Yu Yujia

Phone: +86 15918685363 Email: yujiayu200112@163.com

EDUCATION

Guangzhou University **09/2020 – Present**

- **Major:** Robot Engineering(BE)
- **GPA:** 90.18/100
- **Rank:** 3/83
- **Core Courses:** *Artificial Neural Network Technology(95), Introduction to Machine Learning(96), Fundamentals Of Machine Vision(92), Modeling and Simulation of Robot System(94), Solidworks 3D Solid Modeling Technology(96), Robot Sensing Technology(94)*

PUBLICATION

- W. Huang*, **Y. Yu**, H. Xu, Z. Su and Y. Wu, "Hyperbolic Music Transformer for Structured Music Generation," in *IEEE Access*, vol. 11, pp. 26893-26905, 2023.
- W. Huang*, H. Xu and **Y. Yu**, "MRP-Net: Seizure detection method based on modified recurrence plot and additive attention convolution neural network," in *Biomedical Signal Processing and Control*, vol. 86, p. 105165, 2023.
- H. Xu, J. Wu, **Y. Yu,** J. Ni* and W. Huang*, "Self-Supervised Hyperbolic Metric Few-Shot Learning for Occult Lymph Node Metastasis Prediction in NSCLC," in *IEEE Transactions on Medical Imaging* (under review).

RESEARCH EXPERIENCE

Project: Self-Supervised Hyperbolic Metric Few-Shot Learning for Occult Lymph Node Metastasis Prediction in NSCLC **06/2022 – 04/2023**

Project Leader

- **Exploration of Various Preprocessing Methods for Hidden Lymph Node Data:** Investigated different preprocessing methods for concealed lymph node data, establishing the foundational groundwork for subsequent experiments.
- **Training Multiple 3D ResNet Baseline Models for Comparative Analysis:** Trained multiple 3D ResNet baseline models as outlined in the research paper. Conducted rigorous testing of these baseline models to evaluate their performance in predicting occult lymph node metastasis. Calculated and analyzed various performance metrics, including accuracy, specificity, sensitivity, precision, F1 score, and AUC.
- **Demonstrated the Model's Robust Performance in Few-Shot Training Scenarios:** Conducted multiple comparative experiments to demonstrate that the proposed model maintains exceptional performance even with limited training samples. Compared to traditional models, our model outperforms in most metrics, with an average improvement of 3.5%. Highlighted the model's potential to significantly aid clinical diagnosis for non-small cell lung cancer (NSCLC) patients by improving the prediction of occult lymph node metastasis.

Project: Hyperbolic Music Transformer for Structured Music Generation **03/2022 – 03/2023**

Research Leader

- **Introduction of Hyperbolic Theory into Music Generation:** Recognizing the limitations of Euclidean space modeling for hierarchical data, I introduced hyperbolic theory into the field of music generation. Expanded music encoding from Euclidean space to hyperbolic space, enhancing the low-distortion embedding of hierarchical information.
- **Literature Review and Conceptualization of Hyperbolic Music Transformer:** Conducted an extensive review of relevant literature to inform the development of a novel music generation network, termed the "Hyperbolic Music Transformer." Elevated music representation to the hyperbolic surface, subsequently constructing a hyperbolic attention mechanism. Designed the model to better capture hierarchical structural information in music, addressing

deficiencies in music generation related to hierarchy.

- **Implementation of Hyperbolic Music Transformer Model:** Wrote code related to hyperbolic theory to encode music into REMI (REpresentations in MIcrostates) and model it in the hyperbolic space. Constructed the Hyperbolic Music Transformer model and utilized Riemannian Stochastic Gradient Descent (RSGD) for parameter optimization within the hyperbolic space.
- **Design and Execution of Objective and Subjective Experiments:** Designed and conducted a series of objective and subjective experiments to evaluate the effectiveness of the proposed music generation model. In the objective experiments, our model surpassed traditional models in multiple music metrics, including Information Rate, as well as metrics from the MGEval toolbox like Pitch Count(PC) and Pitch Range (PR). In the subjective experiments, our proposed model showed an average improvement of 8% in each rating compared to traditional models.

Project: MRP-Net: Seizure Detection Method Based on Modified Recurrence Plot and Additive Attention Convolution Neural Network **05/2021 – 05/2022**

Principal Researcher

- **Training and Evaluation of Baseline Models:** Trained multiple base line models as outlined in the research paper. Conducted rigorous testing of these baseline models to evaluate their performance in detecting seizures. Calculated and analyzed key performance metrics, including accuracy, specificity, sensitivity, and other relevant indicators.
- **Optimization of Model Architecture:** Optimized the overall model architecture based on insights and lessons learned from experimentation. Collected experimental data, including EEG recordings from both normal individuals and epilepsy patients during different time periods. Produced relevant visualizations, including EEG plots, to better understand and represent the data.
- **Demonstration of Model Superiority and Generalization:** Conducted multiple comparative experiments,the MRP-Net model achieved 99.77% in sensitivity, 99.57% in specificity, and 99.67% in accuracy, which demonstrate the superiority and generalization of the proposed MRP-Net model in the field of seizure detection.

Project:Pregnancy Residue Segmentation **04/2023 – Present**

Principal Researcher

- **Design of Curvature and Boundary-Based Attention Mechanism:** Designed an attention mechanism based on curvature and boundaries to enhance local features within the images. Developed multiple learners to acquire multi-scale knowledge, addressing the challenge of indistinct boundaries in pregnancy residue segmentation.
- **Training and Evaluation of Baseline Models:** Trained and evaluated several baseline models, including 2D-Unet, 3D-Unet, and U-Net Transformer, as outlined in the research paper. Conducted comprehensive testing of these models to assess their performance in segmenting pregnancy residues. Calculated relevant metrics such as Dice scores to quantitatively evaluate segmentation quality.

HONORS AND AWARDS

- National scholarship（1%） **10/2023**
- Outstanding student（8%） **10/2023**
- The Second Prize Scholarship **11/2022**
- Excellent Student Cadre **11/2022**
- The First Prize Scholarship（8%） **10/2021**
- Outstanding student（8%） **10/2021**

SOFTWARE & LANGUAGE SKILLS

- Python, C,HTML,Markdown, LaTeX
- Pycharm, VS Code, Matlab, SolidWorks, Proteus, Labview