StanCon 2018

2019-01-23 SSL meeting

Mikko Marttila

@mikmart

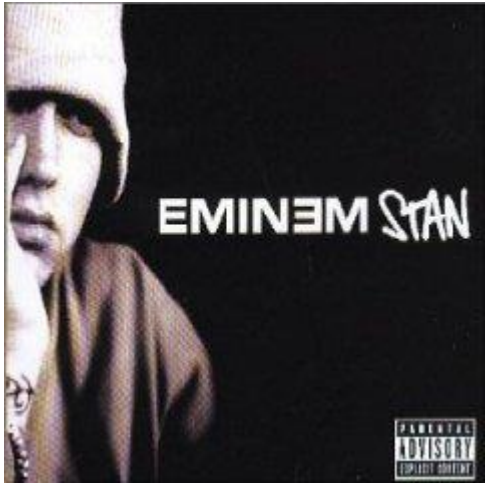
ORION PHARMA

Building well-being

readr
tidyr
dplyr
mc-stan.org
haven
TIBBLE
tidyverse
ggplot2
purrr
rmarkdown
%>%
Ceci n'est pas un pipe
lubridate
Shiny
knitr

StanCon

ORION PHARMA



Stan

Eminem

My tea's gone cold
I'm wondering why I got out of bed at all
The morning rain clouds up my window
And I can't see at all
And even if I could it'd all be gray
But your picture on my wall
It reminds me that it's not so bad, it's not so bad

Dear Slim, I wrote you, but you still ain't callin'
I left my cell, my pager and my home phone at the bottom
I sent two letters back in autumn, you must not've got 'em
There probably was a problem at the post office or somethin'
Sometimes I scribble addresses too sloppy when I jot 'em

Stanislaw
Ulam

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Stan

Stan® is a state-of-the-art platform for statistical modeling and high-performance statistical computation. Thousands of users rely on Stan for statistical modeling, data analysis, and prediction in the social, biological, and physical sciences, engineering, and business.

Users specify log density functions in Stan's probabilistic programming language and get:

- full Bayesian statistical inference with MCMC sampling (NUTS, HMC)
- approximate Bayesian inference with variational inference (ADVI)
- penalized maximum likelihood estimation with optimization (L-BFGS)

https://mc-stan.org/

Example 1: Eight Schools

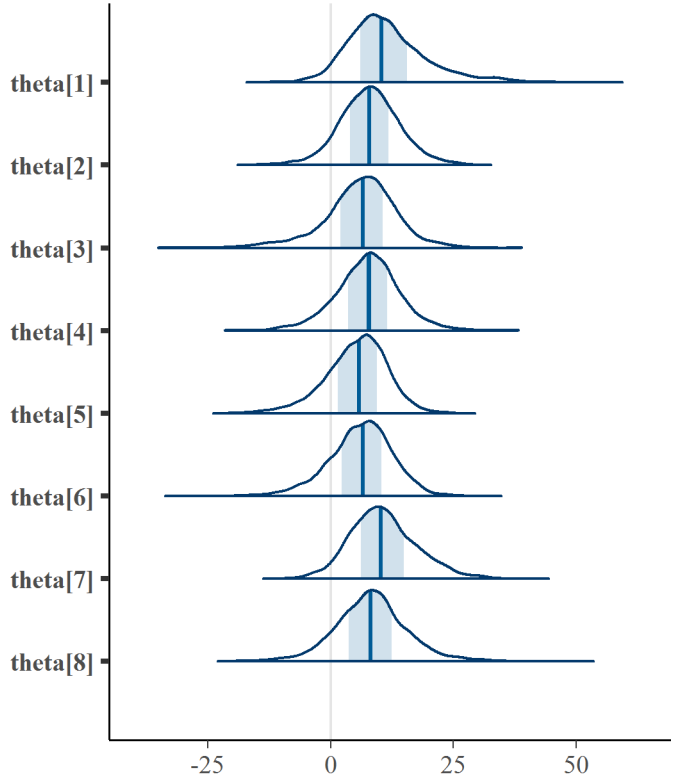
This is an example in Section 5.5 of Gelman *et al* (2003), which studied coaching effects from eight schools. For simplicity, we call this example "eight schools."

