# Nianchao Wang

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## EDUCATION

**Northeastern University**
San Jose, CA
*Master of Science in Computer Science*
*Sep. 2024 – Dec. 2026*

**Texas A&M University**
College Station, TX
*Master of Science in Biomedical Engineering*
*Sep. 2019 – May. 2024*

**Johns Hopkins University**
Baltimore, MD
*Master of Science in Chemical Engineering*
*Sep. 2017 – May. 2019*

## EXPERIENCE

**Texas A&M University**
College Station, TX
*Software Development Researcher*
*Sep. 2019 – Jan. 2024*

- **U-Net Based Convolutional Neural Network (CNN) for Cell Segmentation**
  * Developed a **U-Net** based **CNN** model using **TensorFlow** and **Keras**, achieving 90% segmentation accuracy and 95% **Intersection over Union (IoU)** for T cell datasets.
  * Preprocessed input images using **OpenCV** for contrast enhancement with methods like **adaptive histogram equalization (CLAHE)** and **gamma correction**.
  * Automated the segmentation pipeline with real-time performance monitoring and model checkpointing using **TensorFlow Callbacks**, reducing training time through **Early Stopping** and **ReduceLROnPlateau**.
  * Applied the **watershed algorithm** to derive the final masks of cells based on distance transform outputs, ensuring high accuracy in separating closely adjacent cells.
- **CPPA: Python-based Post-Processing Algorithm for Biomedical Images**
  * Designed and developed a **Python-based** post-processing algorithm (CPPA) integrated with **Cellpose** to enhance instance segmentation for biomedical images.
  * Achieved F-measure values of 0.89, 0.87, and 0.94 for quiescent T cells, activated T cells, and MCF7 cells, respectively, demonstrating the algorithm's high accuracy for challenging biological data.
  * Developed a **Tkinter**-based GUI to facilitate the visualization and analysis of segmentation results, improving user engagement with the CPPA tool.
- **POSEA: Multi-Object Image Segmentation Algorithm**
  * Developed the Per-object segmentation evaluation algorithm (POSEA) algorithm for multi-object image segmentation using **Python**, **OpenCV**, and **NumPy**, improving segmentation evaluation.
  * Applied **connected component analysis** and **morphological operations** to accurately identify and retain the largest segmented objects, improving multi-object dataset evaluation.
  * Visualized segmentation results using **Matplotlib**, providing researchers with detailed performance evaluations.

## PROJECTS

- **HydroUnet**: Hybrid deep learning model combining U-Net and watershed algorithms for cell segmentation.
- **CPPA**: Python-based post-processing algorithm and GUI for improving cytoplasmic segmentation accuracy. ([Publication](#) in Computers in Biology and Medicine; [GitHub](#))
- **POSEA**: An algorithm in Python with a Tkinter-based GUI to evaluate instance segmentation performance. ([Publication](#) in PLOS ONe; [GitHub](#))

## PROGRAMMING SKILLS

- **Languages**: Python, C, C++, Java, R, JavaScript, HTML/CSS, SQL
- **Frameworks**: Django, Node.js, Spring Boot, Angular, TensorFlow, PyTorch, Keras
- **Tools/Technologies**: OpenCV, Tkinter, NumPy, scikit-learn, Matplotlib, Git, AWS, Docker
- **Database**: MySQL, MongoDB