**Naomi Joseph**

[nmj14@case.edu](mailto:nmj14@case.edu) +1(269)832-2868

**Education**

**Case Western Reserve University** Cleveland, OH

Candidate for PhD in Biomedical Engineering Expected 2022/2023

National Institute of Health Biomedical Imaging T32 Training Program

**University of Pittsburgh** Pittsburgh, PA

Bachelor of Science in Chemical Engineering (GPA: 3.89) 2018

**Research Experience**

**Case Western Reserve University** Cleveland, OH

Department of Biomedical Engineering, Biomedical Imaging Laboratory 2018-Present

Research Advisor: Dr. David L. Wilson

In collaboration with University Hospitals, Cornea Image Analysis and Reading Center, and CWRU

**Current Research Focus**

* Applying automatic segmentation pipeline to multifarious clinical datasets of corneal endothelial cell images.
* Developing a manual segmentation/editing software for various ophthalmic imaging modalities.

**Deep learning segmentation of corneal endothelial cell (EC) specular microscopy images**

* Utilized *Amira*, *ImageJ*, *GIMP*, and MATLAB to reduce varying illumination gradients of EC images.
* Implemented an image based segmentation method using deep neural network (U-Net) in *Python.*
* Developed a post-processing pipeline in MATLAB to clean up probability outputs from U-Net.
* Led, designed, and conducted an extensive visual analysis study with an interdisciplinary panel of experts.

**Graphical user interface (GUI) software for semi-automatic segmentation of corneal EC images**

* Mentored an undergraduate student to design a *Python* GUI to visualize and edit EC image segmentations.
* Incorporated a guided editing process by highlighted pre-determined erroneous cells segmentations.

**Machine learning prediction of keratoplasties at-risk for rejection**

* Quantified 190 imaging and physiology-related features from rejection and control EC images.
* Trained and tested a random forest classifier to predict graft rejection 1-12 months in the future.
* Compared novel features and classifier’s performance to current risk prediction methods.
* Designed a random survival forest regression in *R* to predict time to graft rejection, which proved joint modeling or Cox Proportional Hazards approach to better address the survival prediction task.

**Publications and Presentations**

**Naomi Joseph** et al. "Quantitative and qualitative evaluation of deep learning automatic segmentations of corneal endothelial cell images of reduced image quality obtained following cornea transplant," J. Med. Imag. 7(1) 014503 (14 February 2020)

**Naomi Joseph** et al. “Prediction of DMEK-grafts at risk for future rejection from pre-clinical diagnosis endothelial cell images,” Cornea Eye Banking Forum, November 7, 2020, Conference Presentation.

**Invention Disclosures**

* Assessment of endothelial cells and corneas at risk from ophthalmological images. (June 2020).
* Automated segmentation and guided correction of corneal endothelial cell images. (March 2020).

**Work and Leadership Experience**

**The Whole Kid** Cleveland, OH

High School STEM Tutor 2020-Present

* Tutor high school students in Geometry, Pre-calculus, Chemistry, and Physics.
* Guide students through challenging math and science concepts, tricky homework questions, and new problems to foster a better understanding of the fundamental principles taught during classes.

**EQT** Waynesburg, PA

Productions Field Engineering Intern May-August 2016

* Initiated and developed a master spreadsheet using previously obtained data for the Cathodic Protection Project to propose a future plan for data collection
* Manipulated pipeline pressure differentials to unload water from natural gas wells.
* Analyzed company budgets and company well productions