

# Nicholas, Spyrison, Ph.D.

*Biostatistician | Dimension Reduction*

Monona, WI 53713

(720) 765-1836

✉ [spyrison@gmail.com](mailto:spyrison@gmail.com)

📄 [nspyrison.netlify.com/](https://nspyrison.netlify.com/)

🌐 [github.com/nspyrison](https://github.com/nspyrison)

🌐 [linkedin.com/in/nspyrison/](https://linkedin.com/in/nspyrison/)



## Career Summary

A published data scientist with years of experience in hypothesis testing, experimental design, enterprise-level reporting, and machine learning on a diverse range of data. Conducted end-to-end development on multiple R packages delivering open-source solutions to the community. Nick frequently acts as a mentor in sharing best practices with the team resulting in continuous improvement, performance code, and increase project completion.

## Employment History

- 06/2022 – 03/2023 **Biostatistician**, *IFF Nutrition & Biosciences*, Madison, WI.
- On-site Biostatistician. Most senior statistical and data visualization help for >300 employees on-site
- 06/2022 – 01/2023 **Research Data Scientist**, *University of Queensland*, Clayton, VIC, Australia.
- Lead end-to-end analysis of the largest global COVID-19 patient-level data resulting in several submitted journal articles on kidney health outcomes
  - Delivered batteries of models varying cohorts, model formulas, and hyperparameters tuning on patient-level health data
- 07/2018 – 10/2022 **Research Officer**, *Monash University*, Clayton, VIC, Australia.
- Data Fluency Instructor*: Lead workshops (10-30 people) on statistical modeling, R, Python, PowerBI, and Git
  - Teaching Assistant*: Post-grad tutorials on high-dimensional data analysis, post-grad data visualization, and undergrad economic statistics
  - Research Officer*: Extract, transform, load, and analysis of census and text data
- 12/2016 – 1/2018 **Business Intelligence Developer**, *CPI Card Group*, Denver, CO.
- SQL reporting; across 4 reporting platforms and 4 servers
  - Mentor junior teammates and improve query performance
  - Triage and transfer 30+ legacy reports to modern reporting solution
  - Developed supply chain report tracking a cost reduction of more than \$4M USD
- 07/2015 – 10/2016 **Business Intelligence Developer**, *UDR Real Estate Investment Trust*, Denver, CO.
- Transition enterprise reporting from WebFOCUS to SSRS – 10+ reports
- 11/2014 – 04/2015 **Business Intelligence Analyst**, *Heartland Financial USA*, Dubuque, IA.
- Financial reporting for internal and external audiences
- 02/2013 – 05/2014 **Delivery Analyst**, *IBM – International Business Machines*, Dubuque, IA.
- Automated ETL with VBA macros for about 0.5 FTE savings across the team
  - KPI reporting to teams and management
- 01/2010 – 08/2012 **Laboratory Technician**, *The Ames Laboratory & Iowa State University*, Ames, IA.

## Authored Software (R Packages)

- 09/2022 **cheem** – Novel analysis and interactive visual for exploring ML interpretability [Link](#)

10/2020 **spinifex** – ggplot2-like API for composing and exporting animated projections

[Link](#)

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## Education

- 02/2018 – 06/2022 **Ph.D. Information Technology & Statistics**, *Monash University*, Clayton, VIC, Dimension reduction, interactive and animated data visualization, machine learning  
Thesis: *Interactive and Dynamic Visualization of High-dimensional Data*.
- Novel interoperability visualization methods for **Fit random forest models on several contemporary datasets** also shown to generalize to other models with **SVM and XGboost**
  - Utilized **SHAP and LIME local explanations** to explore local linear variable importance to understand large residuals in the models
  - Created **novel interactive animation** facilitating this exploration in a web app
  - **Authored R packages** on CRAN as free and open source work to improve reproducibility and contribute back to the community
- 08/2008 – 05/2012 **B.Sc. Statistics**, *Iowa State University*, minors in Physics and Mathematics, Ames, IA.

