Carlos Gemmell

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TL;DR

I am an NLP PhD at the University of Glasgow. I led the winning Amazon 2021-2022 Alexa Prize TaskBot team.

EDUCATION

University of Glasgow Scotland, UK
PhD in NLP advised by Dr. Jeff Dalton, EPSRC full scholarship *September 2019 – Expected 2023*

- Fundamental research in NLP exploring how language models (LMs) use tools like external knowledge and programs. Inducing models to generate code as part of their reasoning to make them more interpretable and capable of symbolic manipulation.
- Research topics include semantic parsing, conversational query understanding, and extrapolation capabilities of large LMs.

University of Glasgow
Bachelor in Computer Science *September 2015 – June 2019*
Magna Cum Laude, Honours of the First Class
Thesis: Deep recurrent networks for language conditioned code generation

RESEARCH & WORK EXPERIENCE

Team Lead - Amazon Alexa Prize TaskBot Team (1st Place) News, Code June 2021 – July 2022
Advised by Jeff Dalton .

- Successful research proposal to led a team of 5 AI researchers to build and deploy at scale GRILLBot, a multi-modal task-oriented virtual assistant for the 2021-2022 Amazon Alexa Prize Taskbot competition.
- Won 1st place and 500,000$ prize from an initial pool of 125 global university teams. As we progressed through 3 selection stages we were also awarded 250,000$ throughout the competition.
- I designed and built the GPU Kubernetes cluster for deployment and scaling on AWS. GRILLBot was the only system built agnostic of Amazon's Alexa Prize infrastructure and has 99.9% up-time. It is currently deployed on all US Alexa devices. Try it! Say "Alexa, assist me".
- Leadership responsibilities included creating a fun and productive environment centred around agile software engineering practices like kanban using Jira, peer review, sprints, stand-ups, and compassion.
- As a team member, after jointly building the core of the assistant, I designed and trained all neural models (T5, GPT-J, ...) for dialogue management and contextual question answering. To measure their effectiveness, new train/dev/test collections were created leveraging data synthesis and prompting with GPT-3.

Research Scientist - Internship June. 2018 – Dec. 2018
Bird.i

- Developed a real-time object detection pipeline for construction sites satellite in images.
- Surveyed and reproduced results for several state of the art object detection models: Faster-RCNN, YOLO

Software Engineer - Internship June 2017 – Sep 2017
Bird.i .

- Co-authored a customer facing model-to-production pipeline in AWS Lambda with Docker based CI/CD.
- Developed a novel sweep & prune algorithm for real-time geographical analytics.

Software Engineer September 2016 – June 2017
Bcomp Switzerland .

- Prototyped and shipped a roof-mounted LED display for live metrics of an electric race car including real-time software for monitoring.

Publications (see Google Scholar)

GRILLBot: A conversational agent for real-world tasks Amazon Alexa Proceedings 2022
Carlos Gemmell, S. Fischer, I. Mackie, P. Owoicho, F. Rossetto, Jeff Dalton

Induced Natural Language Rationales and Interleaved MathNLP 2022
Markup Tokens Enable Extrapolation in Large Language Models EMNLP
Mirelle Bueno, Carlos Gemmell, Jeff Dalton, Roberto Lotufo, and Rodrigo Nogueira

VILT: Video Instructions Linking for Complex Tasks IMuR 2022
Sophie Fischer, Carlos Gemmell and Iain Mackie, Jeffrey Dalton

GRILLBot: An Assistant for Real-World Tasks with SIGDial 2022
Neural Semantic Parsing and Graph-Based Representations
Carlos Gemmell, I. Mackie, P. Owoicho, F. Rossetto, S. Fischer, Jeff Dalton

CODEC: Complex Document and Entity Collection SIGIR 2022
Iain Mackie, P. Owoicho, Carlos Gemmell, S. Fischer, S. MacAvaney, Jeffrey Dalton

Relevance Transformer: Generating Code Snippets with Relevance Feedback SIGIR 2020
Carlos Gemmell, Federico Rossetto, and Jeff Dalton

Teaching and Outreach

Workshop talk at Search-Oriented Conversational AI (SCAI) July 2022 – SIGIR, Madrid, Spain
Question answering with large language models in GRILLBot

Invited talk at Stanford NLP March 2022 – Stanford, Palo Alto, US
Conversation Search and Language Understanding

Multimodal NLP workshop at USC March 2022 – Los Angeles, US
Multimodal Conversation Search

Invited talk at Universidad NOVA de Lisboa: February 2022 – Lisbon, Portugal
TREC CAsT: Current Challenges and Future Directions

Teaching assistant for bachelors NLP course (COMPSCI4074): University of Glasgow, Scotland
Lectures: Word Embeddings and Sequence to Sequence Models

Organiser and Teacher: University NLP Workshops: October 2019 – University of Glasgow, Scotland
Machine Learning from Square One

Organiser: Department seminars and reading group November 2020 – January 2022
University of Glasgow Information Retrieval seminar and NLP reading group

Reviewer for SIGIR 2021, EMNLP 2021, ECIR 2021, ACL 2021, EMNLP 2022, AACL 2022

Technical Skills

Languages: Python, Java, C/C++, JavaScript, SQL
Libraries: Pytorch (extensive), Tensorflow, AllenNLP, NumPy/SciP, Matpplotlib, Terrier, GRPC
Developer Tools: Git, Docker, Kubernetes, Google Cloud Platform, AWS
Selected GitHub Repositories: Open Assistant Toolkit (OAT) - GRILLBot public release

Personal

Languages: English (Native), Spanish (Native), French (Native)
Interests: Rock Climbing, Longboarding, Latin Dancing, Photography, Hardware Hacker