CV

Information

Ke Xu

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Skill

- **Professional Skills:** Machine Leaning Modeling, Multimodal, Generative Model, Deep Learning Algorithm, Salient Object Detection, Big Data Analysis, Cloud Computing, Data Wrangling
- **Programming Skills:** Python, Linux, Pytorch, MySQL, GitHub, Docker, R, AWS, MATLAB, C and C++
- **Language:** Chinese**,** English
- **Certificate:** IBM Data Science Professional Certificate, Microsoft Azure Fundamental az-900, Oxford University Press Global Competency

Publication

- Ke Xu; Longfei Zhou; Fan He; Siyu Wu; Haoliang Liu; Fei Teng., "A Novel Two-Lane Roundabout Model with Central Cross Structure," 2022 6th International Conference on Universal Village (UV), Boston, MA, USA, 2022, pp. 1-9, doi: 10.1109/UV56588.2022.10185490
- F. He; Longfei Zhou; Siyu Wu; Haoliang Liu; Zehang Li; Ke Xu., "A Novel Adaptive Signal Timing Control Approach for Signalized Intersections," 2022 6th International Conference on Universal Village (UV), Boston, MA, USA, 2022, pp. 1-5, doi: 10.1109/UV56588.2022.10185472.
- Tianqing Ren; Longfei Zhou; Ke Xu; Yifan Wang; Siyu Wu; Yuliang Gai., "Carpet Defect Detection by Transfer Learning Combing Classification and Semantic Segmentation," 2022 6th International Conference on Universal Village (UV), Boston, MA, USA, 2022, pp. 1-6, doi: 10.1109/UV56588.2022.10185478

Education

Hangzhou Dianzi University, China **09/2019-06/2023**

Bachelor of Engineering in Automation in college of AI

Member of **Cultural and Creative Department of College Student Union**

HR director of **University volleyball club**

GPA: 3.5

Thesis:

“Research on Pavement Crack Defect Detection Based on Deep Learning”

Related Coursework:

Automatic Control Principle, Modern Control Theory, Machine Learning, Digital Image Processing, Signal Analysis and Processing, Natural Language Processing, Machine Vision, Computer Control System

Honors and Awards:

college level third-class scholarship(5) 2nd in "I love the word" competition in college of Foreign Language

Chinese National level III volleyball referee certificate

University of Maryland College Park, United States **08/2023-05/2025**

Master of Science in Applied Machine Learning in College of Computer, Mathematical, and Natural Sciences

Related Coursework:

Probability and Statistics, Principles of Machine Learning, Introduction to Optimization, Computing Systems for Machine Learning, Deep Learning, Computer Vision, Principles of Data Science, Algorithms and Data Structures for Machine Learning, Natural Language Processing, Cloud Computing, Big Data Analysis, Communication in Data Science and Analytics, Robotics

GPA：3.7

Research Experience

Deep Learning Research for Salient Object Detection of Road Surface Defects **09/2021-02/2022**

Hangzhou Dianzi University, Hangzhou, Zhejiang, China

- Worked with advisor Xiaofei Zhou to focus on **advanced deep learning model** for detecting **road defects**, implementing the **BASNet model** using **PyTorch** based on related research papers.
- **Developed a novel model** named **Residual Encoder-Decoder Convolution Pyramid Network**, conducted **ablation experiments** for performance evaluation, and wrote a detailed analysis report on model pros and cons.
- Utilized **residual structures** and **encoder-decoder frameworks** for feature extraction and reconstruction, while preprocessing and splitting large-scale datasets into **training and testing sets**.

Improvement of Roundabout Traffic Model based on SUMO **04/2022-12/2022**

MIT Computer and Artificial Intelligence Laboratory, Cambridge, MA

- Conducted research on **roundabout model with X-intersection** using **traffic light control** and **SUMO** to **simulate real-world traffic conditions**.
- Led the **design and construction of the model**, performed **experimental simulations**, and **compared multiple roundabout models**, validating their **rationality through diverse traffic metrics** such as vehicle flow, delays, and halts.

Design of Defect Image Classification and Semantic Segmentation Model based on Transfer Learning **04/2022-12/2022**

MIT Computer and Artificial Intelligence Laboratory, Cambridge, MA

- Designed an **integrated model** for **classification and semantic segmentation of pictures containing**

defects, applied the **training results** to **different defect detection data sets** for prediction through **Transfer Learning**.

- Developed **semantic segmentation model and trained different SOA models like U-net** for comparison, wrote code about **data set importing** and **k-fold cross validation for training**.

Stable Diffusion and Object Detection Studies **01/2024-03/2024**

MIT Online Research Program

- Implemented **Diffusion Transformer** and **Latent Diffusion Model** to generate images and evaluated their performance by comparing **CLIP scores** across multiple datasets, including ImageNet.
- Studied the feasibility of applying **Detection Transformer (DETR)** for **object detection tasks** using **transfer learning techniques**.
- Prepared a paper titled "*Object Detection Based on Transfer Learning Techniques and Transformer*", which is scheduled to be **published at ICDSE 2025 Conference**.

