LIYUAN ZHANG

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EDUCATION

- **Xi'an Jiaotong University**, Xi'an, Shannxi, P.R. China   Sept. 2021 – Present
  M.S. Electronic and Information Engineering, expected July 2024

- **Xi'an University of Technology**, Xi'an, Shannxi, P.R. China   Sept. 2016 – July 2020
  B.S. Software Engineering

RESEARCH EXPERIENCE

- **Electrical Impedance Tomography**

  1. **Improved CNN-based Image Reconstruction Algorithm in EIT**   Nov. 2022 – April 2023
     - **Background:**Electrical Impedance Tomography is a noninvasive and real-time medical imaging technique, which has been widely used in the clinical detection of brain and lung diseases. However, its reconstruction algorithm is a highly nonlinear and ill-posed problem which will lead to poor reconstruction quality.
     - This research proposed a CNN-RBF based method to improve the reconstruction resolution.
     - This work was supported in part by National Natural Science Foundation of China under Grant 51837011 and Key Research and Development Program of Shaanxi Province of China under Grant 2021SF-060.
     - This [paper] has been accepted by The 12th IFMBE Asian Pacific Conference on Medical and Biological Engineering (APCMBE2023), and was presented at the conference on 21 May, 2023.

  2. **Generative EIT Reconstruction Algorithm**   June 2023 – Present
     - **Background:**In recent years, generative models, especially the GAN and Diffusion Models, have demonstrated excellent performance in many computer vision tasks (e.g. image generation). The EIT reconstruction problem is basically a task that generates the conductivity distributions under certain boundary conditions, which probably could be implemented by generative models.
     - This research proposed an improved conditional diffusion model to solve EIT reconstruction problem. We have already designed the structure of the model, and generated the training and test datasets simulated by Eidors (Electrical Impedance Tomography and Diffuse Optical Tomography Reconstruction Software). Currently we are conducting physical experiments for generating the real dataset, which will be used to verify the reconstruction performance and the robustness to the noise.
     - This work was supported in part by National Natural Science Foundation of China under Grant 51837011 and Key Research and Development Program of Shaanxi Province of China under Grant 2021SF-060.

- **Graph Kernel & Graph Isomorphism**   May 2022 – Aug. 2022

- ○ **Background:** determining whether two graphs are isomorphic is a remarkably hard to solve in practice, for the reason that there is no polynomial algorithm is known for that. Graph kernel methods explicitly quantify the similarity between any pair of graphs. And due to their better time performance, it can be used as an alternative to the isomorphic algorithm in some cases.
- ○ In this research, we deeply explored the relationship between graph kernel methods and the graph isomorphism problem, especially the limitations of weisfeiler-lehman test, and compared the results with techniques using graph neural networks.

- **Generative Adversarial Nets for Remote Sensing Image Classification**   Feb. 2020 – June 2020

  - ○ **Background:** With the increasing resolution of remote sensing images, how to quickly and accurately classify the remote sensing images, which is the process of assigning land cover classes to pixels, has become a significant problem in the field of remote sensing.
  - ○ This research proposed an unsupervised classifier based on improved GAN. We compared the performance of the model with other existing methods in different datasets respectively to illustrate its advantages.
  - ○ This is the topic of my undergraduate thesis.

PROJECT

- **A simple implementation of EIT forward and inverse problem solvers in python**   Aug. 2022 – Oct. 2022

  - ○ This project implements a complete EIT model including finite element model constructor, EIT forward problem solver, EIT inverse problem solver and the display function of reconstruction image.
  - ○ all the code is [here]

- **Question answering system based on knowledge graph**   March 2022 – May 2022

  - ○ This project implements a knowledge base question answering system in order to allow users to ask questions about certain diseases (such as symptoms, etc.)
  - ○ I was responsible for the data acquisition and pre-processing of the knowledge graph, as well as the implementation of the question answering algorithms.

HONORS AND AWARDS

- **third price of College Students' 'Internet+'Innovation and Entrepreneurship Competition**
  project name: Self-service payment Multifunctional shopping cart   Jan. 2018

- **Shangzhen Duxue scholarship**   Aug. 2019

- **Learning progress scholarship**   Aug. 2019