

ZACHARY STOEBNER

zstoebns.github.io

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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." 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

Aug 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-task decoder for image-to-image translation for fMRI volumes to EEG topography maps.

Teaching & Service

Teaching Assistant , Artificial Intelligence	<i>Aug 2021 - Present</i>
Teaching Assistant , Deep Learning	<i>Jan 2021 - May 2021</i>
Section Leader & Reviewer , Vanderbilt Undergraduate Research Journal	<i>Jan 2021 - May 2021</i>
Teaching Assistant , Operating Systems	<i>Aug 2020 - Dec 2020</i>
VP of Communications , Vanderbilt Design Studio	<i>Jan 2020 - Dec 2020</i>
Teaching Assistant , Discrete Structures	<i>Aug 2019 - May 2019</i>
Mentor , Vanderbilt Design Studio	<i>Jan 2019 - May 2021</i>
Health and Wellness Committee , Vanderbilt Student Government	<i>Sep 2017 - Dec 2018</i>
East House Service Commissioner , Vanderbilt Commons Leadership Council	<i>Sep 2017 - May 2018</i>

Projects

Autonomous motion planning for an NVIDIA JetBot	<i>Aug 2021 - Present</i>
<u>Automatic verification of a VAE & SegNet</u>	<i>Jan 2021 - May 2021</i>
<u>Visualization of temporal graph networks</u>	<i>Jan 2021 - May 2021</i>
<u>Face following + vSLAM for a Tello quadcopter</u>	<i>Aug 2020 - Dec 2020</i>
<u>Dimensionality reduction on neural data with PCA & an autoencoder</u>	<i>Aug 2020 - Dec 2020</i>
<u>Learning about quadcopters by building one</u>	<i>Jun 2020 - Jul 2020</i>

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](#), nature photographer, weightlifter, trail runner