

Welcome

Modern Statistics & Machine Learning for Population Health in Africa

Machine Learning & Global Health Network

24/3/2025

Overview

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Machine Learning & Global Health Network

Working on methodological and applied problems all in the context of global health across 7 institutes
-> Imperial, Oxford, Bristol, Copenhagen, Kaiserslautern, Singapore, Southampton

- 13 principal investigators
- 6 postdocs
- 20+ PhD students



Machine Learning & Global Health Network

- Applied research in:
 - Epidemiology and public health
 - Non-communicable disease burden
 - Semi-mechanistic modelling of infectious disease dynamics
- Methodological research in:
 - Disease transmission modelling
 - Phylogenetics
 - Bayesian statistics and Bayesian non-parametrics
 - Computational statistics and machine learning
 - Spatiotemporal statistics
 - Survey design
- Theoretical research in:
- Methodological research in:
 - Machine learning and deep learning
 - Graphs and networks
 - Kernel methods



Course overview

Monday - Introduction to probabilistic programming with Stan

Tuesday - Scalable Gaussian process regression models in Stan

Wednesday - Gaussian processes continued + synthesising material with group project

Thursday - Infectious Disease Modelling with Stan

Friday - Introduction to phylogenetics

Learning methods:

- Lectures
- Hands-on computer labs in Python
- Group work
- Break-out rooms

Assessments

- Group presentation (day 3) 10%
- Quiz (day 3) 15%
- Quiz (day 5) 15%
- Take home assignment (Python notebook) 60%

Research-led teaching

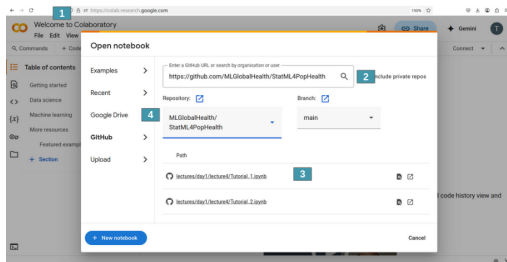
- Two research talks from Machine Learning & Global Health Network (Tuesday)
- Two research talks from UCT and Sand Technology (Thursday)
- Chat with the teaching team during breaks/mealtimes

Google Colab: opening a notebook

Throughout this course we will be using Google Colab for our notebooks.

To open a notebook:

1. In your browser of choice, open:
<https://colab.research.google.com/>
2. Select the GitHub option, and enter the following GitHub url:
<https://github.com/MLGlobalHealth/StatML4PopHealth>
3. You should a list of practical notebooks, navigate to the relevant notebook and open it.
4. To open a notebook that you have previously saved to Google Drive, please click Google Drive option instead. You should a list of notebooks in your Drive, navigate to the relevant notebook and open it.



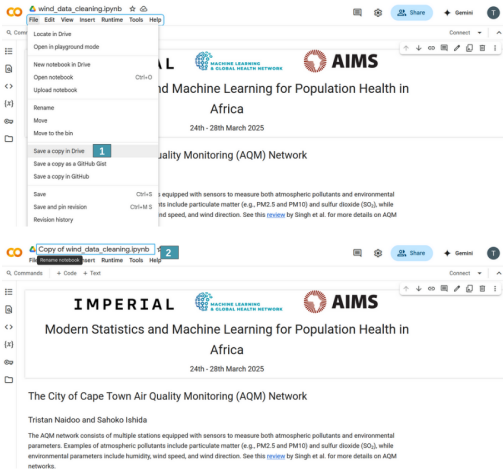
Google Colab: saving a notebook

Many practical notebooks will require you to add solutions. To make sure that your solutions persist across different Colab runtimes you will need to save your notebook.

This is our recommendation to save a notebook:

1. Click on file → Save a copy in Drive
2. This will create a copy of the notebook, with Copy of added to the notebook name. You can rename the notebook if you want to.
3. The new notebook will be saved in the Colab Notebooks folder on your Google Drive. Open the notebook according to Step 4 in the previous slide.

Note: If you are comfortable with and would prefer to use GitHub, you can either fork our repository or save a copy of the notebook to your own separate repository.



Introductions



Dr Ettie Unwin



Dr Alexandra Blenkinsop



Tristan Naidoo



Shozen Dan



Josh Corneck



Dr Sahoko Ishida



Dr Michael Whitehouse

Introductions

Icebreaker in small groups - introduce yourselves. We will tell you when to switch groups!

- Name
- Where are you from
- Background (student/researcher/industry)
- What are you most interested in from the course programme and why