Jasivan Alex SIVAKUMAR

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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, NLP, NLG, LLMs, 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 (arXiv) **Sivakumar, J.**, & Moosavi, N. (2024). How to Leverage Digit Embeddings to Represent Numbers?
- ▹ 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 (arXiv) Pastorino, V., **Sivakumar, J.**, & Moosavi, N. (2024). Decoding News Narratives: A Critical Analysis of Large Language Models in Framing Detection
- ▹ 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 improved 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 a binary classification system to identify insertions of punctuation.
- ▹ Generated synthetic training and testing data from 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 key stakeholder to explain and motivate benchmarking.
- ▹ Collaborated with developers to push revisions to production including code reviewing.

Jan 24 - Jun 24 **Consultancy - Student Marketing / Elevate** (Sheffield, United Kingdom)
- ▹ Discussed with clients to understand their daily activities and workforce distribution.
- ▹ Researched and explained a RAG solution to automate high volume query response.
- ▹ Explored and presented a Topic Modelling solution to cluster document content.

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 Technology 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 **A Mathematical 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**
- Reviewed for multiple tracks: Less-Resourced/Endangered/Less-studied Languages; Lexicon and Semantics, and Social Media Processing; NLP and LLM Applications, Reasoning, Question Answering, and Sentence-level Semantics; Resources and Evaluation; Bio lay summarisation

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.