We start by writing a Stan program for the model in a text file. If you are using RStudio version 1.2.x or greater, click on File -> New File -> Stan File . Otherwise, open your favorite text editor. Either way, paste in the following and save your work to a file called `8schools.stan` in R's working directory (which can be seen by executing `getwd()`)

```
// saved as 8schools.stan
data {
  int<lower=0> J;         // number of schools
  real y[J];              // estimated treatment effects
  real<lower=0> sigma[J]; // standard error of effect estimates
}
parameters {
  real mu;                // population treatment effect
  real<lower=0> tau;      // standard deviation in treatment effects
  vector[J] eta;          // unscaled deviation from mu by school
}
transformed parameters {
  vector[J] theta = mu + tau * eta;        // school treatment effects
}
model {
  target += normal_lpdf(eta | 0, 1);       // prior log-density
  target += normal_lpdf(y | theta, sigma); // log-likelihood
}
```

https://github.com/stan-dev/rstan/wiki/RStan-Getting-Started#example-1-eight-schools

	school	y	sigma
1	A	28	15
2	B	8	10
3	C	-3	16
4	D	7	11
5	E	-1	9
6	F	1	11
7	G	18	10
8	H	12	18



https://mc-stan.org/events/stancon2018Helsinki/

Hierarchical modelling of galaxy clusters for Cosmology

Maggie Lieu, Will Farr, Michael Betancourt, Graham Smith, Mauro Sereno, Ian McCarthy, Paul Giles, Justin Alsing.

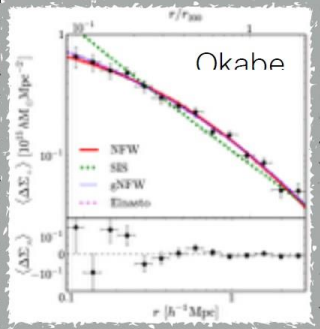
@space_mog

Typical route:

1
Fit galaxy shapes

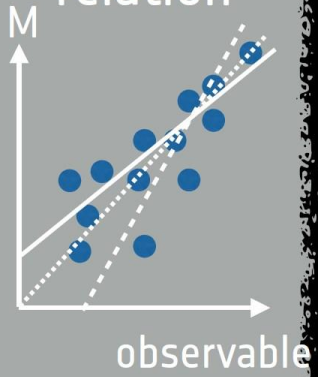
caveats: calibration, errors

2
Fit shear profiles



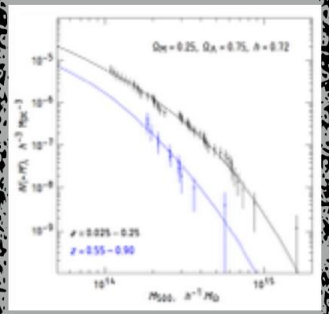
caveats: priors, binning, stacking, centering, errors

