ZACHARY STOEBNER

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Education

Vanderbilt University, Nashville, TN *Expected May 2022*

Master of Science in Computer Science

Thesis: “An automatic segmentation system for surgical endoscopy”

Advisor: Ipek Oguz

Vanderbilt University, Nashville, TN *Aug 2017 - May 2021*

Bachelor of Science with Honors in Computer Science & Neuroscience

Minor in Applied Mathematics

Graduate courses on Intelligent Systems & Robotics (ECE), Systems Theory (ECE), Automatic Verification (CS), Visual Analytics & ML (CS)

Publications & Presentations

Z. Stoebner, K. Hett, I. Lyu, H. Johnson, J. Paulsen, J. Long, I. Oguz “Comprehensive shape analysis of the cortex in Huntington’s disease.” [submitted] *Brain*. Expected 2022.

Z. Stoebner, D. Lu, S. Hong, N. Kavoussi, I. Oguz. “Segmentation of kidney stones in endoscopic video feeds.” [submitted] SPIE Medical Imaging: Image Processing. 2022.

N. Kavoussi, **Z.Stoebner**, D.Lu, I. Oguz. “Automated Method of Tracking and Segmenting Kidney Stones During Ureteroscopy Using Computer Vision Techniques.” Engineering & Urology Society. 2021.

Experience

Vanderbilt University: Medical Image Computing Lab *Aug 2019 - Present*

Prof. Ipek Oguz, Vanderbilt Institute for Surgery & Engineering

- Cortical shape analysis with linear-mixed models: Engineered a statistical ML analysis pipeline in R and MATLAB using LMMs to detect differences resulting from the progression of Huntington’s disease in novel sulcal depth and gyrification measures compared to conventional cortical thickness. **Discovered that differences in gyrification are uniquely detected in the insula**, a region undetected in prior cortical studies of Huntington’s disease.
- Endoscopic video segmentation: Developed a preprocessing pipeline for endoscopic video feeds and used it to build an annotated ureteroscopy dataset. Implemented and fine-tuned a U-Net segmentation model to consistently achieve **>0.9 Dice score** on test data. Investigating non-local attention networks for longitudinal segmentation. **Integrating the model with endoscopic hardware for deployment in an OR**.
- GAN-based MRI harmonization: Searched literature for candidate image-to-image GANS. Built an image quality test suite to compare the performance of UNIT and CycleGAN. **Adapted CycleGAN to accept, preprocess, and reconstruct MRI on limited GPU memory**.

Vanderbilt University: Neuroimaging & Brain Dynamics Lab *July 2021 - Present*

Prof. Catie Chang, Vanderbilt Institute for Surgery & Engineering

- fMRI-to-EEG topography map translation: Preprocessing EEG to align to the temporal resolution of fMRI. **Building a custom VAE** with a multi-tasked decoder for image-to-image translation for fMRI volumes to EEG topography maps.

Teaching & Service

Teaching Assistant, Artificial Intelligence	*Aug 2021 - Present*
Teaching Assistant, Deep Learning	*Jan 2021 - May 2021*
Teaching Assistant, Operating Systems	*Aug 2020 - Dec 2020*
Teaching Assistant, Discrete Structures	*Aug 2019 - May 2019*
VP of Communications, Vanderbilt Design Studio	*Jan 2020 - Dec 2020*
Mentor, Vanderbilt Design Studio	*Jan 2019 - May 2021*
Health and Wellness Committee, Vanderbilt Student Government	*Sep 2017 - Dec 2018*
East House Service Commissioner, Vanderbilt Commons Leadership Council	*Sep 2017 - May 2018*

Projects

NVIDIA JetBot build for bimatrix games	*Aug 2021 - Present*
Automatic verification of a VAE & SegNet [link]	*Jan 2021 - May 2021*
Visualization of temporal graph networks [link]	*Jan 2021 - May 2021*
Face following + vSLAM for a Tello quadcopter [link]	*Aug 2020 - Dec 2020*
Dimensionality reduction on neural data with PCA & an autoencoder [link]	*Aug 2020 - Dec 2020*
Quadcopter build [link]	*Jun 2020 - Jul 2020*

Skills

Programming: Python, C++, C, MATLAB, R, JavaScript
Electrical & Mechanical: soldering, electrical wiring, CAD, 3D printing
Languages: Portuguese (fluent), Spanish (advanced), French (basic)
Other: ***kū & tanka poet*** [link], nature photographer, weightlifter, trail runner