






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

MSc, Math (prov)	2023
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, Adobe Illustrator

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, rewriting systems, higher category theory, topoi, {discrete, differential} geometry, homotopy type theory, sheaf cohomology

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

WORK

WOLFRAM RESEARCH

lead developer @ Deep Learning Group	2016 – 2018
<ul style="list-style-type: none">led creation of Mathematica's built-in deep learning librarycreation & review of 50+ pages of reference material, and tutorialsupstream contributions to Amazon's C++ MXNet deep learning backendco-wrote blog posts for O'Reilly and Wolfram	

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](#))
- supervised Lucene-based [textual search](#), OpenSSL-based [cryptography](#)
- 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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- wrote headline features of [W|A Pro automated data & image analysis](#)
- wrote [Turing machine functionality](#) for W|A
- wrote 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

Array Algebra	DL Indaba Tunisia	2022
Geometry of Computation	Spacious Spatiality	2022
Quiver Geometry	Wolfram Physics Project	2021
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
Mathematica for transfer learning	ETH Zürich	2018
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

"Build your own TensorFlow"	math and code of automatic differentiation
"Array Algebra"	explain higher-order array APIs visually

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
spieltje	lab for multi-agent RL on zero-sum differentiable games
floatworld	lab for evolution of population of RNN-controlled agents
funes	persistent, definition-sensitive caching of scientific computations
↑ MXNet	generalized <code>reshape_like</code> op for dynamically-sized tensors
↑ open_spiel	Swift implementation of Monte Carlo Tree Search (WIP)
↯ katex	added graph edge symbols to Katex , a JS-native \LaTeX library