Shyamal Dharia

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WORK EXPERIENCE

The University of Winnipeg **Winnipeg, Canada**
Research Assistant *Sept 2022 - Present*

- Designed and executed customized EEG experiments to collect data on emotion regulation failures, effectively integrating and synchronizing the experiments with portable EEG devices for seamless data acquisition.
- Integrated a photodiode sensor on a portable EEG device, enabling precise synchronization with visual stimuli presentation.
- Developed a multimodal deep learning architecture for subject-independent EEG-Based emotion recognition. Achieved 72% accuracy in classifying 5 distinct emotions.

TIATECH **Surat, Gujarat**
Electronics & Computer Vision Intern *Jan 2021 – Nov 2021*

- Developed a deep learning architecture for textile fabric fault detection, implementing transfer learning from VGG16.
- Optimized the data pipeline to standardize images into 224x224 pixel values and applied data augmentation techniques in the training dataset, resulting in enhanced fault detection accuracy (94%) while preventing overfitting.
- Developed motion planning and control software for a 6-axis robotic arm utilizing tools such as MoveIt and ROS.

EXPERIMENTAL PROJECTS

ViT (Vision Transformer) for Emotion Recognition

- Transformed EEG features into images (28x28x3), implemented patching and linear mapping to divide input images into equal-sized sub-images and map them into a linear space.
- Integrated positional encoding to enable the model to identify the original location of each patch in the image.
- Utilized transformer encoders with multi-head self-attention mechanisms and implemented a classification MLP block for the final classification.
- Currently, working on improving the performance (~50% accuracy) of the model.

Eye-Tracking Algorithm

- Developed an eye-tracking algorithm that allows researchers to extract eye movement features when collecting EEG data for behavioural sciences experiments.
- Utilized OpenCV to detect the pupil and accurately segment it for tracking and measuring pupil dilation in indoor light settings.
- Future implementation includes detecting the number of blinks in parallel with pupil dilation, with a focus on integrating the algorithm on Raspberry Pi Zero or 4.

EDUCATION

The University of Winnipeg **Winnipeg, Canada**
Master of Science, Applied Computer Science *Sept 2022 – Sept 2024*

- GPA: 4.43 / 4.5

TECHNICAL SKILLS

Machine Learning: PyTorch, TensorFlow, Keras, Scikit-Learn, Numpy, SciPy, and Pandas.

Programming Languages: C++, Python, JavaScript, HTML and CSS

Version Control: Git and Github

PUBLICATION

- S. Y. Dharia, C. E. Valderrama and S. G. Camorlinga, "Multimodal Deep Learning Model for Subject-Independent EEG-based Emotion Recognition," 2023 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE), Regina, SK, Canada, 2023, pp. 105-110, doi: 10.1109/CCECE58730.2023.10289007.