






Taliesin Beynon

EDUCATION

SUMMER SCHOOLS

Categories for AI		2022
RLSS		2019
IBRO-Simons Comp. Neuro.		2019
Deep Learning Indaba		2017
Wolfram Summer School		2009

FORMAL EDUCATION

BSc Hon, Math	2005 – 2008
University of Cape Town	
Self-taught high school	2000 – 2004
Johannesburg, South Africa	

SKILLS

EXPERT

C++, Python, Go, Mathematica, Swift, PyTorch, \LaTeX , Javascript

INTERMEDIATE

Zig, Haskell, Jax, Julia, TensorFlow

PATENTS

co-inventor with [Stephen Wolfram](#) on 4 granted USPTO patents

INTERESTS

SOFTWARE

dataviz, {functional, differentiable} programming, type systems, database theory, distributed systems, data-oriented design

MATHEMATICS

hypergraphs, {fibred, applied, enriched} category theory, string diagrams + graphical calculi, homotopy type theory

ARTIFICIAL INTELLIGENCE

interpretability + safety + fairness, reinforcement learning, causality, knowledge representation & reasoning

NEUROSCIENCE

Bayesian brains, predictive coding, grid & place cells, cognitive maps

LINKS

Email:	contact@tali.link
Website:	tali.link
Twitter:	@taliesinb
Hacker News:	taliesinb
GitHub:	github.com/taliesinb
LinkedIn:	linkedin.com/in/taliesinb

PAPERS

“Complex computation in developmental priors”	– Nature Comm.	2023
“Arrays, generalized associativity, and heapoids”	– ArXIV preprint	2022

INDUSTRY

WOLFRAM RESEARCH

lead developer @ Deep Learning Group	2016 – 2018
• led creation of Mathematica’s built-in deep learning library	
• creation & review of 50+ pages of reference material , and tutorials	
• upstream contributions to Amazon’s C++ MXNet deep learning backend	

manager & lead developer @ Advanced Research Group	2013 – 2015
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- [Facebook analysis project](#), work publicized in [Wired Magazine](#)
- designed and wrote [DataFrame-like functionality](#) for Mathematica
- co-designed automated machine learning ([Classify](#), [Predict](#))
- co-designed [templating](#), core hash-map data structure ([Association](#))
- designed & supervised [CloudExpression](#) functional hierarchical database

WOLFRAM|ALPHA

manager & lead developer @ Special Projects	2012 – 2013
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- supervised W|A’s [Personal Analytics for Facebook product](#)
- designed, wrote, documented caching and logging framework for W|A

research programmer @ Special Projects	2010 – 2012
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- created headline features of W|A Pro automated [data & image analysis](#)
- created Turing machine functionality for W|A
- created widely-used internal parsing and visualization tools for W|A

software engineer @ Nimbula Cloud Computing	2009
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engineering intern @ Center for High Performance Computing	2008
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engineering intern @ iThemba LABS Proton Accelerator	2008
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SELECTED TALKS

“The Power of Named Axes”	ArrayCast podcast	2023
“Array Algebra”	DL Indaba Tunisia	2022
“Interpretable ML for Fund. Science”	ICLR FSAI workshop panel	2020
“Intro to Reinforcement Learning”	DL IndabaX Sudan	2019
“Neuroscience and AI”	IndabaX South Africa	2019
“Data science for non-scientists”	SXSW conference	2015
“Machine learning in Mathematica”	MIT IAP lectures	2015
“Wolfram’s data analysis platform”	Strange Loop conference	2012

VOLUNTEER WORK

practicals team	Deep Learning Indaba, Africa (  	2018 – 2022
tutor & mentor	Wolfram Summer School , Boston	2010 – 2022
guest lecturer	Data Science Initiative , Cape Town	2022
math tutor	IkamvaYouth township tutors , Cape Town	2006 – 2007

TUTORIALS / BLOGPOSTS

“Rainbow array algebra”	graphical calculus for array manipulation
“Quiver geometry”	discrete differential geometry via groupoids
“Build your own TensorFlow”	math and code of automatic differentiation
“Wasserstein GANs”	tutorial for Depth First Learning

OPEN SOURCE

quiver-geometry	Mathematica library behind quivergeometry.net
hypernet	library for building flexible hypernetworks in PyTorch
spatial-game-theory	lab for experiments in evolutionary spatial game theory
spieltjie	lab for multi-agent RL on zero-sum differentiable games
floatworld	lab for evolution of population of RNN-controlled agents
↑ MXNet	generalized reshape_like op for dynamically-sized tensors
↑ open_spiel	Swift implementation of Monte Carlo Tree Search (WIP)