

Hugh Murrell

Resume

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Personal Details

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Birth Date 17 December 1954.

Birth Place Kasama, Zambia.

Citizenship dual, British and South African

Education

1971: Matric, Hyde Park, Johannesburg.

1975: B.Sc., Natal University, Pietermaritzburg.

1981: B.Sc. Hons, Rhodes University, Grahamstown.

1982: M.Sc., Rhodes University, Grahamstown.

1995: PhD., Natal University, Durban.

Experience

1977-1978: Natal Provincial Administration in Pietermaritzburg, Programmer.

1979-1984: Rhodes University, Computing Services, Programmer.

1985-1986: Department of Mathematics, Rhodes University, Lecturer.

1987-2003: Department of Computer Science, Natal University, Senior Lecturer and Associate Professor (Durban campus).

2004-2014: School of Computer Science, University of KwaZulu-Natal, Professor (Pietermaritzburg campus)

- Head of School (2005-2007)
- PI for Bioinformatics NBN grant (2006-2009)

2015-2018: Contract Lecturing and Postgrad supervision, University of KwaZulu-Natal.

2019-2019: Postgrad supervision, University of KwaZulu-Natal.

2020-2020: Developed Covid-19 dashboard.

2021-2026: Developed PORPID-pipeline for PacBio and Nanopore datasets.

Postgrad Supervision

- Hilton Goldstein**, MSc thesis, 1990,
Computer Enhanced Skull Surgery
- Hilton Goldstein**, PhD thesis, 1994,
Space Frequency decomposition of arbitrary signals
- Cuan Brown**, MSc thesis, 2000,
A Real Time, Secure, Internet Based, Auctioning System
- Mark Lewis**, MSc thesis, 2001,
Spectral Techniques for Roughness Estimation
- Keagan Moodley**, MSc thesis, 2002,
Pseudo-Colouring of grayscale images
- Kieran O’Neill**, MSc thesis, 2007,
Relieving the Cognitive Load of Constructing Molecular Biological Ontology Based Queries by means of Visual Aids
- Rafael Jimenez**, MSc thesis, 2007,
Vector Graphics to improve Blast Graphic Representations
- John McGuinness**, MSc thesis, 2009,
Investigation of techniques for automatic polyphonic music transcription using wavelets,
- Anisa Ragalo**, MSc thesis, 2011,
An analysis of algorithms to estimate the characteristics of the underlying population in Massively Parallel Pyrosequencing data
- Devin Pelsler**, Msc thesis, 2019,
Deep and dense sarcasm detection

Coding Projects

CRAN package During my 2012 sabbatical I wrote an R data mining package for discovering non-linear associations between variables in a dataset. Read [https://journals.plos.org/plosone/article?id=](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0151551)

[10.1371/journal.pone.0151551](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0151551) for further details.

Deep Learning with Julia During 2018 I developed a textbook that teaches Deep Learning using the Julia computing ecosystem. The current version of the text is available online <https://hughmurrell.github.io/DeepLearningNotes/index.html>.

Covid-19 tracking During 2020, I constructed a Julia script to compute Rt estimates at scale from global data sets. This script updates nightly and allows users to compare Covid outbreaks from region to region.

PORPIDpipeline In July 2021, I started supporting a high throughput PacBio pipeline that performs demultiplexing, filtering and UMI analysis to obtain sequence populations from HIV patients. The pipeline is composed of Julia scripts running under SnakeMake. I have recently extended the pipeline to handle Nanopore datasets. For further details please consult the repository at: <https://github.com/MurrellGroup/PORPIDpipeline>

aliViz In the first half of 2026, I experimented with *vibe* coding using *Cursor* to develop an alignment viewing web based application for the HIVDiversity group under Carolyn Williamson. The app allows the user to load alignments, group sequences, construct phylogenetic trees and produce epitope logograms. The app is open source and can be accessed from the HIVDiversity github pages at: <https://hivdiversity.github.io/webwidgets/aliViz.html>

Selected Publications

- 1996:** *Computer Aided Tomography*, The Mathematica Journal, Vol 6, No. 2, pp.60-65
- 2001:** *On Measuring Roughness*, South African Computer Journal, Number 27, pp 49-56, Co-Authors: Mark Lewis, Colin Jermy and Tally Palmer.
- 2004:** *A colour-map plugin for the open source, Java based, image processing package, ImageJ*, Computers & Geosciences, vol 30, pp 609-618. Co-Author: Keagan Moodley.
- 2008:** *Gene Spotting with Support Vector Machines*, Proceedings of IMS2008, Maastricht.
- 2011:** *Fisher Discrimination with Kernels*, The Mathematica Journal, Vol 13, July 26, Co-Authors: Kazuo Hashimoto and Daichi Takatori.
- 2014:** *R^2 -equitability is satisfiable*, Proc Natl Acad Sci USA , early edition, Co-Authors: Ben Murrell and Daniel Murrell.
- 2016:** *Discovering General Multidimensional Associations*, PLoS ONE 11(3): e0151551. doi:10.1371/journal.pone.0151551 Co-Authors: Ben Murrell , Daniel Murrell.
- 2019:** *Deep and dense sarcasm detection*, <https://arxiv.org/abs/1911.07474>, November 2019, Co-Author: Devin Pelser.
- 2019:** *Deep Learning Notes, with Julia and Flux*, Edition 1, <https://HughMurrell.github.io/DeepLearningNotes> Co-Author: Nando de Freitas.
- 2023:** *Optimized SMRT-UMI protocol produces highly accurate sequence datasets from diverse populations - application to HIV-1 quasispecies*, <https://www.biorxiv.org/content/10.1101/2023.02.23.529831v1> Co-Authors: Dylan H. Westfall, et al.
- 2025:** *Rare twin cysteine residues in the HIV-1 envelope variable region 1 link to neutralization escape and breadth development*. Cell Host & Microbe, Volume 33, Issue 2, 2025, Pages 279-293.e6, ISSN 1931-3128, <https://doi.org/10.1016/j.chom.2025.01.004> Authors: Maria C. Hesselman, et al
- 2025:** *VRC01 Selects Rare HIV Escape Mutations After Acquisition in Antibody-Mediated Prevention Trials*. bioRxiv [Preprint]. 2025 Oct 29:2025. <https://www.biorxiv.org/content/10.1101/2025.10.29.685411v1> Authors: Williamson C, et al.
- 2026:** *Long-read deep sequencing reveals high rates of multilingual transmission and rapid viral population changes in acute HIV infection*. Nat Commun (2026): <https://doi.org/10.1038/s41467-026-73496-0> Authors: Mullins, J.I., et al.

Referees

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