Christina Sheckler

Curriculum Vitae

EDUCATION

UNIVERSITY OF MICHIGAN — ANN ARBOR, MI

Bachelor of Science in Computer Science — **Anticipated May 2025**

Bachelor of Science in Cognitive Science — **Anticipated May 2025**

HONORS AND AWARDS

1st place in Neural Engineering Training Symposium research symposium poster competition

3rd place in BI Research Day poster competition

RESEARCH EXPERIENCE

UNIVERSITY OF MICHIGAN MEDICINE — ANN ARBOR, MI

Under Dr. William Stacey — **June 2023-Present**

- Created an automated C++ text-parsing script that could extract relevant information from EEG comments file (.lay) and convert information to standard format used worldwide (BIDS format)
- Created a computational toolbox and tutorial for generating synthetic EEG seizure data based on a mathematical model, enabling precise control over seizure onset and offset dynamics for use in developing seizure detection algorithms and training data analysis tools. Writing a manuscript on this work.
- Developed a seizure dynamotype classifier by creating a comprehensive preprocessing pipeline for EEG data, including high-pass and low-pass filtering, median filtering, sequence length normalization via cubic spline interpolation, and dimensionality reduction. Implemented data augmentation techniques such as series flipping to enhance model robustness. Applied sequence padding and data normalization to ensure consistent input shapes for neural networks. Constructed an LSTM neural network for classification of EEG signals, incorporating custom loss functions and evaluation metrics such as F1-score. Validated model performance through cross-validation and hyperparameter tuning, achieving improved accuracy on noisy and unbalanced EEG datasets. Created custom LSTM-GradCam to further understand the model classification.
- Developed a sequence-to-sequence LSTM model in TensorFlow to remove white noise from EEG data. The model was trained on simulated EEG signals with white noise added at varying levels, then denoised to restore the original clean signals. Data preprocessing involved concatenating, reshaping, and padding the time-series data, followed by splitting it into training and testing sets. The model was optimized using mean squared error (MSE) to effectively filter out noise. The trained model demonstrated strong performance in removing white noise from the signals, improving data quality for subsequent analysis.

UNIVERSITY OF MICHIGAN PSYCHOLOGY — ANN ARBOR, MI

Under Dr. Stephanie Preston — **June 2023-December 2023**

- Assisted in Discomfort and Uncertainty in Autonomous Vehicles study exploring factors influencing passenger discomfort and trust in Autonomous Vehicles by measuring physiological stress responses and conducting post-ride surveys.
- Created and administered Qualtrics surveys to assess participant discomfort before and after riding in autonomous vehicles.
- Managed and assisted in a paid participant study, including physiological data collection (saliva samples, biometric monitoring) and analysis of survey responses.
- Coordinated participant recruitment, scheduling, and compensation through the Prolific platform.

SELECT PROJECTS

Variational Autoencoder for Image Reconstruction on the Flowers102 Dataset **Winter 2024**

- Developed a Variational Autoencoder (VAE) for unsupervised image learning using the Flowers102 dataset in PyTorch. Implemented the VAE architecture, including an encoder that maps input images to a probabilistic latent space using a reparameterization trick and a decoder that reconstructs the images from the latent representations. Optimized the model using the Evidence Lower Bound loss function, balancing reconstruction loss with a KL-divergence term for regularization. Employed data augmentation techniques to improve generalization and prevent overfitting.

SVM Word Review Classifier **Winter 2024**

- Utilized review data from Prime Video's extensive movie catalog containing thousands of reviews and ratings from diverse users. Developed and trained Support Vector Machines (SVMs) to classify review sentiment, enabling automation of movie selection for enhanced user experience. Leveraged scikit-learn packages and data science techniques to implement effective classification methodologies.

