Jacob C. Metzger

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Professional Summary

AI/ML researcher, engineer, and technical leader with 8+ years' experience in applied machine learning, generative AI, and probabilistic modeling. Proven record of leading cross-functional teams and deploying intelligent systems grounded in statistical modeling, probabilistic reasoning, and Bayesian inference. Specialized in developing interpretable, uncertainty-aware AI solutions for complex domains including digital twins, supply chains, and medical trials.

Focus Areas: Bayesian Learning • Probabilistic Modeling • Causal Inference • Statistical ML • Generative AI • Explainable AI

Technical Skills

Programming Languages: Python, R, Scala, Java, SQL
Frameworks: PyTorch, TensorFlow, Hugging Face, scikit-learn, LangChain, LangGraph
Platforms: AWS, GCP, Azure, Docker, Kubernetes
Statistical Modeling and Bayesian Inference: Probabilistic Graphical Models, Causal Inference, MCMC,
Variational Inference, Bayesian Neural Networks, Deep Ensembles, Pyro, NumPyro, Stan
Other Expertise: NLP, Digital Twins, Knowledge Graphs, MLOps, xAI

Professional Experience

Aktus.AI

Chief AI/ML Architect and Senior Technical Lead San Mateo, CA • Jun 2024 – Jan 2025

- Designed and deployed scalable, vendor-agnostic agentic LLM / generative AI systems for document automation and workflow inference.
- Led end-to-end development of deep generative models and process-understanding systems.
- Directed cross-functional engineering teams and mentored senior staff to align innovations with product and business goals.

Lead Machine Learning Engineer – Vision San Francisco, CA • Mar 2024 – Jun 2024

- Designed deep vision models using LLMs, Stable Diffusion, and transformer-based architectures.
- Built scalable training/inference pipelines for text-to-image and multimodal applications.

• Developed novel semantic evaluation metrics for context-aware model performance.

Accenture Labs

Associate Principal R&D Scientist San Francisco, CA • Nov 2021 – Jan 2024

- Led applied AI research in probabilistic modeling, causal inference, and digital twin systems.
- Developed Bayesian models and probabilistic digital twins for forecasting and counterfactual simulation in supply chain and manufacturing contexts.
- Designed causal and censored estimators using Bayesian inference to improve demand estimation under uncertainty.
- Co-authored Accenture Labs' first code of research values and ethics; contributor to TEthER initiative.
- Communicated complex research topics to non-expert audiences
 - "Probabilistic Reasoning and Knowledge Graphs", Accenture Labs Notebook Talk, Mar 2023
 - "Unlocking Business Value with Probabilistic Reasoning", Accenture Labs Blog, Mar 2023 Authors: Jake Metzger; Alexandria Pabst

OSARO, Inc.

Machine Learning Engineer San Francisco, CA • Oct 2019 – Oct 2021

- Created production ML models for robotic bin picking using multimodal sensor data.
- Led development of novel box-pick system improving pick success by 14%.
- Co-invented novel, online tool change optimizer, increasing throughput by 19%.

Accenture Liquid Studio

Data Scientist San Francisco, CA • Sep 2018 – Oct 2019

- Prototyped NLP and conversational AI solutions at scale.
- Developed explainable reasoning systems and co-invented a patented xAI recommendation engine.
- Led technical workshop for up-skilling new audiences in Conversational AI
 - \circ Oct 2018 Conversational AI Lab faculty for Accenture's Technology Architecture Workshop

Artificial Intelligence Analyst Phoenix, AZ • Sep 2017 – Aug 2018

- Built hybrid cloud/on-prem NLP agents for enterprise clients.
- Specialized in rapid ML prototyping for conversational systems.
- Led technical workshop in NLP/ML technology on the AWS platform
 - Jun 2018 AWS faculty for Amazon Lex and SageMaker for Accenture TechStars annual conference

Applied Research Projects

Probabilistic Reasoning & Digital Twins

- Probabilistic Ontologies for Knowledge Graphs (Paper)
- Bayesian Inference for Digital Twins and Knowledge Graphs (Patent)
- Physics-Informed Digital Twins for Climate Modeling
- Medical Trial Optimization via Graph Digital Twins

Supply Chain and Causal Estimation

- Censored Demand Estimation (Patent Pending)
- Counterfactual Analysis of Industrial Processes using Bayesian Supply Chain Models

Robotic Grasping

- Online Tool Selection (Paper + Patent)
- Deep Uncertainty Estimation using Ensemble Models for Grasp Robustness

Explainable AI

• Explanation-Driven Recommendation Engine (Patent)

Education

University of Illinois - Springfield

MS in Computer Science • May 2017

University of Arizona

BA in Mathematics, Philosophy; Minor in Physics • Dec 2010

Publications

- Online Tool Selection with Learned Grasp Prediction Models, IEEE ICRA, May 2023 Authors: Khashayar Rohanimanesh; Jake Metzger; William Richards; Aviv Tamar
- *Ontology Modeling for Probabilistic Knowledge Graphs*, IEEE ICSC, Feb 2023 Authors: Hayden Freedman; Neda Abolhassani; **Jacob Metzger**; Sanjoy Paul
- *A Bayesian Approach to Constructing Probabilistic Models from Knowledge Graphs*, IJSC, Dec 2023 Authors: Hayden Freedman; **Jacob Metzger**; Neda Abolhassani; Ana Tudor; Sanjoy Paul

Patents

- 2023 AI-Based Optimization And Management of Supply Chain Networks
- 2023 System For Probabilistic Modeling And Multi-Layer Modeling For Digital Twins
- 2022 Automated Robotic Tool Selection
- 2019 Explanation-Driven Reasoning Engine (Issued 2023)

Awards and Recognition

- 2023 Outstanding Thought Leadership, Accenture Labs
- 2019 Top 3 Global Panelist, Accenture "Greater Than" Awards (onyxAI)
- 2018 Q1 Demo Award Winner (Flare360 Conversational AI)

Certifications and Learning

- Deep Learning Specialization (DeepLearning.AI, 2019)
- Functional Programming in Scala (EPFL, 2017)
- Machine Learning (ColumbiaX, 2018)

Professional Affiliations

• Association for Computing Machinery (ACM), Member since 2022