Ruohan Li

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DATA SCIENCE CERTIFICATE

Machine Learning (Stanford Online course certificate) (96%)

Deep Learning (Five specialized courses):

Convolutional Neural Networks (97%), Neural Networks and Deep Learning (95%), Sequence Models (95%), Improving Deep Neural Networks (98%), Structuring Machine Learning Projects (96%)

EDUCATION BACKGROUND

College of Traffic and Transportation | Lanzhou Jiaotong University Aug.2020- Jul. 2023

Master of Engineering in Traffic and Transportation, Overall GPA: 3.62/4.0

Core Courses:

Operations Research Modeling and Algorithms (A), Traffic Engineering Theory (A), Numerical Computation Method (A), Urban Transportation Network Analysis (A), Traffic Demand Management and Impact Analysis(B), Theory and design of metaheuristic algorithms (A), Traffic Prediction and Evaluation (B), Optimization Theory (B)

College of Traffic and Transportation | Lanzhou Jiaotong University Aug.2016- Jul. 2020

Bachelor of Engineering in Traffic and Transportation, Overall GPA: 3.47/4.0 (top 5%)

Core Courses:

Operations Research (A), Linear Algebra (A), Probability and Mathematical Statistics(A), C/C++ Programming (A), Object Oriented Programming (C#) (A), Traffic Engineering (A), Basics of Railroad Traffic Organization (A), Large Scale Database Development (A), Engineering Mechanics (A), Organization of Railroad Cargo Transportation (A)

RESEARCH EXPERIENCE

Intelligent quality detection of lane rendering data Aug.2022- Oct.2022

- ***Objective***: To efficiently detect whether there are defects in the rendered generated map data for navigation
- Implemented pre-training with Masked Image Modeling using three hybrid CNN-LSTM neural network models
- Build the pre-training pipeline for the image recovery task and carried out the pre-training
- Tested different numbers of continuous sequence image inputs with different pre-training models
- Adjusted the pre-trained models for fine-tuning the image classification task
- Developed the pipeline for abnormal image detection to identify defected lane rendering image
- ***Delivery***: An implementation report and participated in the HUAWEI 2022 Global AI Challenge

Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders Sept.2021- Sep.2022

- ***Objective***: To develop robust lane detection neural network model that can tackle challenging scenes
- Proposes a pipeline consisting of self pre-training with masked sequential autoencoders and fine-tuning with customized PolyLoss for the end-to-end neural network models to do lane detection using multi-continuous image frames
- Adopted masked image modelling with masked sequential autoencoders to pre-train the hybrid CNN-RNN models with Mean Square Error (MSE) loss to transform the image reconstruction task into a minimization problem
- Customized a PolyLoss for the fine-tuning per-pixel segmentation task to further improve the accuracy
- The developed model can make full use of the valuable features and aggregate contextual information
- Tested and verified the proposed pipeline using hybrid CNN-RNN models and obtained state-of-the-art performance
- ***Delivery***: A research paper titled *Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss*

Research on ecological risk assessment and traffic carrying capacity of road areas in ecological function zones

| Lanzhou Jiaotong University | Research Assistant Sep.2021 - Aug.2022

- ***Objective***: To study the impact of highway traffic on the surrounding environment, calculate the carrying capacity of traffic
- Wrote the research proposal.
- Arranged the required instruments and equipment for the research (portable weather stations, noise detectors, etc.), tested and debug the equipment
- Led the research team for a 5-day field data collection. Collected data includes regular air pollution data, meteorological data, traffic data, soil heavy metal data, noise data, etc.
- Established a road traffic and ecological risk evaluation index system for ecological function areas
- Determined the scope of the environmental impact of the highway is 600 meters using remote sensing data

Delivery: Completed a research report, and prepared a project proposal for the **National Natural Science Foundation of China**

Research on the mechanism of the rural roads on the revitalization of rural industries in Gansu Province

| Lanzhou Jiaotong University | Research Assistant Sep.2020 - Aug.2021

- ***Objective***: To investigate the impact of rural roads on the industry in rural areas, taking rural roads as the main research object, revealing the mechanism of the role of the rural roads in the revitalization of the industry
- Established the evaluation index system to analyze the relationship between the rural roads and agricultural industries
- Utilized the entropy value method and Analytic Hierarchy Process(AHP) method to comprehensively assign weights to the index system, and calculated coupling coordination.
- It is concluded that rural roads and agricultural industries in the study area are in a high degree of coupling, and county roads are developed in a point-axis pattern.

