Nicholas Clark

RESEARCH INTERESTS

My research advances retrieval-augmented generation (RAG) systems for robust, transparent question-answering in dynamic knowledge domains. I develop novel retrieval architectures to integrate external and parametric knowledge, with particular focus on handling evolving information and contested topics. Current projects concern probabilistic methods to enhance the ability of large language models (LLMs) to evaluate source credibility, while tracking conversational context to disambiguate user intent.

Keywords: retrieval-augmented generation (RAG), large language models (LLMs), knowledge integration, uncertainty quantification, probabilistic reasoning, explainable AI (XAI), human-centered AI

EDUCATION

Ph.D. in Information Science — Sep 2024 - Present
Information School — Seattle, WA, USA
University of Washington
Advisor: Dr. Tanushree Mitra & Dr. Bill Howe

B.S. in Mathematics (Honors), Philosophy — Aug 2019 - May 2023
College of Science — Notre Dame, IN, USA
University of Notre Dame

EXPERIENCE

SimLoop AI — Dec 2023 - Aug 2024
Co-Founder & CTO — San Francisco, CA, USA

- Co-founded and pitched to Y Combinator a platform that automates website testing through multi-agent LLM simulation, accelerating user studies by 10x while uncovering edge cases missed by traditional methods
- Engineered advanced prompting techniques for behavioral replication, achieving user conversion predictions within ±3% accuracy through targeted persona design

Notre Dame Center for Research Computing — Jan 2023 - Jun 2024
Research Fellow & Trusted AI Research Assistant — Notre Dame, IN, USA
Mentors: Paul Brenner, Charles Vardeman

- Spearheaded Lockheed Martin partnership on multi-agent systems, optimizing deployments of open-source models like Llama 2 and Mistral using vLLM, an inference and serving engine for LLMs
- Published research on browser privacy affordances (**P.1**) and social network bot perception (**P.2**) in premier venues including the *AAAI Symposium Series* and *Computers & Security*
- Developed a secure AI toolkit with Naval Surface Warfare Center, enabling scalable deployment across 25 research teams while supporting diverse ML applications from Natural Language Processing (NLP) to Computer Vision (CV)

Electronic Arts — May 2022 - Aug 2022
Data Analytics Intern — Remote

- Engineered automated A/B testing pipeline using SQL and Apache Airflow, reducing analysis time from 7 days to 75 minutes while implementing statistical safeguards for test validity
- Developed comprehensive Looker dashboards and scalable ETL processes analyzing player behavior across 300k+ daily users, enabling real-time monitoring of key engagement metrics for PvE game modes

TE Connectivity Jun 2021 - Aug 2021
Data Analytics Intern Remote

- Designed interactive Tableau dashboards analyzing environmental impact metrics across 120+ global manufacturing sites, enabling data-driven sustainability decisions at executive level
- Processed and validated emissions data through automated pipelines, developing statistical models to assess 2030 sustainability target feasibility across business units

SELECTED HONORS AND AWARDS

Innovation Award - SimLoop AI, ND McCloskey New Venture Competition, ($10,000) 2024
W24 Interview - SimLoop AI, YCombinator, (Top 5% of Applicants) 2023
International Data Open Regional Team, Citadel Securities, Correlation One 2022
Central North America Datathon Champion, Citadel Securities, Correlation One, ($10,000) 2021
Data Challenge Finalist, Facebook, (Top 100 North America) 2021

PUBLICATIONS

Preprints Under Review

P.3 David Farr, Iain Cruickshank, Nico Manzonelli, **Nicholas Clark**, Kate Starbird, Jevin West.
LLM Confidence Evaluation Measures in Zero-Shot CSS Classification.

Conference & Journal Papers

P.2 Kristina Radivojevic, **Nicholas Clark**, Paul Brenner.
LLMs Among Us: Generative AI Participating in Digital Discourse.
AAAI Spring Symposium 2024 on Empowering Machine Learning and Large Language Models with Domain and Commonsense Knowledge.
AAAI-MAKE 2024
Media Coverage: *Notre Dame News*, *World Economic Forum*, *Futurity*

P.1 Kristina Radivojevic, **Nicholas Clark**, Anna Klempay, Paul Brenner.
Defending novice user privacy: An evaluation of default web browser configurations.
Computers & Security

Posters

Po.2 Peter Ainsworth, **Nicholas Clark**, Daniel Weldon, James Sweet, Charles Vardeman, Paul Brenner.
Trusted AI Frameworks: Use Case Infrastructure.
SCALE Symposium between Notre Dame, Purdue, Indiana University, and Naval Surface Warfare Center

Po.1 Peter Ainsworth, Katherine Hill, Katie Greed, Kate Mealey, Maria Murphy, Miles Roberts, **Nicholas Clark**, Paul Brenner, Charles Vardeman, Eli Phillips.
Challenges to Trust in Complex Knowledge Extraction AI Stacks.
SCALE Symposium between Notre Dame, Purdue, Indiana University, and Naval Surface Warfare Center

TECHNICAL SKILLS

ML & Data PyTorch, TensorFlow, Transformers, Scikit-Learn, Python (NumPy, Pandas), R, SQL
Cloud & DevOps AWS (SageMaker, EC2), Google Cloud, Docker, Kubernetes, Linux/Unix, Shell Scripting
Development Full-Stack (React.js, Node.js), JavaScript, HTML/CSS, REST APIs