Kartik Ravisankar

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Research Interests: Mechanistic interpretability and Multilinguality of LLM-s

EDUCATION

UMD COLLEGE PARK
MS Applied Mathematics, Statistics, and Scientific Computing (AMSC)
Current | College Park, MD
Cum. GPA: 3.93 / 4.0
Cleared the PhD level Mathematical Statistics qualifying exam

PURDUE UNIVERSITY
MS: Industrial Engineering
May 2016 | West Lafayette, IN
Cum. GPA: 3.71 / 4.0

COURSEWORK

Mathematical Statistics
Linear Statistical Models
Natural Language Processing
Statistical Pattern Recognition
Bayesian Statistical Analysis
Linear Programming
Advanced Numerical Optimization
Foundations of Deep Learning
High Dimensional Statistics

SKILLS

Programming Languages
Python • R • SQL
Technologies/Frameworks
Pytorch • Tensorflow • Stan
•Huggingface •Sklearn •numpy •einops
Version control
git

ACADEMIC PROJECTS

COMPUTATIONAL LINGUISTICS AND INFORMATION PROCESSING (CLIP) LAB Advisor: Dr.Marine Carpuat
Fall 2023 - Present | College Park

- Decoded the intermediate layers of multilingual LLMs using logit lens to identify "English" dependence.
- Utilized other mechanistic interpretability techniques including tuned lens, activation, and attribution patching.
- Analyzed the generalizability of LLMs fine-tuned for translation across natural language understanding tasks including `xstorycloze`, `xcopa`, and `xnli`.

DEEP LEARNING RESEARCH Advisor: Dr.Soheil Feizi
Spring 2024 | College Park

- Applied non-linear dimensionality reduction techniques (Kernel PCA, UMAP, t-SNE) on LLM weights.
- Introduced `ZiPR` (Zero Integrated Padding Reduction), a dimensionality reduction technique on pre-trained weight matrices to make LLMs faster.
- Improved 0-1 accuracy of GPT-J, Llama, and ROBERTA models on multiple QA datasets (FEVER, TruthfulQA, and BIOSGender) by up to **20.1%**.

MACHINE TRANSLATION MARATHON (MTMA) 2024 Advisor: Dr.Matt Post
Summer 2024 - Present | Johns Hopkins University, Baltimore

- Formulated a technique for ensembling language models built from arbitrarily different vocabularies.
- Conducted unit testing using the pytest framework to ensure code reliability and functionality.
- Achieved an increase of **0.4** BLEU score using the proposed algorithm on WMT'23 dataset by ensembling NLLB and M2M models.

WORK EXPERIENCE

EVIDERA Senior Research Associate - Modeling and Simulation
April 2020 - Present | College Park

- Conceptualized and developed health econometric simulation models to assess the effectiveness of healthcare interventions.
- Managed projects with an annual budget of **$5 million**, ensuring efficient allocation and delivery within scope and timelines.
- Led a cross-functional team of **5**, including health economists, statisticians, and medical writers, to deliver project outcomes.
- Used the `survfit` package to fit standard and flexible survival curves to extrapolate treatment effect beyond the observed clinical trial period.

AXTRIA | Project Lead - Health Economics and Outcomes Research
June 2016 – May 2020 | Berkeley Heights, NJ

- Built a Monte Carlo simulation model to demonstrate the benefit of cholesterol reduction, which supported multiple manuscripts.
- Transformed legacy patient-level simulation models built in VBA to Python which improved the performance by a magnitude of **20x**.