# Josua Krause

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## Education

**PhD in Computer Science, NYU Tandon School of Engineering**
dissertation: "Using Visual Analytics to Explain Black-box Machine Learning"
advisor: Prof. Dr. Enrico Bertini
*New York, USA* – 2013 - 2018

**MSc in Computer Science, University of Konstanz**
thesis: "Graph Comics: Interactive Staging for Exploring Dynamic Graphs"
advisor: Prof. Dr. Oliver Deussen, Prof. Dr. Enrico Bertini
*Konstanz, Germany* – 2011 - 2014

**BSc in Information Engineering, University of Konstanz**
thesis: "Annotation of Changes in Evolving Graphs"
advisor: Prof. Dr. Oliver Deussen, Prof. Dr. Ulrik Brandes
*Konstanz, Germany* – 2008 - 2011

## Employments

**UNDP**, Accelerator Labs
role: NLP Researcher
focus on accessibility of LLMs in low-resource environments and facilitating information access in low-bandwidth communities through LLMs
major projects: online semantic search on document corpus; deep dive semantic search with offline LLM result refinement; LLM RAG for report generation
scale: field notes on grassroots innovation and UNDP published blogs, speeches, press releases, reports: 10k documents (200k chunks)
select AI technology: PyTorch, Hugging Face, llama.cpp, Llama 3, Gemma, ChatGPT 3.5/4, Project Jupyter, spaCy
select Cloud technology: Azure, qdrant, Docker Compose, Redis, PostgreSQL
select (public) URLs: (see page 7 for more details)
https://github.com/UNDP-Accelerator-Labs/nlpapi
https://github.com/JosuaKrause/scattermind
https://github.com/JosuaKrause/redipy
https://github.com/JosuaKrause/quick_server
*New York, USA* – 2023 - current

**Accern**, NLP startup in the FinTech space ($20M Series B early 2022)
role: Vice President of Data Science
lead of research, development, and deployment of AI models; focus on deep representation learning, NLP, and adaptive learning at scale
major projects: progressively refining real-time custom NER and event extraction pipeline; subject dependent sentiment analysis; fine-tuned BERT for financial documents and LoRA for task specialization
team: 6 Data Scientists; 2 Data Engineers (excluding myself)
tenure: started during Pre-Series A as Senior Data Scientist
scale: 500k documents per day; repository of 4B historical documents
select AI technology: PyTorch, Hugging Face BERT / DistilBERT, NVIDIA Triton, scikit-learn, pandas, pola-rs, Project Jupyter
select Cloud technology: AWS, GCP, DigitalOcean, Kubernetes, Prometheus, Grafana, Redis, PostgreSQL, Apache Spark
*New York, USA* – 2018 - 2023

**NYU Tandon School of Engineering**
role: Adjunct Professor
teaching: Foundations of Data Science
*New York, USA* – 2021

**Pacific Northwest National Laboratory**
role: PhD Intern, National Security Internship Program
*Washington, USA* – 2016 and 2017

**IBM T. J. Watson Research Center**
role: Research Summer Intern
Interacting with Predictions: Visual Inspection of Black-box ML Models
*New York, USA* – 2015

**IBM T. J. Watson Research Center**
role: Research Summer Intern
Supporting Iterative Cohort Construction with Visual Temporal Queries
*New York, USA* – 2014

**NYU Tandon School of Engineering**
role: Research Assistant, Teaching Assistant
*New York, USA* – 2013 - 2018

**University of Konstanz**
role: Research Assistant, Teaching Assistant
*Konstanz, Germany* – 2009 - 2013

## Patents

**Josua Krause**, Kenney Ng, Adam Perer: **"Identifying and ranking risk factors using trained predictive models"**,
*US Patent 11,355,245 and 11,355,246* – submitted 2017, accepted 2022

