Parmida Ghahremani

Stony Brook, NY
pghahremani@cs.stonybrook.edu
+1-631-704-7014

EXPERTISE

Deep Learning	Image Processing	Computer Vision	Computer Graphics	Visualization

EDUCATION

- **Stony Brook University** — *Sep. 2017 – Feb. 2022 (Expected)*
  Ph.D. Candidate in Computer Science
- **Stony Brook University** — *Aug. 2015 – Aug. 2017*
  M.S. in Computer Science
- **Sharif University of Technology** — *Sep. 2011 – Aug. 2015*
  B.Sc. in Computer Engineering

RESEARCH EXPERIENCE

- **Center for Visual Computing** — Stony Brook University
  PhD Candidate (Focus: Deep learning, computer vision, and virtual reality) — *Jun. 2016 - Present*

  - **DeepLIIF: Deep-Learning Inferred Multiplex Immunofluoresence for IHC Image Quantification**
    Python, R, PyTorch, Keras, OpenCV, Numpy, Skimage, Scipy, Matplotlib, Sklearn, Pillow, Tifffile, Javabridge, Numba
    * Designed and implemented a GAN-Based multitask deep learning model (DeepLIIF) for single-step translation, segmentation, and classification. Achieved this by designing a universal optimizer and weighted loss function, outperforming state-of-the-art models such as Mask-RCNN and nnUNet on segmentation and classification tasks.
    * Designed and implemented a GAN-based image synthesis model for generating high fidelity IHC images using corresponding Hematoxylin and Marker images by defining style- and feature-based loss function.
    * Developed a framework offering rigid transformations for co-registering IHC and mpIF data using Tkinter python interface.
    * Implemented computer vision algorithms for pre- and post-processing data using skimage, scipy, numba, and matplotlib.

  - **NeuroConstruct: 3D Reconstruction and Visualization of Neurites in Optical Microscopy Brain Images**
    Python, Keras, Tensorflow, FluoRender, ImageJ, Matlab, OpenCV, Numpy, Skimage, Matplotlib, PyQt5, VTK
    * Developed an end-to-end application (NeuroConstruct) for reconstruction and visualization of 3D neuronal structures.
    * Designed and implemented a novel 3D nested UNet-based network with skip pathways for segmenting objects in volumes using Tensorflow and Keras, outperforming state-of-the-art models including U2Net, UNet++, and UNet3+.
    * Designed a hybrid rendering approach, combining iso-surface rendering of high-confidence classified neurites, along with real-time rendering of raw volume.
    * Created segmentation and registration toolbox for auto & manual segmentation of neurons and coarse-to-fine alignment of serial brain sections with 3D rendered volume, 2D cross-sectional views, and novel annotation functions using PyQt5 and vtk.

  - **CrowdDeep: Nuclei detection and segmentation using crowdsourcing and deep learning**
    Python, Keras, Tensorflow, Amazon Mechanical Turk, JavaScript (D3 visualization)
    * Created a semi-automatic crowdsourcing framework for nuclei segmentation in pathology slides, allowing publication of jobs containing question and judgment phases on Amazon Mechanical Turk for collecting ground-truth segmentation dataset.
    * Designed and implemented a novel CNN approach (CrowdDeep) for nuclei segmentation using a combination of crowd and expert annotations, outperforming expert-trained-only models.
    * Developed a visual analytic framework for evaluation of CrowdDeep using D3 visualization.

  - **Exploration of Large Omnidirectional Images in Immersive Environments**
    C#, Unity®Game Engine, R
    * Conducted two VR user studies to evaluate our techniques over a search and comparison task using Unity®Game Engine, HTC Vive headset, and controllers.
    * Performed quantitave analysis in R to evaluate our novel approaches against state-of-the-art methods using traditional and proposed questionnaires and metrics including SSQ, NASA-TLX, Presence, Performance, Tapping Test, and Movement with two-way RANOVA and Tukey's ladder of power.

- **Data Storage Systems and Networks Lab** — Sharif University of Technology
  Undergraduate Research Assistant (Focus: Operating Systems) — *Sep. 2014 - Aug. 2015*
  - **B.Sc. Thesis:** Workload characterization of buffer cache layer in Linux operating system
    * Designed an efficient data migration scheme at the OS level in a hybrid DRAM-NVM memory architecture by only allowing migrations with benefits to the system in terms of power and performance.

- **Bioinformatics Group Research** — Sharif University of Technology
  Undergraduate Research Assistant (Focus: Simulation) — *Feb. 2014 – Aug. 2015*
  - **Cancer Simulation**
    * Developed a Java-based system for simulating DCIS Cancer cells' growth using an agent-based model of tumor growth, followed by evolutionary game theory to model the interactions between adjacent cancer cells via gap junctions.

Work Experience

- **Department of Medical Physics at Memorial Sloan Kettering Cancer Center** NYC, NY
  Graduate Research Intern (Python, PyTorch) *May 2021 - Sep. 2021*
  - Designed deep learning approaches for cell and membrane segmentation in IHC and fluorescence microscopy images.

- **Opensource Information and Communications Technology Co. Ltd** Tehran
  Software Development Intern (Java, Geoserver, PostGIS, Geotools, Maven) *Jun. 2015 - Aug. 2015*
  - Designed an interactive offline map with informative pins on locations.

Skills

- **Programming:** Proficient in Python, PyTorch, Java, Keras, Tensorflow, MATLAB, R. Experienced in C/C++, SQL, Hadoop, OpenGL, JavaScript (D3 visualization).
- **Image Analysis:** ImageJ, FluoRender, 3D Slicer, OpenSlide.

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", *To appear 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 MicroscopyBrain 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.

Teaching Experience

- **Stony Brook University**: TA for 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**: TA for Numerical Computations (Fall'14), Digital System Design (Fall'14), OS (Fall'14), Technical & 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**
  Stony Brook University, CSE 528 (C++, OpenGL) *Fall 2016*
  - Co-segmented 3D shapes via subspace clustering and visualized them.
- **Scalable and secure concurrent evaluation of history-based access control policies**
  Stony Brook University, CSE 535 (Python, DistAlgo) *Fall 2016*
  - Developed 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**
  Stony Brook University, CSE 564 (Python, D3 visualization, Wireshark) *Spring 2015*
  - Designed 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**
  Stony Brook University, CSE 532 (Java, Hadoop) *Fall 2015*
  - Implemented 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.