3
Fit scaling relation



caveats: fit type, biases, selection effects, errors

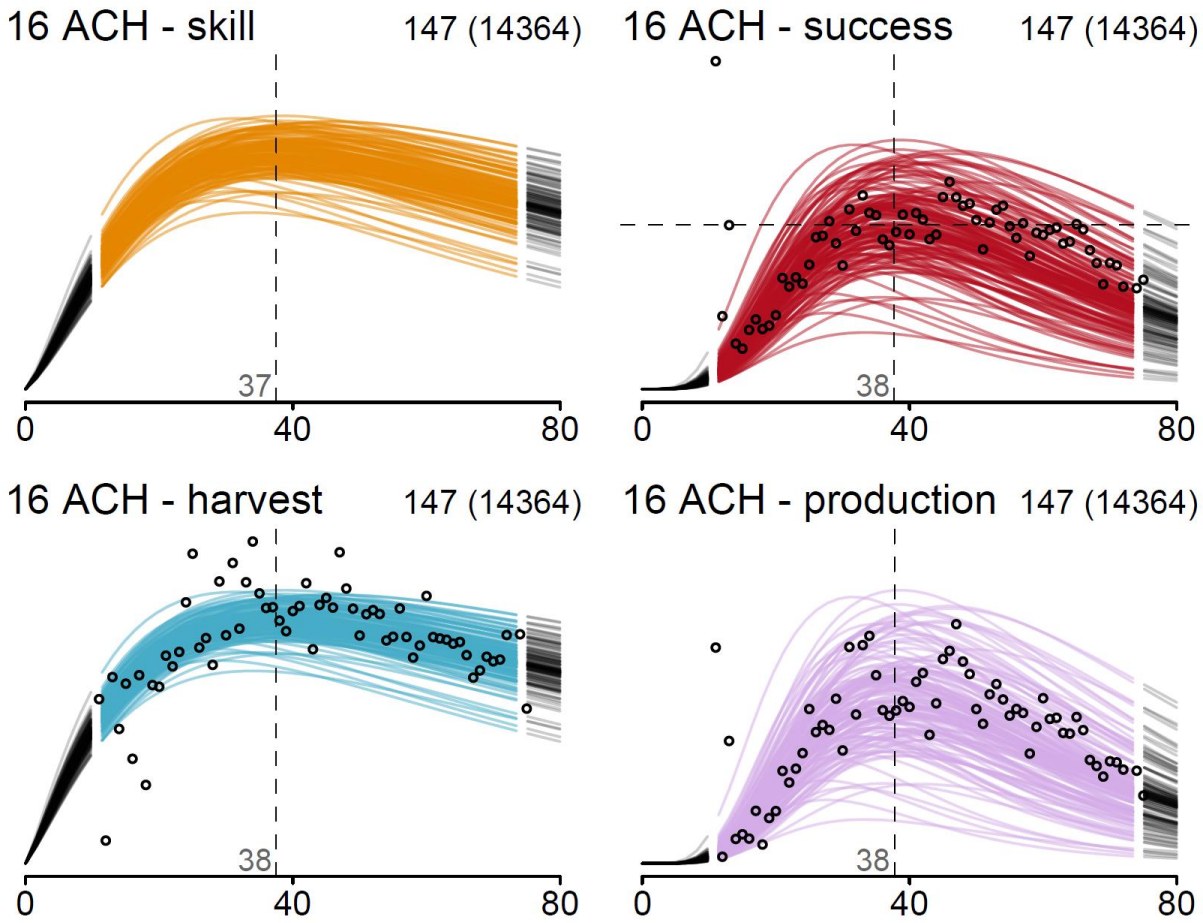
4
Fit cluster mass function



caveats: propagation of errors

Bad Data, Big Models & Statistical Methods for Studying Evolution

Richard McElreath
Max Planck Institute for Evolutionary Anthropology
Leipzig


16 ACH - skill
147 (14364)
37
0
40
80
16 ACH - success
147 (14364)
38
0
40
80
16 ACH - harvest
147 (14364)
38
0
40
80
16 ACH - production
147 (14364)
38
0
40
80