## Invited Talks / Teaching

mentor: Capstone Project
Bringing Structure to Emergent Taxonomies from Open-Ended CMS Tags
*NYU Center for Data Science* – 2023

hackathon: UN Datathon 2023
Best European Team; Best Solution using AIS Data
*United Nations* – 2023

blog: A Backend Agnostic Redis Interface
https://medium.com/stackademic/a-backend-agnostic-redis-interface-9fdeb8641bc5
blog: Dot Product is a Bad Distance Function
https://medium.josuakrause.com/dot-product-is-a-bad-distance-function-aff7667da6cc
blog: Asymmetric Topic Models
https://medium.josuakrause.com/asymmetric-topic-models-199a0e1d03fc
blog: The Problem with Teaching Language Models about the World
https://medium.josuakrause.com/the-problem-with-teaching-language-models-about-the-world-5e024b408711
*Medium* – 2023

invited talk: AI4CI: Artificial Intelligence for Collective Intelligence
*United Nations Development Programme* – 2022

webinar: How to Spot and Understand AI Bias within Financial Services
*Accern* – 2022

blog: Adaptive Modeling: Building Models that Last
*Accern* – 2021

teaching: Foundations of Data Science
*NYU Tandon School of Engineering* – 2021

mentor: Capstone Project
Beyond Bert-based Financial Sentimental Classification: Label Noise and Company Information
*NYU Center for Data Science* – 2020

mentor: Capstone Project
Visualizing and Analyzing Accern Signals as Knowledge-Graph
*Columbia University* – 2020

mentor: Capstone Project
Predicting Stock Market Movements using Public Sentiment Data & Sequential Deep Learning Models
*NYU Center for Data Science* – 2019

teaching: VIS for Practice Workshop – Vis. for the Web: Front- & Backends
*Universität Konstanz* – 2018

teaching assistant: Foundations of Data Science *NYU Tandon* – 2017
teaching assistant: Information Visualization *NYU Tandon* – 2015 - 2016
teaching assistant: Concepts of Computer Science *Univ. Konstanz* – 2012
teaching assistant: Concepts of Programming *Univ. Konstanz* – 2011

## Committee Memberships

session chair: "Visualizing Machine Learning"
*IEEE VIS Short Papers Track* – 2020

associate chair: Special Applications Subcommittee
*ACM CHI Conference on Human Factors in Computing Systems* – 2019

reviewer: OPUS Grant Proposal
*National Science Center, Poland* – 2018

chair: *Workshop on Visual Analytics in Healthcare (VAHC)* – 2017

journal reviewer
Journal of Computational and Graphical Statistics – 2021 - 2022
Transactions on Visualization and Computer Graphics – 2015, 2018 - 2021
IEEE Transactions on Big Data – 2015, 2021
ACM Transactions on Interactive Intelligent Systems – 2021
IEEE Computer Graphics and Applications – 2015

program committee / reviewer
IEEE VIS – 2020 - 2022, 2024
IEEE VIS Short Papers Track – 2020 - 2022, 2024
EuroVis – 2016, 2019 - 2020, 2022
ACM Symposium on User Interface Software and Technology (UIST) – 2020
IEEE Information Visualization (InfoVis) – 2015, 2017 - 2019
IEEE Visual Analytics Science and Technology (VAST) – 2016 - 2019
ICLR Wrkshp. on Debugging Machine Learning Models (DEBUGML) – 2019
KDD Wrkshp. on Interactive Data Exploration and Analytics (IDEA) – 2018
IEEE Pacific Visualization Symposium (PacificVis) – 2018
ACM CHI Conference on Human Factors in Computing Systems – 2016

## Publications

**Josua Krause**, Adam Perer, Enrico Bertini: **"A User Study on the Effect of Aggregating Explanations for Interpreting Machine Learning Models"**,
***KDD Workshop*** *on Interactive Data Exploration and Analytics (**IDEA**)* 2018

**Josua Krause**, Aritra Dasgupta, Jordan Swartz, Yindalon Aphinyanaphongs, Enrico Bertini: **"A Workflow for Visual Diagnostics of Binary Classifiers using Instance-Level Explanations"**,
*IEEE Transactions on Visualization and Computer Graphics (**TVCG** – **VAST**)* 2017

Paolo Tamagnini, **Josua Krause**, Aritra Dasgupta, Enrico Bertini: **"Interpreting Black-Box Classifiers Using Instance-Level Visual Explanations"**,
***SIGMOD Workshop*** *on Human-In-the-Loop Data Analytics (**HILDA**)* 2017

