marino and A. Kaufman, "Exploration of Large Omnidirectional Images in Immersive Environments," *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, Osaka, Japan, 2019.

WORK EXPERIENCE

- **Department of Medical Physics at Memorial Sloan Kettering Cancer Center** NY, US
Graduate Research Intern (Python, PyTorch) May 2021 - Sep. 2021
 - IHC Quantification and Nuclei and Membrane Segmentation using Deep Learning.
- **Opensource Information and Communications Technology Co. Ltd** Tehran, Iran
Software Development Intern (Java, Geoserver, PostGIS, Geotools, Maven) June 2015 - Aug. 2015
 - Designing an interactive offline map with informative pins on locations.

SKILLS

- **Programming Tools**
 - Expert: Python, PyTorch, Java, Keras, Tensorflow, OpenCV, MATLAB, SQL
 - Intermediate: C/C++, R, Hadoop, OpenGL, JavaScript (D3 visualization)
- **Image analysis tools**
 - ImageJ, FluoRender, 3D Slicer, OpenSlide.

TEACHING EXPERIENCE

- **Stony Brook University**: Visualization and Visual Analytic (Spring'17), Theory of Database Systems (Fall'16), Computer Science 3 (Spring'16), Computer Science 1 (Fall'15).
- **Sharif University of Technology**: Numerical Computations (Fall'14), Digital System Design (Fall'14), Operating Systems (Fall'14), Technical and Scientific Presentation (Fall'14), Advanced Programming in Java (Fall'13), Fundamentals of Programming (Fall'13).

NOTABLE PROJECTS

- **Unsupervised Co-segmentation of 3D shapes via clustering** Fall 2016
Stony Brook University, CSE 528 (C++, OpenGL)
 - Co-segmenting 3D shapes via subspace clustering and visualizing them.
- **Scalable and secure concurrent evaluation of history-based access control policies** Fall 2016
Stony Brook University, CSE 535 (Python, DistAlgo)
 - Developing the distributed coordinator proposed in "Scalable and Secure Concurrent Evaluation of History-based Access Control Policies". Extended it to a multi-version concurrency control algorithm with timestamp ordering in DistAlgo.
- **Visualization tool for network packets analysis** Spring 2015
Stony Brook University, CSE 564 (Python, D3 visualization, Wireshark)
 - Designing a visualization tool to analyze and compare characteristics of SPDY and HTTP packets.
- **On-line aggregation for interactive analysis over large-scale spatial and temporal data** Fall 2015
Stony Brook University, CSE 532 (Java, Hadoop)
 - Implementing a temporal and spatial SQL query executor system, supporting all spatial operators.

ACTIVITIES

- **Seminar coordinator and presenter** Stony Brook University
Graphics and visualization seminar Feb 2015 - Present
 - Graphics and visualization seminar is a weekly reading group for reviewing recent works in graphics and visualization, held every semester under the supervision of Prof. Kaufman.
- **PC member of IEEE AIVR** IEEE AIVR
Technical Paper Reviewer 2019 - 2021
 - IEEE International Conference on Artificial Intelligence and Virtual Reality is a unique event, addressing researchers and industries from all areas of AI as well as Virtual, Augmented, and Mixed Reality.