Zhaoning Li

github.com/Das-Boot | (853) 62513554 | yc17319@umac.mo
Centre for Cognitive and Brain Sciences, N21-1004, University of Macau, Macau, China

EDUCATION

University of Macau (UM)   Macau, China
Doctor of Philosophy in Psychology   2021.08-
♦ Research Interests: Social Cognition, Mentalising

Sun Yat-sen University (SYSU)   Guangzhou, China
Master of Engineering in Software Engineering   2016.09-2018.07
♦ Research Interests: Natural Language Processing, Information Extraction
♦ Awards: Third Class Scholarship (2016, 2017)
♦ Graduation Thesis: Research on Causal Knowledge Extraction Method based on Deep Learning and Sequence Labeling
Bachelor of Engineering in Information Security   2012.09-2016.07
♦ Relevant Courses: Computer Programming, Data Structure and Algorithm, Graph Theory and Its Algorithms, Principles and Applications of Artificial Intelligence

PUBLICATIONS

Li, Z., Li, Q., Zou, X., Ren, J. Causality Extraction based on Self-Attentive BiLSTM-CRF with Transferred Embeddings. *Neurocomputing*. 2021 (arXiv version: http://arxiv.org/abs/1904.07629)

Li, Z., Ren, J. Fine-tuning ERNIE for Chest Abnormal Imaging Signs Extraction. *Journal of Biomedical Informatics*. 2020 (arXiv version: https://arxiv.org/abs/2010.13040)

Li, Z., Jiang, Q., Wu, Z., Liu, A., Wu, H., Huang, M., Huang, K., Ku, Y. Towards Human-compatible Autonomous Car: A Study of Turing Test in Automated Driving with Affective Variability Modelling. *IEEE Transactions on Affective Computing*. Under review

Li, Z., Dong, Q., Hu, B., Wu, H. Every individual Makes a Difference: A Trinity Derived from Linking Individual Brain Morphometry, Functional Connectivity and Mentalising Abilities. In preparation

PATENTS

Li, Z. Causal Knowledge Extractor based on Deep Learning V1.0. China Patent Application 2018SR275268, Certificate No.: 2604363, filed 2018.

RESEARCH EXPERIENCE

Linking Individual Brain Morphometry, Functional Connectivity and Their Mentalising Abilities   Macau, China
Individual Research, with Prof. Haiyan Wu and Prof. Qunxi Dong, A. N. D Lab at UM   2021.06-Present
♦ Employed inter-subject representational similarity analysis (IS-RSA) to assess relationships between MRI-based multivariate morphometry statistics (MMS), resting-state functional connectivity (rs-FC) and mentalising abilities (tested by the Interactive Mentalization Questionnaire) across the subjects
♦ Results showed that significant correlations (i.e., second-order isomorphisms) between all representational dissimilarity matrices (RDMs), indicating that a trinity in idiosyncratic patterns of brain morphometry, functional connectivity and mentalizing scores
♦ Illustrated promise in using IS-RSA to study individual differences (i.e., idiosynchrony), deepening understanding of how individual brains give rise to individual mentalising abilities.

How Passenger Tells apart AI and Human Drivers in the Turing Test of Automated Driving?   Guangzhou, China
Research Assistant, with Prof. Yixuan Ku, Memory & Emotion Lab at SYSU   2020.09-Present
♦ Conducted a Turing test of automated driving based on 69 passengers' feedback in a real-road scenario
♦ Collected passengers' choices of response after the process in which passengers rode in the autonomous car (driven by either the human driver or AI driver) and inferred the intentions of the driver (i.e., mentalizing)
♦ Test results showed that Level 4 autonomous cars could pass the Turing test with accuracy less than 50% accuracy

- Proposed a computational model based on signal detection theory, where signal strength was represented by affective variability (tested by modified Differential Emotions Scale and transformed by pre-trained language models), to understand cognitive mechanisms underlying passengers' mentalising process in the Turing test
- Analysis showed that the greater affective variability that passengers had, the more likely they identified the driver as the AI algorithm
- Suggested that future automated driving should incorporate and improve the affective stability of passengers

Causality Extraction based on Self-Attentive BiLSTM-CRF with Transferred Embeddings
Research Assistant, with Prof. Jiangtao Ren