Multi-Task model for diseases Diagnosis in ED **06/2025-Now**

University of Minnesota Twin City, Minneapolis, MN

- Working with graduate students in Prof. Xie's lab, our project is about **Multi-Task model for disease diagnosis outcomes prediction in the Emergency Department**. It focused on building **multi-task deep learning models** to **analyze the relationship** between various diseases utilizing **image and text Emergency Health Records** and then achieve prediction of **different disease outcomes**.
- Conducted training of **various multi-task foundation models** and performed **benchmark results** to evaluate and compare **model performance**, while **managing and curating the EHR dataset and project's GitHub repository as well as the comprehensive code documentation**.

Internship

Data Analyst (Remote) **08/2021**

Ali Cloud Big Data Project

Alibaba Group, Hangzhou, Zhejiang, China

- Learned and used Alibaba cloud three suites, **MaxCompute, Dataworks, QuickBI.**
- Established **housing supply portrait model**, collated **data requirements** and data from different systems to create a **complete report.**
- Analyzed the **dimensions of portraits**, **sorted out data** from different systems of the company, displayed the analyzed data in the form of report.
- Built a set of **available housing information portrait model system** for the company, introduced the concept of **data visualization** into the company's operations.

Partnership Support Staff (Remote) **06/2022-09/2022**

PACC Policy Internship

Pan African Center For Climate Policy, Oyarifa, Accra, Ghana

- PACC Policy, a international organizations of **self-motivated climate solutions enthusiasts** from diverse professional background with a strong affinity to **advocate, preserve and conserve** the African

environment through systematic thinking while working in line with **national policies and international framework on climate change**.

- Planned for the **communication, logistics, research and the management of the relationship** within the corporate milieu and with community partners.
- Established and implemented **a comprehensive partnership strategy** for inspiring the public and individuals to support our work and share our mission.

Machine Learning Algorithm Engineer **07/2024**

Algorithms Internship

China France Bohai Geoservices Co., Ltd, Tianjin, China

- Completed the **machine learning algorithm** for revising conclusions derived from a **comprehensive oil-gas layer prediction model**, which was primarily used for **correcting prediction conclusions** in the application process to **improve prediction effectiveness**.
- Wrote a **constrained genetic algorithm** to **optimize weights of various well logging prediction models** within the **comprehensive prediction model**, achieving **optimal prediction performance**.
- Constructed the **function calling module** of large language model then deployed it to **utilize SQL** as tools to complete database management.

Projects

New York City Central Park Weather Prediction **10/2023-12/2023**

Principle of Data Science #MSML 602

- Utilized the **modeling methods** to predict future temperatures through the GHCND dataset, obtained from the National Oceanic and Atmospheric Administration's website.
- Constructed and trained the **weather predicted model** (a three-layer neural network) through TensorFlow, **exhibited unique features** based on a heat map and created various **interactive graphs through Dashboard** for data visualization.
- Mastered **data scraping** and **wrangling skills** utilizing **BeautifulSoup Python package**, **data visualization interface** through Dashboard.

Transformer Based Machine Translation from English to Mandarin **03/2024-05/2024**

Natural Language Processing #MSML 641

- Implemented **a transformer-based architecture** to develop **a machine translation model** that translates English sentences into Mandarin. Achieved translations that are comprehensible at a human level, maintaining the semantic integrity of the original English inputs.
- Developed the **Transformer model, fine-tuned hyperparameters**, gave ideas about how to set up **mask and padding**. Wrote the evaluation and limitation part in the final report and gave presentation.

Text-to-image Denoise Stable Diffusion Model Based on AWS **09/2024-12/2024**

Cloud Computing #MSML 650

- Integrated **textual input** into **diffusion models**, merged the **stable diffusion model** instead of the **original denoise diffusion probabilistic model**, and evaluated the model's capability to **generate coherent images** based on **an input text**. Then deployed through AWS.
- Created **a new ECR repository in AWS CLI** and **push an image to ECR**, wrote **dockerfiles** and **uploaded the artifacts into docker**, managed **data storage** using **AWS services like S3**.

COVID-19 Cases and Deaths Trends Analysis on Top 5 Regions with the Highest Population

09/2024-12/2024

Communication in Data Science and Analytics #DATA 607

- Conducted the analysis of the trends of **COVID-19 confirmed cases and deaths** over 5 region with the highest population, evaluated **the impact of two government policies over the timeline** through their **correlation with the confirmed cases**, **built two regression models to predict the number of confirmed cases and deaths in the future** through **the analysis of confidence interval**.
- Utilized **R programming language** for **Data preprocessing and Trend Analysis**, draw variety of plots including **bar plot and line graph** through **ggplot2 library based on RStudio**.