Arun Tejasvi Chaganty

Senior Research Scientist

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EXPERIENCE

Google

Senior Research Scientist   Dec 2020–(today)

- Created **dialog inpainting** (co-first author), a technique to generate millions of information-seeking conversations from documents using language models (T5 S–XXL). Implemented the entire bulk inference pipeline (average throughput of ~3k inference calls/s) using Apache Beam. Led human evaluation and safety analysis. Trained masked language models and retrieval models.
- Created the **Conversational Playlist Curation Dataset** (first author; PI), one of the first resources for conversational recommendation with multiple item ratings per-turn. Designed and implemented human-human methodology, including all annotation interfaces.
- Developed **Talk the Walk** (PI), a recipe to generate millions of (music) recommendation-seeking conversations from existing playlists using a combination of random walks and language models. Bootstrapped an end-to-end conversation recommendation system that significantly outperforms baselines in live experiments.
- Defined task and evaluation methodology for **RARR**, a post-hoc attribution and reivision method for large language models (PaLM-540B).

Research Intern   Summer 2014

- Explored multi-sentence relation extraction for knowledge bases.

Square

AI Lead   May 2019–Dec 2020

- Led a small team of AI engineers that built **Square Assistant**—a chatbot we launched in October 2019 that helps customers book and reschedule appointments with Square merchants.
- Designed and shipped **conversational rescheduling** feature that increased booking and rescheduling success rates by helping customers find a concrete time for their appointment; the feature understands temporal constraints in user utterances using a model-based semantic parser.
- Developed a **type-safe domain-specific language** to describe asynchrony and interruptions in dialog flows using coroutines. Implemented Java-to-Java compiler. DSL reduced feature code 10–20x and fixed subtle asynchrony bugs.
- Developed most of the AI model deployment, logging and data annotation infrastructure.

EDUCATION

Stanford University
PhD (Computer Science)   2012-2018
Advised by Percy Liang

Indian Institute of Technology, Madras
MTech. (Computer Science)
BTech. (Computer   2011-2012
Science)   2007-2011
Minor in Physics   GPA: 9.24/10

AWARDS

- Stanford Graduate Fellow ('14–'17)
- Robert Padovani Scholar ('09)
- Google Summer of Code ('08)
- Kishore Vaigyanik Protsahan Yojana Scholar ('06–'07)

SKILLS

Natural Language Processing
Conversational AI • Recommendation Systems • Synthetic Data Generation • Evaluation • Retrieval • Crowdsourcing • Semantic Parsing • Information Extraction

Machine Learning
Deep Learning • Latent Variable Models • Probabilistic Programming

Programming
Python (PyTorch, Tensorflow) • Typescript (Angular, React) • SQL • Bash • Java • C++

Computer Science
Compilers • Operating Systems • Computer Networks • Cloud Computing

Eloquent Labs

Head of AI   June 2018–May 2019

- Led a small team of AI engineers that built a conversational AI system for enterprise customer service. Interfaced with clients directly.
- Developed a **human-in-the-loop system to fine-tune question similarity models** for particular clients; led to 2–3x increases in precision and recall for each client.
- Startup acquired by Square in May 2019.

Stanford University

PhD Candidate   Sept 2012–Sept 2018

- Led / part of the Stanford team at TAC-KBP 2013, 2015–17. Our entry was the top-ranked at the TAC-KBP 2015--17 Cold Start tracks.
- Co-author of **CoreNLP Server**, an extremely popular API server for the Stanford CoreNLP package.
- Can we scalably evaluate open-ended language tasks like information extraction or summarization with human feedback? We show fundamental limitations with existing automatic metrics **(ACL 2018)**.
- Proposed a human-in-the-loop solution for knowledge-base population evaluation that eliminates *pooling bias* using a novel importance-reweighted estimator that decreases annotation costs by a factor of 4 **(EMNLP 2017)**.
- Numeric comparisons, while common in the news, are hard to identify because their definition emerges only in context. We define an explicit representation, called a *textual analogy frames*, for such comparisons and build a semantic parser to identify such frames in text **(EMNLP 2018)**.
- People best understand concepts through comparisons: we provide a system to generate compositional comparisons for numerical expressions in text, such as describing Cristiano Ronaldo's signing fee of $131 million as roughly the amount it would take to pay everyone in Kansas City the median salary for a week **(ACL 2016)**.
- Can we efficiently learn latent variable models with guarantees? We show that this is possible for a variety of models satisfying a 'uniformly bottlenecked' assumption including discriminative mixtures of linear experts **(ICML 2013)**, high tree-width models, log-linear models and multi-view Markov random fields **(ICML 2014)**. In later work, we show guaranteed recovery for any mixture model with polynomial moments is possible via reduction to the generalized moment problem **(NIPS 2015)**. All of these methods require tensor factorization, which we show can be more efficiently performed by reduction to simultaneous matrix diagonalization using random productions **(AISTATS 2015)**.

Microsoft Research India

Intern   Summer 2009, 2010, 2011

- Used dynamic analysis and concolic execution to efficiently sample from probabilistic programs by avoiding invalid states in both an importance sampling and Metropolis-Hastings setting **(AISTATS 2013)**.
- Applied Counter-Example Guided Abstraction Refinement, and generalization (from program analysis) to the Markov Logic Network framework, with significant performance improvements over prior art **(CAV 2013)**.