Guangzhou, China
2018.09-2020.03

- Designed a causality tagging scheme and transformed the causality extraction into a sequence labeling task to handle multiple causal triplets and embedded causal triplets in the same sentence
- Identified cause and effect without extracting candidate causal pairs and identifying their relations separately by proposing SCITE (Self-attentive BiLSTM-CRF with Transferred Embeddings), a neural-based causality extractor with transferred contextual string embeddings trained on a large corpus
- Introduced the multi-head self-attention mechanism into SCITE to capture long-range dependencies between cause and effect
- Proposed a model outperformed BiLSTM-CRF by 7.24% by verifying that the causality tagging scheme achieved an improvement rate of 10.06% over the general tagging scheme

Causality Extraction based on Bi-directional LSTM Networks with Focal Loss
Individual Research, with Prof. Jiangtao Ren

Guangzhou, China
2017.09-2018.04

- Formulated causality extraction as a sequence labeling problem based on deep learning models to minimize feature engineering and extract the causal knowledge directly
- Investigated different BiLSTM-based end-to-end models to achieve the best performance
- Addressed the tag class imbalance problem in causal sequence labeling by proposing an end-to-end model with focal loss as the loss function, named BiLSTM-Softmax (FL)
- Evaluated on a public dataset and identified that the proposed model can effectively enhance the association between cause and effect

PROFESSIONAL EXPERIENCE

Fine-tuning ERNIE for Chest Abnormal Imaging Signs Extraction
NLP Engineer, Department of Big Data and Artificial Intelligence at Tianpeng Technology Co., Ltd.

Guangzhou, China
2019.04-2020.05

- Formulated chest abnormal imaging sign extraction as a sequence tagging and matching problem
- Alleviated the problem of data insufficiency by proposing a transferred abnormal imaging signs extractor with pre-trained ERNIE as the backbone, named EASON (fine-tuning ERNIE with CRF for Abnormal Signs ExtractiON)
- Designed a tag2relation algorithm based on the nature of chest imaging report text with more than 2,500 training sets
- Evaluated the algorithm with over 450 test sets to serve the matching task
- Proved the effectiveness of the proposed model for chest abnormal imaging signs extraction, which outperformed ERNIE by 1.05 points in abnormal imaging identification, 0.37 points in attributes identification, and 2.15 points in matching in terms of F1-score

Multi-task Learning for Diagnosis Assistance based on Information Extraction and Text Classification
NLP Engineer, Department of Biomedical Artificial Intelligence at Tianpeng Technology Co., Ltd.

Guangzhou, China
2019.09-2019.12

- Improved the interpretability of the deep learning-based diagnosis prediction model by proposing a multi-task learning model based on information extraction and text classification
- Programmed with Keras to predict the disease and extract relevant proof from each patient's e-medical records, providing evidence for the prediction
- Reached a hypothesis that diagnosis prediction and interpretability analysis are mutually reinforcing

Rare Disease Diagnosis based on Similarity Measuring and Additive Margin Softmax
NLP Engineer, Department of Biomedical Artificial Intelligence at Tianpeng Technology Co., Ltd.

Guangzhou, China
2019.08-2019.12

- Trained the classification model to get the vector representation of each patient by applying the diagnosis prediction model for common diseases as an encoder
- Employed K-nearest neighbor algorithm on the basis of cosine similarity to contrast and sort the vector representations, achieving the results of the prediction
- Applied AM-Softmax in face recognition as the loss function to reduce intra-class variation and increase inter-class difference

CONFERENCE PRESENTATIONS

Bot or Not: How Passenger Tells apart AI and Human Drivers in the Turing Test of Automated Driving? Presented virtually at *Greater Bay Area Young Scholar Forum on Psychological Science*, 2021 (Oral Presentation - 3rd place)

ADDITIONAL TRAINING

The Computational and Cognitive Neuroscience (CCN) summer school, *Cold Spring Harbor Laboratroy*, 2021
Online summer school for Computational Neuroscience, *Neuromatch Academy*, 2021
Brain Data Analysis, *Institute of Engineering Medicine, Beijing Institute of Technology*, 2021

LANGUAGES AND SKILLS

Programming Skills: Python, Jupyter Notebook, R, LaTeX
Languages: Mandarin (Native), English (Proficient)