

Bayes on the Beach 2024

# COOLANGATTA GOLD

Bayesian mixture modelling...  
of delicious mixtures for Bayesians.





# DARE

ARC Training Centre in  
Data Analytics for Resources & Environments



**Australian Government**

**Australian Research Council**



## Bayes on the Beach Challenge: Coolangatta Gold

Dr. Travis Stenborg  
Research Engineer  
DARE / University of Sydney





# Coolangatta Gold

## Ironman Race

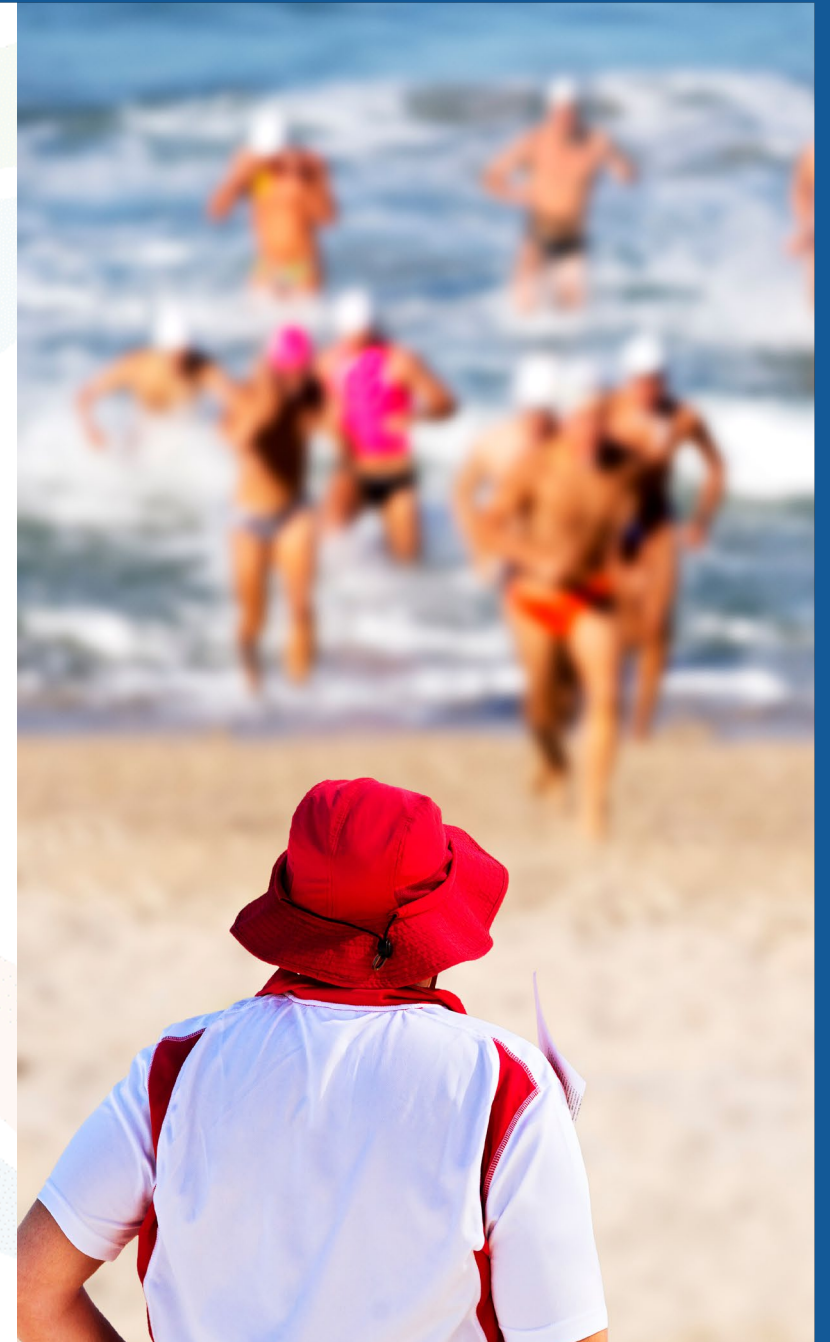
- Iconic Gold Coast surf lifesaving race.
- Organised by Surf Lifesaving Australia.

## Australian Film

- 1984 film starring actors and real ironmen.

## Bayes on the Beach Cocktail

- A fictional cocktail invented for this challenge!
- Based on a particular specialty Martini.







# Prerequisites

## R + Stan

- Ensure R is installed.

<https://cran.csiro.au/>

- Invoke Stan via the rstan package.

<https://mc-stan.org/users/interfaces/rstan>

- RStudio may be helpful too.

<https://posit.co/download/rstudio-desktop/>





# Secret Ingredient

## Coolangatta Gold

- 1.5 ounces *SECRET INGREDIENT*.
- 0.5 ounces yellow Chartreuse.
- 1 dash orange bitters.
- Garnish: pineapple slice.

## Challenge

- Find the secret ingredient.
- Use Bayesian mixture modelling.





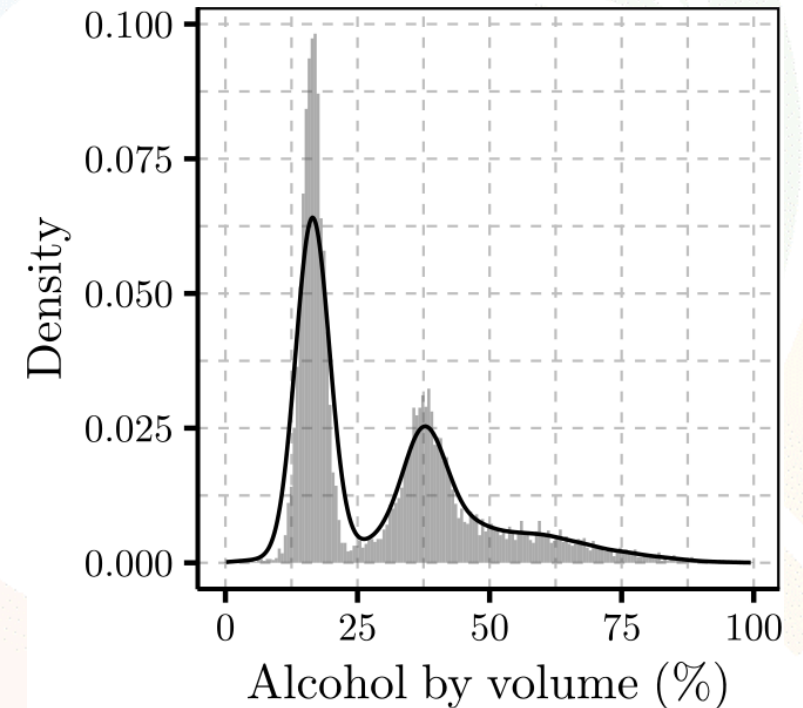
# Gaussian Mixture

## Cocktail Testing

- A mixture of 10,000 test cocktails.
- They used a common base ingredient set.
- Each one also had a secret ingredient added.
- The secret (alcoholic) ingredient could vary between test cocktails.
- Small number of distinct secret ingredients.

## Imprecise Alcohol by Volume

- Different **inter**ingredient means.
- Dispersed **intra**ingredient values.



Probability density function of the alcohol by volume for the secret ingredient in 10,000 test cocktails.