GRANVILLE MATHESON

I am an academic data scientist with a background in neuroscience. I am a generalist, but my speciality is in statistical modelling and inference, as well as presentation and communication. My work has made international news and been cited in policy[1], I have been involved in developing field-wide guidelines to improve replicability[2] and several R packages that I developed are used internationally. I am passionate about learning new things, and enjoy the challenge of presenting complex results in a compelling way to audiences with different backgrounds.

I am currently looking for a position that allows me to work with complex data to derive useful insights, and to develop tools to streamline the process and make it reproducible.

EDUCATION

2018 | 2014

PhD, Neuroscience
Stockholm, Sweden — Karolinska Institutet

- Thesis: Reliability, Replicability and Reproducibility in PET Imaging
- Working with PET imaging of the dopamine system in psychosis and proneness to developing psychosis, as well as methods development.

2013 | 2010

MSc, Neuroscience
Utrecht, The Netherlands — Universiteit Utrecht

2009 | 2006

BSc, BA Hons, Psychology, Applied Chemistry
Johannesburg, South Africa — University of Witwatersrand

- Other courses: Chemistry I & II, Applied Chemistry III, Physics I, Pure Mathematics I, Research Design and Analysis

RESEARCH EXPERIENCE

2022 | 2020

Postdoctoral Researcher*
Columbia University — Molecular Imaging / Biostatistics

- * Cancelled / indefinitely postponed on account of COVID-19 pandemic (NYC)
- Developing Bayesian methods for performing pharmacokinetic modelling using a multilevel framework, with Markov Chain Monte Carlo.

2020 | 2018

Postdoctoral Researcher
Karolinska Institutet — Cervenka Lab, PET Group

- Developing tools for reproducible modelling, data storage and documentation.

CONTACT

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TECHNICAL SKILLS

● R ● STAN ● Git ● Docker
● Python ● MATLAB ● Bash
● Markdown ● Cloud-Computing
● SQL ● APIs ● Binder
● `tidyverse` ● `ggplot2`
● `devtools` ● `brms` ● `caret`

OPEN SOURCE CONTRIBUTIONS

I have written and maintain several R packages, available on GitHub:

`kinfitr`: PET pharmacokinetic modelling
`rwithings`: Withings Activity API access
`relfeas`: Study feasibility assessment
`nls.multstart`: Nonlinear least squares regression

2014 | 2012

Research Assistant

Karolinska Institutet — Cervenka Lab, PET Group

- Image processing and analysis of MR and PET Imaging data to produce the Karolinska Behavioural PET Database

2011 | 2010

Research Intern

Universiteit Utrecht — Ramakers Group, Rudolf Magnus Institute

- Using single-cell electrophysiology to investigate the dynamics of ion channel caused by morphine

SELECTED DATA SCIENCE WRITING

2020

Nonlinear Modelling using nls, nlme and brms

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- A demonstration of how to fit nonlinear models using standard gradient descent optimisation, as well as both frequentist and Bayesian multilevel modelling strategies

2020

Creating an API for 4.2M texts with tidytext, RSQLite, dbplyr and plumber

granvillematheson.com

- I prototyped an idea for identification of useful patterns in a large set of text data, to identify useful skills to learn to maximally improve employability from job postings.
- To handle the data set size, I turned it into a SQL database for fast, convenient access, and then created an online API to make its results accessible.

2020

Pharmacokinetic Modelling of PET Data in R using kinfitr. Part 2: Basics and Iteration[3]

granvillematheson.com

- Part 2 of a four part series describing my kinetic modelling R package. Here I cover basic usage of the package. I cover bias-variance tradeoffs and other relevant considerations during modelling.

2018

My Physiological Response to my PhD Defence[4]

granvillematheson.com

- I recorded my physiological data in the months leading up to my PhD defence, and analysed it here, using data visualisation to tell the story of my sleep changes, and heart rate, both before and during the defence.
- I also wrote an R package for extracting this data from the Withings API. This software is now used internationally.

Competencies

- R package development
- Statistical inference
- Nonlinear models
- Bayesian statistics
- Multilevel modelling
- Version control
- Reproducibility
- Measurement & Reliability
- Data visualisation
- Machine Learning
- Simulation
- API Queries & Deployment
- Natural Language Processing
- Web-scraping

I have a blog about data science and visualisation where I publish mostly side projects. Upcoming posts include city commute time visualisations.

2018

Making a Reminder Bot for Automating Meeting Organisation using R and Google Sheets[5]

granvillematheson.com

- Demonstrated my reminderbot system which has effectively automated the organisation for two sets of meetings continuously for the past 4 years.
- Setting up a productionised system, running several times each week on a Raspberry Pi

2018

The Weather in Stockholm, Inside and Out, and the Curious Case of Summer 2018[6]

granvillematheson.com

- Analyzing meteorological data from open data and private data, examining the effects of global warming, and examining how extreme 2018 really was

TEACHING EXPERIENCE

2019 | 2015

Positron emission tomography imaging of the CNS

Karolinska Institutet — Stockholm, Sweden

- Lecturer and TA training students in biannual course, teaching about pharmacokinetic modelling and statistical analysis

2009

Research Design and Analysis

University of Witwatersrand — Johannesburg, South Africa

- Tutor for research design and statistics

I am passionate about teaching, and in addition to direct teaching experience, I have held numerous seminars to teach colleagues how to approach statistical problems, and to share knowledge about various new tools that may be helpful.

SELECTED PUBLICATIONS

2020

Guidelines for the content and format of PET brain data in publications and archives: A consensus paper

Journal of Cerebral Blood Flow & Metabolism

- Authored with all the influential figures in our field
- This article establishes a consensus for how to report on studies within our field, for which I was asked to contribute my expertise.

2020

Kinfitr – an open source tool for reproducible PET modelling: validation and evaluation of test-retest reliability

bioRxiv

- Authored with Jonathan Tjerkaski, Simon Cervenka and Lars Farde
- I supervised this project, in which we evaluated the performance of my kinetic modelling R package against the established commercial tool used in our field.

2017

The readability of scientific texts is decreasing over time

Elife

- Authored with Pontus Plavén-Sigray, Björn Schiffler and William Hedley Thompson
- This project resulted from our gathering as a group of PhD students for a collaborative data science project. In this, we learnt version control with GitHub, collaborative coding among other things.

2015 | 2019

We need to talk about reliability: making better use of test-retest studies for study design and interpretation

PeerJ

- Sole author publication
- I present a new statistical method for estimating study feasibility with limited, and not directly representative data.

LINKS

1: https://www.altmetric.com/details/18028335
2: https://journals.sagepub.com/doi/abs/10.1177/0271678X20905433
3: https://www.granvillematheson.com/post/pharmacokinetic-modelling-of-pet-data-in-r-using-kinfitr-part-2-basics-and-iteration/
4: https://www.granvillematheson.com/post/self-portrait/
5: https://www.granvillematheson.com/post/reminder-bot/
6: https://www.granvillematheson.com/post/20180821-stockholmweather/