Image classification for CIFAR-10 dataset **Fall 2023**

- Designed, implemented, and fine-tuned a ResNet18 convolutional neural network for image classification on the CIFAR-10 dataset, utilizing PyTorch for model architecture and training. Achieved high accuracy by optimizing hyperparameters (e.g., learning rate, batch size, and optimizer) and leveraging data augmentation techniques such as random horizontal flips, random rotations, and random crop resizing to improve model generalization. Employed techniques like dropout, batch normalization, and residual connections to mitigate overfitting and enhance performance on 60,000 32x32 pixel color images across 10 distinct classes.

Natural Language Processing for NLTK Gutenberg corpus dataset **Fall 2023**

- Leveraged advanced NLP techniques to preprocess and analyze text data from the NLTK Gutenberg corpus including tokenization, word filtering, and stopword removal. Employed a custom English dictionary to filter out non-English and capitalized words, enhancing the quality of input data for sequence modeling. Integrated NLTK's stopwords corpus to further refine the text by removing common, non-informative words, improving model efficiency and performance in natural language tasks. Utilized the preprocessed data to train a Vanilla RNN for sequence prediction tasks.

Response Inhibition Underlies Congruency Sequence Effect paper **Fall 2023**

- Authored an in class research paper investigating the congruency sequence effect (CSE) in distractor-interference tasks using fMRI, exploring whether the CSE is driven by selection for action or response inhibition. Processed fMRI data to examine neural activity during incongruent and congruent trials, revealing that response inhibition best explains the CSE, as shown by a reverse congruency effect and longer response times following incongruent trials. Demonstrated strong scientific writing by clearly articulating the findings and their relevance to the broader field of neuroimaging.

COMMUNITY ENGAGEMENT EXPERIENCE

ANN ARBOR ICE CUBE ANN ARBOR, MI

Volunteer for adaptive figure skating program **Winter 2023 - Fall 2024**

- Help push wheelchairs and teach kids how to skate with severe neurological disorders

UNIVERSITY OF MICHIGAN - DEPARTMENT OF ENTREPRENEURSHIP ANN ARBOR, MI

Undergraduate Teaching Assistant **Winter 2022**

ENTR 490: Organizational Management in Startups

- Optimized classroom management processes through the implementation of a new attendance tracking system and graded homework assignments

UNIVERSITY OF MICHIGAN ANN ARBOR, MI

Society for Women Engineers member **Fall 2021**

- Orchestrated a charity fun run that raised funds for C.S. Mott Children's Hospital; liaised with local businesses and secured 20+ sponsors, increasing community engagement and awareness

WORK EXPERIENCE

AURORA TIGHTS — ANN ARBOR, MI

Product and Strategy Intern — **Summer 2022**

- Conducted market research, competitive analysis and consumer needs assessment. Analyzed and tracked customer data to develop a targeted marketing strategy, resulting in a 30% increase in lead generation
- Analyzed market trends, customer feedback and sales data to develop pricing strategy for emerging market

KIDSPORT SUMMER CAMP — ANN ARBOR, MI

Camp counselor — **Summer 2022**

- Worked in two sections of a sports camp, supporting both children with disabilities and neurotypical children by adapting sports activities to be inclusive, ensuring all participants had the opportunity to engage, develop skills, and build confidence.

ACADEMIC PRESENTATIONS

SOCIETY FOR NEUROSCIENCE — CHICAGO, IL

Poster Presentation — **Fall 2024**

- Presented poster *A comprehensive, realistic model to simulate the full repertoire of human seizure dynamics using bifurcation theory* at Society for Neuroscience conference

CAMPUS INVOLVEMENT

- Member of 3D printing club
- Member of AR/VR club
- Member of Figure Skating club
- Member of Living Arts Community

TECHNICAL AND QUANTITATIVE SKILLS

- Proficient in Machine learning (SVM, CNN, LSTM, Encoder/Decoder, Generative Models), Artificial Intelligence, Natural Language Processing. conducting a paid participant study, EEG Analysis, FMRI analysis, basic signal processing, mathematical modeling, 3D printing, AR/VR technology, GUI design, C++, Matlab, Python, Excel, Access, Unity
- Proficient in Spanish
- Excellent written and oral communication

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