Jasivan Alex SIVAKUMAR

Department of Computer Science,
University of Sheffield, UK
E-mail: jasivakumar1@sheffield.ac.uk

Webpage: jasivan.github.io
Twitter: @jasivan_s
LinkedIn: Jasivan Sivakumar

QUALIFICATIONS

Sep 21 - Dec 25 **PhD Computer Science** (Supervised by Dr. Nafise Sadat Moosavi)
  ▷ Natural Language Processing Group, University of Sheffield, United Kingdom
  ▷ Research title: *Numerical Reasoning for General-Purpose Language Models*
  ▷ Focus: AI, ML, DL, NLP, NLU, NLG, LLM, Reasoning, Number Representation, Tokenisation

Sep 20 - Sep 21 **MA Computational Linguistics - Distinction**
  ▷ University of Wolverhampton, United Kingdom

Oct 12 - Jul 16 **Bachelor (MMath) Mathematics - First Class**
  ▷ University of Warwick, United Kingdom

PUBLICATIONS

Jul 24 (preprint) **Sivakumar, J.**, & Moosavi, N. (2024). How to Leverage Digit Embeddings to Represent Numbers? [Under review]
  ▷ Designed a mathematically informed number representation by aggregating digit ones.
  ▷ Evaluated the alignment of novel number representations with numerical proximity.
  ▷ Explored incorporating new number representations at encoding and in loss function.

Jun 24 (preprint) Pastorino, V., **Sivakumar, J.**, & Moosavi, N. (2024). Decoding News Narratives: A Critical Analysis of Large Language Models in Framing Detection [Under review]
  ▷ Explored LLMs capability to distinguish between framed and neutral news articles.
  ▷ Evaluated effect of different few-shot examples and impact on out-of-domain news.
  ▷ Created a new dataset for frame detections and analysed misclassifications.

Jul 23 (ACL) **Sivakumar, J.**, & Moosavi, N. (2023). FERMAT: An Alternative to Accuracy for Numerical Reasoning. In Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers). ACL.
  ▷ Designed a mathematically informative multi-view test sets for numerical reasoning.
  ▷ Published a method for automatic data-augmentation of worded arithmetic problem.
  ▷ Demonstrated that diversity in language significantly improves performance.
  ▷ Explored data-leakage to justify improvement of BART and FLAN type LLMs.

Dec 21 (IALP-IEEE) **Sivakumar, J.**, et. al. (2021, December). A GRU-based pipeline approach for word-sentence segmentation and punctuation restoration in English. In 2021 International Conference on Asian Language Processing (IALP). IEEE.
  ▷ Trained GRU models using PyTorch for punctuation retrieval of concatenated strings.
  ▷ Created deep learning classification systems to identify insertions of punctuation.
  ▷ Generated synthetic training and testing from a big data source of punctuated text.
  ▷ Investigated automatic evaluations metrics against human perception.

PROFESSIONAL ACTIVITIES

Jul 24 - Oct 24 **Amazon - Applied Scientist Intern** (Alexa International - United States)
  ▷ Created benchmark using AWS tools with human-in-the-loop approach for relevancy.
  ▷ Presented documentation to cross-functional partners to explain benchmarking need.
  ▷ Collaborated with software engineers to review code and deploy updates to production.

Jan 24 - Jun 24 **Consultancy - Student Marketing / Elevate** (Sheffield, United Kingdom)
  ▷ Researched and explained a RAG solution to automate high-volume query response.
  ▷ Delivered a Topic Modelling solution to analyse large and complex document sources.
  ▷ Advised clients on cost, efficiency, scalability, stability and technical skills required.

SKILLS

Programming
- ▷ Python (PyTorch, Huggingface, AWS, scikit-learn, NLTK)
- ▷ MATLAB
- ▷ Bash (HPC)
- ▷ Version control (git/github)
- ▷ Latex

Languages
- ▷ French (Native)
- ▷ Tamil (Native)
- ▷ English (Native)
- ▷ Spanish (Fluent)
- ▷ German (Conversational)

RESEARCH ACTIVITIES

Sep 21 - Present — **NLP for Endangered Language Revitalisation in Colombia**
- ▷ Collected and digitised text using OCR for Palenquero, an endangered language.
- ▷ Deploying low-resource language NLP research to develop pedagogical resource.

Nov 21 - Jun 22 — **Speech Processing and NLP to improve Oral History Search functionality**
- ▷ Explored existing NER systems to identify domain specific terms.
- ▷ Automated annotated transcriptions to improve search and retrieval of video frames.

Sep 20 - Sep 21 — **Semantic Sentence Embeddings for Natural Language Inference**
- ▷ Trained BERT embeddings using siamese network contrastive loss over NLI tasks.
- ▷ Inductively biased embeddings with semantic parse trees over Graph Neural Network.

Sep 15 - May 16 — **AMathematical Approach at Analysing the Influence of English on French**
- ▷ Generated a diachronic dataset of French news articles to observe language evolution.
- ▷ Modelled adoption of English lexica into French with stochastic/differential equations.

ACADEMIC ACTIVITIES

Jan 24 - Present — **Reviewer for ARR/ACL/EMNLP/NAACL/LREC/COLING**
- ▷ Tracks: NLP and LLM Applications; Resources and Evaluation; Reasoning, Question Answering, and Sentence-level Semantics; Lexicon and Semantics, and Social Media Processing; Less-Resourced/Endangered/Less-studied Languages; Bio lay summarisation.

Jan 22 - Sep 24 — **Human Annotator**
- ▷ Followed annotation guidelines and provided feedback for experiments relating to: **Psychology** (Eye-tracking from reading), **Human-Robot Interaction** (Perception of robot feature and interaction), **Text** (Hate Speech detections, Misinformation), Named Entity Recognition, **Speech** (Intelligibility), **Vision** (Naming Images, Bias from Visual Posters).

Nov 23 - Jun 24 — **Supervisor for final year research project in number representation**
- ▷ Weekly supervision for number decoding project, helped with latest deep learning techniques both theoretically and practically.

Jun 23 — **Invited Talk** - 3rd Speech and Language Technology CDT Conference
- ▷ Presented FERMAT research in main talk event.

Nov 22 - Feb 23 — **Examiner for Text Processing and Professional Issues**
- ▷ Assessed student code and marked reports, provided feedback on assignments.

Jul 22 — **12th Lisbon Machine Learning Summer School**
- ▷ Attended lectures on linear classifiers, seq2seq models, neural networks and talks from industry and academia on novel research, networked with other attendees.

Jan 22 - Jun 22 — **Teaching Assistant for Foundations of Computer Science**
- ▷ Taught fundamental mathematics: probability, linear algebra and number theory.

Jan 21 - May 21 — **Machine Learning Tutorial for Postgraduate Computational Linguists**
- ▷ Explained mathematics using linguistics examples for kNN, decision trees, Naive Bayes, linear regressions, regularisation, beam search, EM algorithm, gradient descent, entropy.