Delivery: Completed a research report, and a research paper titled *Research on Coordination Relationship between Development of Rural Roads and Industrial Structure of Agriculture*

Air pollutant concentration prediction based on LSTM-CNN Sept.2021- Oct.2021

- ***Objective***: To accurate weather forecasting, a second forecast is made based on the first forecast to improve forecast accuracy
- Studied the influence of meteorological conditions on the distribution of pollutant concentrations using the pearson correlation coefficient method in combination with heat maps
- Built a secondary forecast model based on LSTM on the basis of the first forecast data
- Considering regional coordinated prediction of weather using LSTM-CNN to mine the temporal and spatial characteristics of pollutants between multiple sites
- Test comparing LSTM and LSTM-CNN, and the prediction results with different hyperparameters
- ***Delivery***: Participated in The 18th China Post-Graduate Mathematical Contest in Modeling, won the 3rd prize

PUBLICATION

- ***Journal***: Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss. *IEEE Transactions on Intelligent Transportation Systems*. ***Co-First author*** (rank 1st) [Under Review].
- ***Patent***: Robust lane detection method through self pre-training with masked sequential auto-encoders and fine-tuning with customized PolyLoss (2022). E.U. Patent Application No. OCT-22-060. [Submitted].
- ***Conference***: Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss. *The Transportation Research Board (TRB) 102nd Annual Meeting*. ***Co-First author*** [**Accepted**].
- ***Conference***: The Highway Region Boundary Based on Multi-Environmental Factors. *The 23rd COTA International Conference of Transportation Professionals (CICTP2023)*. ***First author*** [Submitted]
- ***Journal***: Research on Coordination Relationship between Development of Rural Roads and Industrial Structure of Agriculture. *Comprehensive Transport*. 2023. ***Corresponding author*** (rank 2nd) [**Accepted**].

ORGANIZATION ACTIVITIES & VOLUNTEERING

School Basketball Team | Captain Sep.2016-Jan.2019

- Responsible for helping the coach to organize and manage the daily basketball practice
- Assist coaches in basketball tournaments and lead teams in basketball tournaments

School Taekwondo Club | Teaching department | Coach Sep.2016-Jun.2018

- Organize daily taekwondo training for club members
- Organize and plan activities, and lead the performance team in the evening show

AWARDS

- "*Huawei Cup*" The 18th China Post-Graduate Mathematical Contest in Modeling |The 3rd Prize Nov.2021
- 2020-2021 The Second Prize School Scholarship Nov.2021
- Lanzhou Jiaotong University 52nd Sports Competition Basketball Competition | **Champion** (1st) May.2021
- 2018 *Certificate Authority Cup* International Mathematical Contest in Modeling | (Meritorious) Nov.2018
- The 5th CUBA Chinese University Basketball Tournament (Gansu) | **Champion** (1st) Dec.2018
- 2017-2018 The Second Prize School Scholarship Nov.2018
- "*Longren cup*" The 5th Lanzhou University Taekwondo Invitational Tournament | Poomsae | **Champion** (1st) Dec.2018
- 2018 *Higher Education Cup* National Student Mathematical Modeling Competition (Gansu) | The 2nd Prize Oct.2018
- 2016-2017 The Second Prize School Scholarship Nov.2017
- "*Longren cup*" The 4th Gansu University Taekwondo Invitational Tournament | Poomsae | **Champion** (1st) Dec.2017
- The 4th CUBA Chinese University Basketball Tournament (Gansu) | Runner-up (2nd) Oct.2017
- "*Longren cup*" The 3rd Lanzhou University Taekwondo Invitational Tournament | Poomsae | **Champion** (1st) Dec.2016

SKILLS

Programming Languages: Python, C/C++, C#

Machine Learning: SVM, CNN, LSTM, AutoEncoder, Transformer, U-Net | **Masked Image Modeling** | PyTorch, TensorFlow

Software: VISSIM, ArcGIS, ENVI, Revit, Auto CAD, ADAM, SPSS, PyCharm/Spyder