

Zeping Li

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EDUCATION

University of Edinburgh | Edinburgh, UK

09/2022–09/2023

MSc in Artificial Intelligence

GPA: 79/100 (Distinction)

Relevant Courses: Machine Learning and Pattern Recognition; Probabilistic Modelling and Reasoning;
Natural Language Understanding, Generation and Machine Translation

University of Warwick | Coventry, UK

10/2020–10/2021

MSc in Behavioural and Economic Science

GPA: 80/100 (Distinction)

Relevant Courses: Principles of Cognition; Neuroeconomics; Psychological Models of Choices;
Bayesian Approaches in Behavioural Science

Zhejiang University | Hangzhou, China

09/2016–07/2020

BSc in Psychology

GPA: 86/100 (3.75/4)

Relevant Courses: Calculus; Linear Algebra; Probability and Mathematical Statistics; Sampling Theory;
Stochastic Processes; Methods of Mathematical Physics; Cognitive Psychology

RESEARCH INTERESTS

My objective is to understand how humans and machines find patterns in high-dimensional/unlabeled data and subsequently adapt their beliefs, especially from a probabilistic/Bayesian perspective. I am particularly interested in cognitive modeling, generative models (latent variable models) and Bayesian statistics (e.g., Bayesian nonparametrics, approximate inference).

RESEARCH EXPERIENCE

Modelling Object Co-Occurrences in Images

02/2023–09/2023

Master's Thesis

Supervisor: Professor Chris Williams

- Modelled the high-dimensional object count data from COCO dataset using VAE, mixture, discrete autoregressive flow and discrete autoregressive diffusion models.
- Developed a sequence-to-set variational autoencoding transformer modelling the sparse counts as sets.
- Compared the models using test set likelihood and sample quality (introducing a discriminator network).
- Found the sequence-to-set model achieved the highest test set likelihood, while the discrete autoregressive diffusion model generated samples closest to the empirical data.

Deep Bayesian Active Learning with Hybrid Query Strategies

01/2023–05/2023

Group Work

- Proposed two computationally efficient diversity metrics to measure the distance between a data point and a set of data points.
- Developed 54 hybrid query strategies by considering three uncertainty metrics, three diversity metrics and six combination methods.
- Compared the hybrid and pure query strategies in two image classification tasks (MNIST and CIFAR-10) with deep Bayesian active learning (via MC dropout).
- Found the hybrid query strategies performed better in the difficult task (CIFAR-10). Their advantages decreased but still existed with more queried data.

Human Probability Judgments: A Bayesian Sequential Sampler Account

02/2021–09/2021

Master's Thesis

Supervisors: Professor Adam Sanborn & Professor Nick Chater

- Extended a sampling-based Bayesian cognitive model to predict human probability judgments and response times simultaneously.
- Collected data through an online behavioural experiment.
- Fitted the model using moment matching between the simulated and empirical data.
- Compared its variants with different stopping rules using the Wasserstein distance between the simulated and empirical distributions.
- Found task condition (accuracy emphasized/speed emphasized/ambiguous stimuli) could change the choice of stopping rule and the underlying cognitive processes.

- Modelled the human choices in two-armed bandit problems using the temporal difference reinforcement learning and the win-stay-loss-shift heuristics.
- Fitted the models using maximum likelihood.
- Compared their variants on one-step-ahead (BIC and test set likelihood) and long term predictive abilities (MSE between the simulated and empirical choice sequences).
- Found the heuristics model explained the human choices better overall.

PROJECTS

Machine Translation Systems Using Transformers With Lexical Models	2023
A Review of Dirichlet Process Mixture Models for Clustering and Density Estimation	2022
A Review of Sequential Sampling Models in Computational Cognitive Neuroscience	2021
A Comparison of Generalized Cognitive Hierarchy Models for Matrix Games	2020

WORK EXPERIENCE

Openvserse Hangzhou, China	09/2023-Present
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Multimodal Research Engineer

- Clustered black hole images in terms of painting styles using the BLIP model.
- Finetuned the stable diffusion model using LoRA to generate black hole images in various styles.
- Reconstructed primitive bird sketches from fossil images using the stable diffusion model with ControlNet.
- Developed an iterative text-image transformation system (via GPT-4 and DALL-E-3) to generate sketches illustrating scientific concepts.

Shokz | Shenzhen, China

01/2022-09/2022

Data Analyst

- Designed and updated the sales data dashboard.
- Utilized time-series models to forecast the sales data during promotional periods.

COMPUTATIONAL SKILLS

Programming: MATLAB, Python (pytorch, pyro, pymc, transformers), R (tidyverse), C, JavaScript

Statistics: JAGS, Stan, JASP, SAS, SPSS, G*Power

Others: Latex, Tableau, SQL, Power BI, Stable Diffusion WebUI

AWARDS

Outstanding Thesis Award for MSc in Artificial Intelligence	2023
Best Overall Score Award for MSc in Behavioural and Economic Science	2021
Second Prize in Zhejiang Province College Physics Competition	2018
Zhejiang University Academic Scholarship	2017