Identifying the effect of public holidays on daily demand for gas

Sarah Heaps

Joint work with Malcolm Farrow and Kevin Wilson

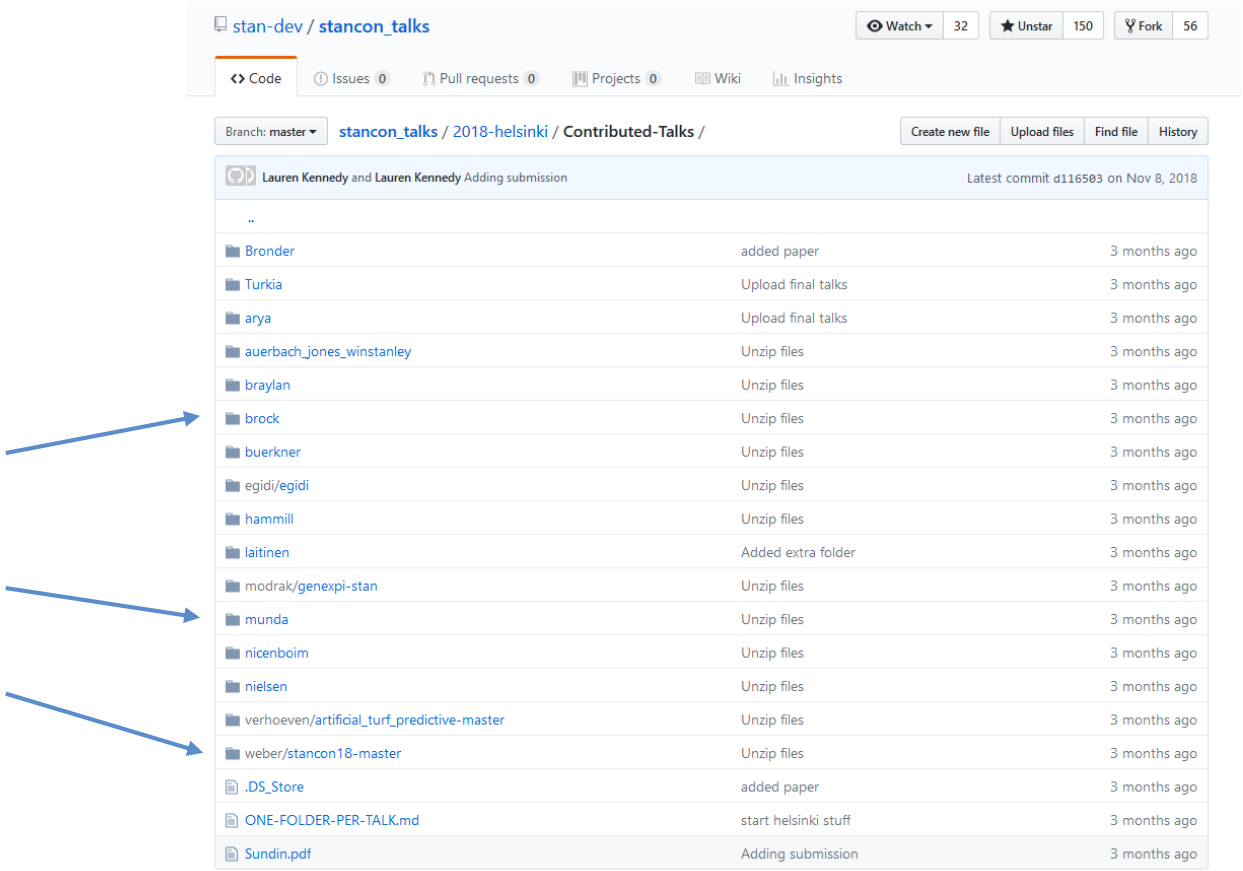
School of Mathematics, Statistics and Physics, Newcastle University, UK

StanCon 2018 Helsinki,
August 31, 2018

ESTHER WILLIAMS IN THE HAROLD HOLT MEMORIAL SWIMMING POOL

Some thoughts on complexity

Daniel Simpson
University of Toronto
@dan_p_simpson



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Lauren Kennedy and Lauren Kennedy Adding submission — Latest commit d116503 on Nov 8, 2018

..		
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braylan	Unzip files	3 months ago
brock	Unzip files	3 months ago
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egidi/egidi	Unzip files	3 months ago
hammill	Unzip files	3 months ago
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munda	Unzip files	3 months ago
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.DS_Store	added paper	3 months ago
ONE-FOLDER-PER-TALK.md	start helsinki stuff	3 months ago
Sundin.pdf	Adding submission	3 months ago

Solving ODEs in the wild: Scalable pharmacometrics with Stan

Sebastian Weber, Eero Siivola

Statistical Methodology Group, Novartis Pharma AG

StanCon Helsinki, 29-31 Aug 2018

Analysis of repated measures data in RStan

Marco Munda [marco.munda@pharmalex.com]
Pharmalex [formerly Arlenda]

StanCon 2018
Helsinki, 29-31 Aug 2018

Dose-Finding Clinical Trials in Stan

Kristian Brock, StanCon Helsinki, 30-Aug-18

https://cran.r-project.org/package=trialr

In conclusion

- I went to StanCon 2018 Helsinki.
- You should go to the next one, if…
  - you’re interested in Bayesian statistics: last year was great.
  - you’re not interested in Bayesian statistics: you will be afterwards.
- (I don’t know when it’s going to be.)

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Materials for the conference talks:
https://github.com/stan-dev/stancon_talks

Recordings of all sessions:
https://mc-stan.org/events/stancon2018Helsinki/#videos

Materials for this talk:
https://github.com/mikmart/ssl-winter-2019

mikko.marttila@orionpharma.com