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## Technical Skills

Programs R, SQL, Python, Git, GitHub, L<sup>A</sup>T<sub>E</sub>X, Excel, VBA  
Packages ggplot2, tidyverse, plotly, shiny, tidymodels, caret, keras, pandas, scikit-learn  
Reporting SSRS, Tableau, PowerBI, Rmarkdown, Shiny

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## Awards and Honors

- 06/2022 Invited article for INFORM's OR/MS Tomorrow [Link](#)  
04/2022 RStudio: March "Top 40" New CRAN Packages [Link](#)  
05/2022 Monash Postgraduate Publication Award  
10/2020 Melbourne Datathon 2020 – **1st place of several hundred entries** [Link](#)
  - *Changes to Victorian Intraday Electricity Demand Following COVID-19 Restrictions*  
11/2018 ACEMS Impact and Engagement Award  
07/2018 UseR2018 Datathon – 3rd place
  - Spatio temporal animated visualization of over 7 million avian sightings  
2018 – 2022 Faculty Graduate Research Scholarship  
2018 – 2022 Co-funded Monash Graduate Scholarship  
05/2012 Nominated for Student Employee of the Year  
05/2011 Nominated for Student Employee of the Year  
05/2008 American Legion Award

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## Publications

### Doctoral Thesis

- [1] Nicholas Spyrison. "Interactive and dynamic visualization of high-dimensional data". en. PhD thesis. Monash University, Mar. 2022. URL: [https://github.com/nspyrison/thesis\\_ns/blob/master/docs/thesis\\_ns.pdf](https://github.com/nspyrison/thesis_ns/blob/master/docs/thesis_ns.pdf).

### Journal Articles

- [2] Nicholas Spyrison and Dianne Cook. "spinifex: an R Package for Creating a Manual Tour of Low-dimensional Projections of Multivariate Data". en. In: *The R Journal* 12.1 (2020), p. 243. ISSN: 2073-4859. DOI: 10.32614/RJ-2020-027. URL: <https://journal.r-project.org/archive/2020/RJ-2020-027/index.html> (visited on 10/16/2020).
- [3] Stuart Lee et al. "The state-of-the-art on tours for dynamic visualization of high-dimensional data". en. In: *WIREs Computational Statistics* (Dec. 2021), p. 21. ISSN: 1939-0068. DOI: 10.1002/wics.1573. URL: <https://onlinelibrary.wiley.com/doi/pdf/10.1002/wics.1573> (visited on 12/10/2021).

- [4] Nicholas Spyrison, Dianne Cook, and Przemyslaw Biecek. "Exploring Local Explanations of Nonlinear Models Using Animated Linear Projections". In: *arXiv preprint, submitted to JMLR* (2022). DOI: 10.48550/ARXIV.2205.05359. URL: <https://arxiv.org/abs/2205.05359>.
- [5] Nicholas Spyrison, Dianne Cook, and Kim Marriott. "A Study on a User-Controlled Radial Tour for Variable Importance in High-Dimensional Data". In: *arXiv preprint, submitted to TVCG* (Dec. 2022). arXiv:2301.00077 [stat]. DOI: 10.48550/arXiv.2301.00077. URL: <http://arxiv.org/abs/2301.00077> (visited on 01/06/2023).
- [6] Marina Wainstein, Nicholas Spyrison, and et al. "Association of country income level with the characteristics and outcomes critically ill patients hospitalized with acute kidney injury and COVID-19: A multinational study." In: *preprint Kidney International submission* (Jan. 2023). (Visited on 01/20/2023).

### Software (R Packages)

- [7] Nicholas Spyrison and Dianne Cook. *spinifex: Manual Tours, Manual Control of Dynamic Projections of Numeric Multivariate Data*. 2021. URL: <https://CRAN.R-project.org/package=spinifex>.
- [8] Nicholas Spyrison. *cheem: Interactively Explore the Support of Local Explanations of a Model*. 2022. URL: <https://CRAN.R-project.org/package=cheem>.

### Conference Proceedings

- [9] Nicholas Spyrison. "spinifex: visualizing local structure of higher dimensions". en. In: Brisbane, Australia, 2018. URL: <https://user2018.r-project.org/poster/> (visited on 07/28/2020).
- [10] Madeleine Barrow, Jieyang Chong, and Nicholas Spyrison. "Changes to Victorian Intraday Electricity Demand Following COVID-19 Restrictions". en. In: *Melbourne Datathon 2020, Insights category*. Oct. 2020, p. 4. URL: [https://github.com/nspyrison/melb\\_datathon2020/blob/master/\\_paper/paper.pdf](https://github.com/nspyrison/melb_datathon2020/blob/master/_paper/paper.pdf) (visited on 02/09/2022).
- [11] Nicholas Spyrison, Benjamin Lee, and Lonni Besançon. "'Is IEEE VIS \*that\* good?' On key factors in the initial assessment of manuscript and venue quality". In: *IEEE AltVis Workshop*. type: article. July 2021. DOI: 10.31219/osf.io/65wm7. URL: <https://osf.io/65wm7/> (visited on 08/21/2021).
- [12] Nicholas Spyrison. "Animated Linear Projections". In: *Summer 2022*. INFORMS, May 2022.

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*References available on request.*