

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

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Coolangatta Gold

Ironman Race

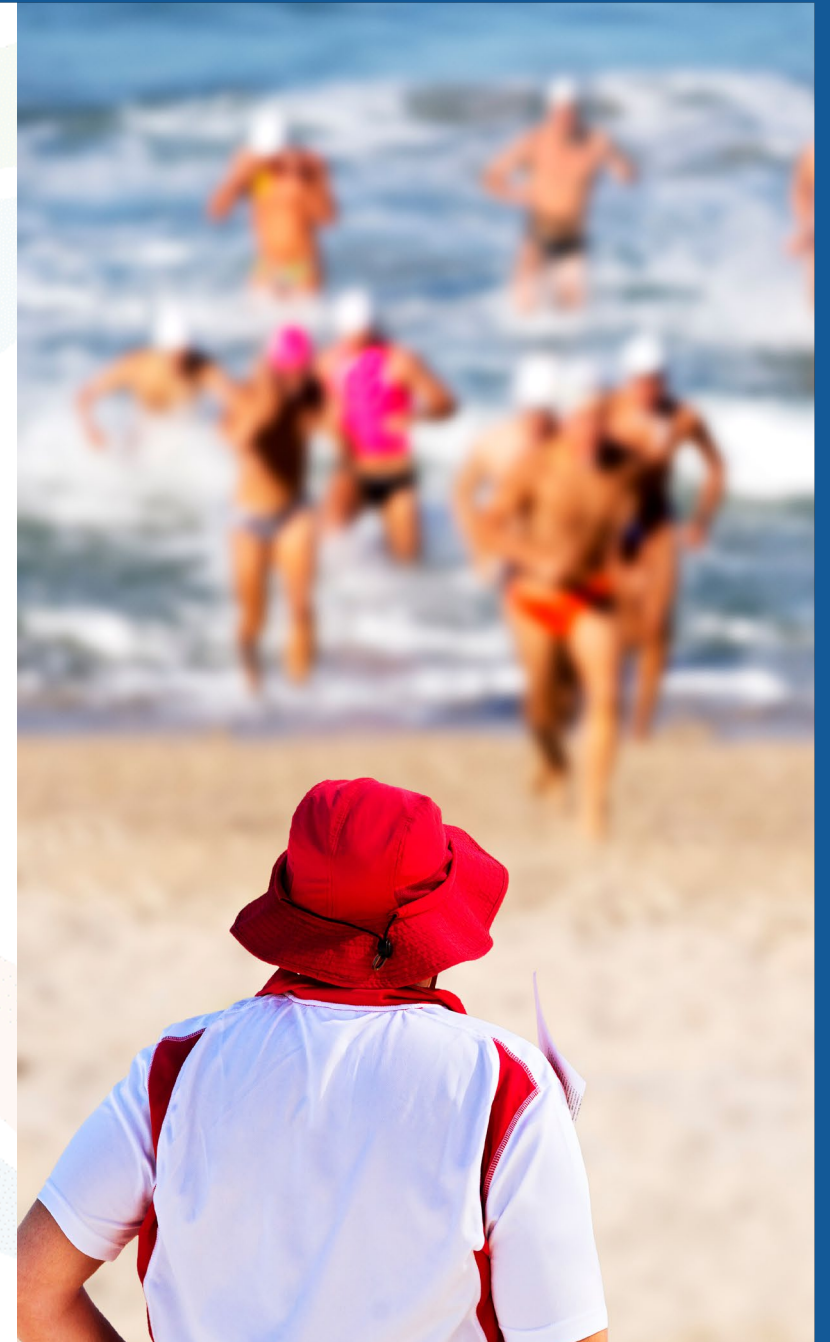
- Iconic Gold Coast surf lifesaving race.
- Organised by Surf Lifesaving Australia.

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.





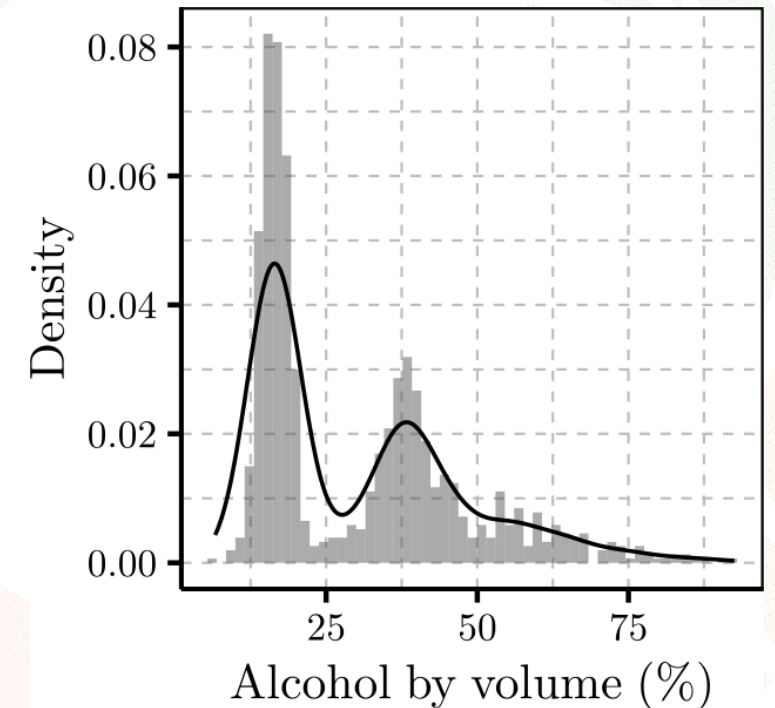
Gaussian Mixture

Cocktail Testing

- A mixture of $\approx 1,000$ 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 $\approx 1,000$ test cocktails.