**Josua Krause**, Aritra Dasgupta, Enrico Bertini: **"Explanatory Visual Analytics for Enhancing Human Interpretability of Machine Learning Models"**,
*Visualization in Data Science (**VDS at IEEE VIS**)* 2016

**Josua Krause**, Adam Perer, Kenney Ng: **"Interacting with Predictions: Visual Inspection of Black-box Machine Learning Models"**,
***KDD Workshop*** *on Interactive Data Exploration and Analytics (**IDEA**)* 2016

**Josua Krause**, Adam Perer, Enrico Bertini: **"Using Visual Analytics to Interpret Predictive Machine Learning Models"**,
***ICML Workshop*** *on Human Interpretability in Machine Learning (**WHI**)* 2016

**Josua Krause**, Aritra Dasgupta, Jean-Daniel Fekete, Enrico Bertini: **"SeekAView: An Intelligent Dimensionality Reduction Strategy for Navigating HD Data Spaces"**,
*IEEE Symposium on Large Data Analysis and Visualization (**LDAV**)* 2016

Anshul Vikram Pandey, **Josua Krause**, Cristian Felix, Jeremy Boy, and Enrico Bertini: **"Towards Understanding Human Similarity Perception in the Analysis of Large Sets of Scatter Plots"** (Honorable Mention),
*ACM Conference on Human Factors in Computing Systems (**CHI**)* 2016

**Josua Krause**, Adam Perer, and Kenney Ng: **"Interacting with Predictions: Visual Inspection of Black-box Machine Learning Models"**,
*ACM Conference on Human Factors in Computing Systems (**CHI**)* 2016

**Josua Krause**, Adam Perer, and Harry Stavropoulos: **"Supporting Iterative Cohort Construction with Visual Temporal Queries"**,
*IEEE Transactions on Visualization and Computer Graphics (**TVCG - VAST**)* 2015

**Josua Krause**, Narges Razavian, Enrico Bertini, and David Sontag: **"Visual Exploration of Temporal Data in Electronic Medical Records"**,
*Poster Session I of the **AMIA** Annual Symposium; Poster* 2015

**Josua Krause** and Adam Perer: **"Data-Driven Cohort Construction with Interactive Visual Queries"**,
*2015 **Workshop** on Visual Analytics in Health Care (**VAHC**); Demo* 2015

**Josua Krause**, Narges Razavian, Enrico Bertini, and David Sontag: **"Visual Inspection of Longitudinal Electronic Medical Records"**,
*2015 **Workshop** on Visual Analytics in Health Care (**VAHC**); Demo* 2015

**Josua Krause**, Adam Perer, and Enrico Bertini: **"INFUSE: Interactive Feature Selection for Predictive Modeling of High Dimensional Data"**,
*IEEE Transactions on Visualization and Computer Graphics (**TVCG – VAST**)* 2014

**Josua Krause**, Marc Spicker, Leonard Wörteler, Matthias Schäfer, Leishi Zhang, and Hendrik Strobelt: **"Interactive Visualization for Real-time Public Transport Journey Planning"**,
*Proceedings of **SIGRAD*** 2012

## Open Source Projects

UNDP AccLabs NLP API
API for various NLP tasks, including semantic search.
https://github.com/UNDP-Accelerator-Labs/nlpapi

Scattermind
Decentralized and distributed horizontally scalable ML model execution framework.
https://github.com/JosuaKrause/scattermind

RediPy
An in-memory Redis implementation in Python.
https://github.com/JosuaKrause/redipy

QuickServer
A quick to use and easy to set up Python server implementation.
https://github.com/JosuaKrause/quick_server

Searchspace
Visualization for various similarity functions (euclidean, cosine, dot, etc.).
https://github.com/JosuaKrause/searchspace

BubbleSets for JavaScript
An isosurface visualization for sets in JavaScript.
https://github.com/JosuaKrause/bubblesets-js

Projections for JavaScript
JavaScript implementation of MDS and PCA.
https://github.com/JosuaKrause/mdsjs

BubbleSets
An isosurface visualization for sets in Java.
https://github.com/JosuaKrause/Bubble-Sets

Explanation Explorer
A visual interface to explore ML explanations.
https://github.com/nyuvis/explanation_explorer

patient-viz
Visualization for electronic medical record patient histories.
https://github.com/nyuvis/patient-viz