Raghuveer Thirukovalluru

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EDUCATION

UMASS AMHERST | MS in Computer Science
Graduated July 2021 | Amherst, Massachusetts
• Cum. GPA: 4.0/4.0

IIT KANPUR | B.Tech in Electrical Engg.
Graduated July, 2016 | Kanpur, India
• Cum. GPA: 8.9 / 10.0

DUKE UNIVERSITY | PhD in Computer Science
2021-Present | Durham, North Carolina
Advisors: Dr. Bhuwan Dhingra
• Cum. GPA: 4.0/4.0

PUBLICATIONS & PATENTS

- **R. Thirukovalluru** and B. Dhingra. GenEOL: Harnessing the Generative Power of LLMs for Training-Free Sentence Embeddings. *arXiv; https://arxiv.org/abs/2410.14635*, 2024

- **R. Thirukovalluru**, Y. Huang, and B. Dhingra. Atomic Self-Consistency for Better Long Form Generations. In *Accepted at South NLP Symposium (Oral); Also Accepted to EMNLP 2024*

- **R.Thirukovalluru**, X. Wang, J. Chen, S. Li, J. Lei, R. Jin, and B. Dhingra. SumCSE: Summary as a transformation for Contrastive Learning. In *Findings of the Association for Computational Linguistics: NAACL 2024*, pages 3577–3588, 2024

- **R.Thirukovalluru**, N. Monath, B. Dhingra, and S. Wiseman. Sequence Reducible Holdout Loss for Language Model Pretraining. In *Proceedings of the (LREC-COLING 2024)*, pages 14705–14716, 2024

- **R. Thirukovalluru**, N. Monath, K. Shridhar, M. Zaheer, M. Sachan, and A. McCallum. Scaling Within Document Coreference to Long Texts. In *Findings of the Association for Computational Linguistics: ACL 2021*, pages 3921–3931, 2021

- **R. Thirukovalluru***, M. Sridhar*, D. Thai*, S. Chanumolu, N. Monath, S. Ananthakrishnan, and A. McCallum. Knowledge informed semantic parsing for conversational question answering. In *Proceedings of the 6th Workshop on Representation Learning for NLP (RepL4NLP-2021)*, pages 231–240, 2021

- D. Thai*, **R. Thirukovalluru***, T. Bansal *, and A. McCallum. Simultaneously Self-Attending to Text and Entities for Knowledge-Informed Text Representations. In *Proceedings of the 6th Workshop on Representation Learning for NLP (RepL4NLP-2021)*, pages 241–247, 2021

- N.K.Verma*, R.K.Sevakula*, and **R.Thirukovalluru***. Pattern Analysis Framework with Graphical Indices for Condition-Based Monitoring. *IEEE Transactions on Reliability, vol. 66, no. 4, pp. 1085-1100*, 2017

- **R.Thirukovalluru**, R.Mariyappan, and S.Roy. Method and System for Real-time Summary Generation of Conversation. *USPTO*, US9881614

EXPERIENCE

META AI, | Research Scientist Intern
Summers 2023 | Sunnyvale

• Worked on generating unsupervised sentence embeddings for sentence similarity.

INFORMATION EXTRACTION & SYNTHESIS LAB | Research Assistant
Summers 2019 | Amherst

• Worked on multiple high impact NLP problems- Coreference Resolution, Knowledge graphs etc. Details in Research Section.

AI IN FINANCE | Co-Founder
August 2018 - May 2019 | Bangalore (Non-Incorporated)

• Designed and developed a credit card alternative with better creditworthiness estimation, lower NPAs and higher user incentives. Worked on both *pricing & growth models* and also *hardware & software* of payment devices.

XEROX RESEARCH CENTRE, INDIA | Budding Scientist, Text & Graph Analytics
July 2016 – July 2018 | Bangalore

• Worked on multiple research problems from conversation summarization to trending topic analysis.

RESEARCH

HIGH RECALL CLOSEDBOOK LONG FORM QA | Mentor : Dr. Bhuwan Dhingra
Oct 2023 – Present | Duke University

- *Problem Statement*: Improve closedbook recall of LLMs for long form question answering.

- *Approach*: While most LLM generation techniques like self-consistency, self evaluation improve precision of LLMs, we improve recall of generations in this project. We use a clustering based solution over candidate resposes from an LLM.

UNSUPERVISED SENTENCE EMBEDDINGS | Mentor : Dr. Xiaolan Wang, Jun Chen, Dr. Shuyang li
Jul 2023 – Nov 2023 | Meta AI, Sunnyvale

- *Problem Statement*: Propose a methodology for generating sentence embeddings in an unsupervised fashion.

- *Approach*: Showed that Summary as a transformation works very well to create both positives and negatives for contrastive learning of sentence embeddings. Our method beats all other unsupervised baselines and multiple supervised baselines.

FASTER LANGUAGE MODEL PRETRAINING | Mentor : Dr. Bhuwan Dhingra, Dr. Sam Wiseman
Sept 2021 – April 2023 | Duke University

- *Problem Statement*: Propose a methodology to improve language model pretraining time.

- *Approach*: Proposed an auxiliary model which can filter out some less important examples for the language model at a given state during training. These examples while not contributing much to pretraining of the language model, eat up time.

COREFERENCE RESOLUTION | Mentors: Nicholas Monath, Dr. Manzil Zaheer, Dr. Mrinmaya Sachan, Dr. Andrew McCallum
June 2020 – Present | IESL, UMass Amherst

- *Problem Statement*: Propose techniques to perform coreference on long documents having found that existing tools dont scale.

- *Approach*: Proposed a token level mechanism to perform coreference. Each token was scored for a start score and end score using feed forward networks. The overall system performed on par with existing neural arts while consuming < 10% GPU RAM and being 4x faster on longer documents.

CONVERSATIONAL QUESTION ANSWERING | Mentors: Mukund, Dung Thai, Dr. Andrew McCallum
Feb 2020-July 2020 | Amazon Alexa AI & UMass Amherst

- *Problem Statement*: Involves a conversation turn containing a complex natural language question with references to previous turns. The question can be answered on a knowledge graph(KG). Dataset: "Complex Sequential Question Answering" (CSQA).

- *Approach*: Developed a knowledge graph(KG) driven semantic parsing approach to generate logical forms conforming to the KG subgraph required to answer the question. This addressed the problem of non executable logical forms and resulted in 2.5 F1 improvement, 4% accuracy improvement. The model also performed on par with baseline with just 10% of baseline parameters.

COURSEWORK

• Machine Learning • Reinforcement Learning • Algorithms for Data Science • Probabilistic Graphical Models • Advanced NLP
• Adv. Algorithms• Theory Software Engineering • Software Architecture
• Discrete Mathematics • Game Theory

ACHIEVEMENTS

- Academic Excellence Award, IIT Kanpur, 2013.
- All India Rank 26 in Kishore Vaigyanik Protsahan Yojana (KVPY 2012).
- All India Rank 588 (amongst 5,00,000 students) in IIT-JEE 2012.
- All India Rank 87 (amongst 10,00,000 students) in AIEEE.BA 2012.

PROGRAMMING

ML Libraries: TensorFlow • PyTorch
Programming Languages: Python • JS • C++ • Java
Frameworks: Android • NodeJS

EX. CURRICULAR

- **Chess** - Regular player of chess. Rated 1650+(rapid) on chess.com.
- **Table Tennis** - Regular player. Won multiple office contests.

REVIEWER

• Neurips 2023, AAAI 2024
• ARR - Dec'23, Feb'24, June'24, August'24
• ICML 2023, ICML 2024