PUBLICATIONS 🔍

1. **A. Chaganty, M. Leszczynski, R. Ganti, S. Zhang, K. Balog, and F. Radlinski** (**2023**). Beyond Single Items: Exploring User Preferences in Item Sets with the Conversational Playlist Curation Dataset. *In Submission*.

2. **M. Leszczynski, R. Ganti, S. Zhang, K. Balog, F. Radlinski, F. Pereira, and A. Chaganty** (**2023**). Generating Synthetic Data for Conversational Music Recommendation Using Random Walks and Language Models. *arXiv*.

3. **L. Gao, Z. Dai, P. Pasupat, A. Chen, A. Chaganty, Y. Fan, V. Zhao, N. Lao, H. Lee, D. Juan, and K. Guu** (**2022**). RARR: Researching and Revising What Language Models Say, Using Language Models. *arXiv*.

4. **Z. Dai, A. Chaganty, V. Zhao, A. Amini, Q. Rashid, M. Green, and K. Guu** (**2022**). Conformal Retrofitting via Riemannian Manifolds: distilling task-specific graphs into pretrained embeddings. *In submission; Advances in Neural Information Processing Systems (NeurIPS)*.

5. **J. Dieter, and A. Chaganty** (**2020**). Conformal Retrofitting via Riemannian Manifolds: distilling task-specific graphs into pretrained embeddings. *arXiv*.

6. **J. Dieter, T. Wang, G. Angeli, A. Chang, and A. Chaganty** (**2019**). Mimic and Rephrase: Reflective Listening in Open-Ended Dialogue. *Computational Natural Language Learning (CoNLL)*.

7. **M. Lamm, A. Chaganty, C. D. Manning, D. Jurafsky, and P. Liang** (**2018**). Textual Analogy Parsing: What's Shared and What's Compared among Analogous Facts. *Empirical Methods in Natural Language Processing (EMNLP)*.

8. **A. Chaganty, S. Mussmann, and P. Liang** (**2018**). The price of debiasing automatic metrics in natural language evaluation. *Association for Computational Linguistics (ACL)*.

9. **A. T. Chaganty, A. Paranjape, J. Bolton, M. Lamm, J. Lei, A. See, K. Clark, Y. Zhang, P. Qi, and C. D. Manning** (**2017**). Stanford at TAC KBP 2017: Building a Trilingual Relational Knowledge Graph. *Text Analytics Conference (TAC)*.

10. **A. Chaganty, A. Paranjape, P. Liang, and C. Manning** (**2017**). Importance sampling for unbiased on-demand evaluation of knowledge base population. *Empirical Methods in Natural Language Processing (EMNLP)*.

11. **A. T. Chaganty, and P. Liang** (**2016**). How Much is 131 Million Dollars? Putting Numbers in Perspective with Compositional Descriptions. *Association for Computational Linguistics (ACL)*.

12. **Y. Zhang, A. Chaganty, A. Paranjape, D. Chen, J. Bolton, P. Qi, and C. D. Manning** (**2016**). Stanford at TAC KBP 2016: Sealing Pipeline Leaks and Understanding Chinese. *Text Analytics Conference (TAC)*.

13. **S. I. Wang, A. Chaganty, and P. Liang** (**2015**). Estimating Mixture Models via Mixture of Polynomials. *Advances in Neural Information Processing Systems (NeurIPS)*.

14. **K. Werling, A. Chaganty, P. Liang, and C. Manning** (**2015**). On-the-Job Learning with Bayesian Decision Theory. *Advances in Neural Information Processing Systems (NeurIPS)*.

15. **V. Kuleshov, A. Chaganty, and P. Liang** (**2015**). Tensor factorization via matrix factorization. *Artificial Intelligence and Statistics (AISTATS)*.

16. **G. Angeli, V. Zhong, D. Chen, A. Chaganty, J. Bolton, M. Premkumar, P. Pasupat, S. Gupta, and C. D. Manning** (**2015**). Stanford at TAC KBP 2015: Bootstrapped Self Training for Knowledge Base Population. *Text Analytics Conference (TAC)*.

17. **A. Chaganty, and P. Liang** (**2014**). Estimating Latent-Variable Graphical Models using Moments and Likelihoods. *International Conference on Machine Learning (ICML)*.

18. **A. Chaganty, and P. Liang** (**2013**). Spectral Experts for Estimating Mixtures of Linear Regressions. *International Conference on Machine Learning (ICML)*.

19. **G. Angeli, A. Chaganty, A. Chang, K. Reschke, J. Tibshirani, J. Wu, O. Bastani, K. Siilats, and C. D. Manning** (**2013**). Stanford's 2013 KBP System. *Text Analytics Conference (TAC)*.

20. **A. T. Chaganty, A. Lal, A. Nori, and S. Rajamani** (**2013**). Probabilistic model approximation for statistical relational learning. *US Patent App. 13/308,571*.

21. **A. Chaganty, A. Lal, A. Nori, and S. Rajamani** (**2013**). Combining Relational Learning with SMT Solvers using CEGAR. *Computer Aided Verification (CAV)*.

22. **A. Chaganty, A. Nori, and S. Rajamani** (**2013**). Efficiently Sampling Probabilistic Programs via Program Analysis. *Artificial Intelligence and Statistics (AISTATS)*.

23. **A. Chaganty, P. Gaur, and B. Ravindran** (**2012**). Learning in a Small Wolrd. *Autonomous Agents and Multi-Agent Systems (AAMAS)*.

24. **A. Chaganty** (**2012**). Inter-task Learning with Spatio-Temporal Abstractions. *Master's Thesis*.