GUIDE TO RISCIS BAYESIAN ANALYSIS APP

https://alim.shinyapps.io/bayseanriscis/

Please inquire with Ali for username and password

INPUT

RISCIS Baysean Analysis

Which Data Type:

Full Data ▼

Type of data refers to the database used. Currently only the full data is available. Other data types include imputed missing and regression missing data.
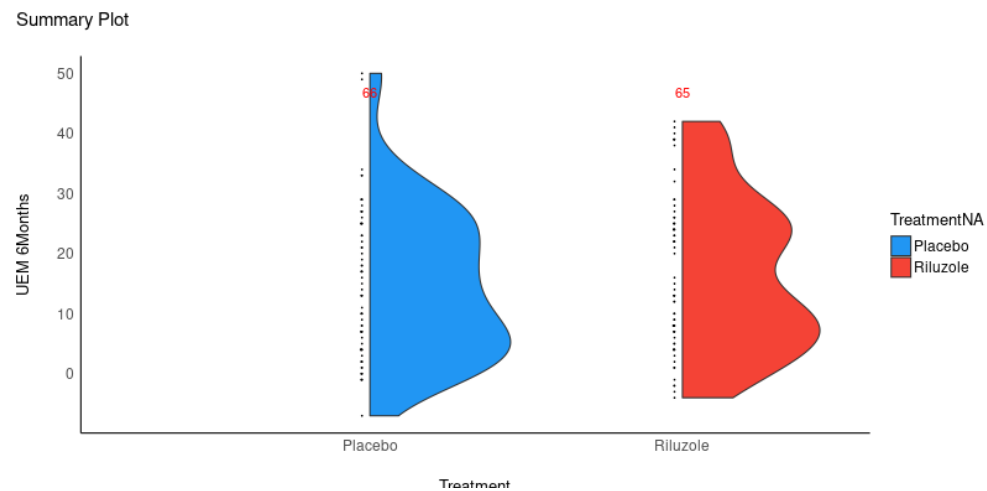
Which ASIA Choice:

All ▼

Baseline ASIA Grade of patients

Which Outcome Measure:

UEM 6Months ▼

Outcome Measure of interest. The variable would be a difference of the measure at the indicated time to baseline

Minimum of Region of Practical Equivalence

-2

Maximum of Region of Practical Equivalence

2

In Baysean analysis rather than concluding that an effect is present when it simply differs from zero, we would conclude that the probability of being outside a specific range that can be considered as **"practically no effect"** (*i.e.*, a negligible magnitude) is sufficient. This range is called the **region of practical equivalence (ROPE)**. You can define the boundaries of this range for the given variable in this app.
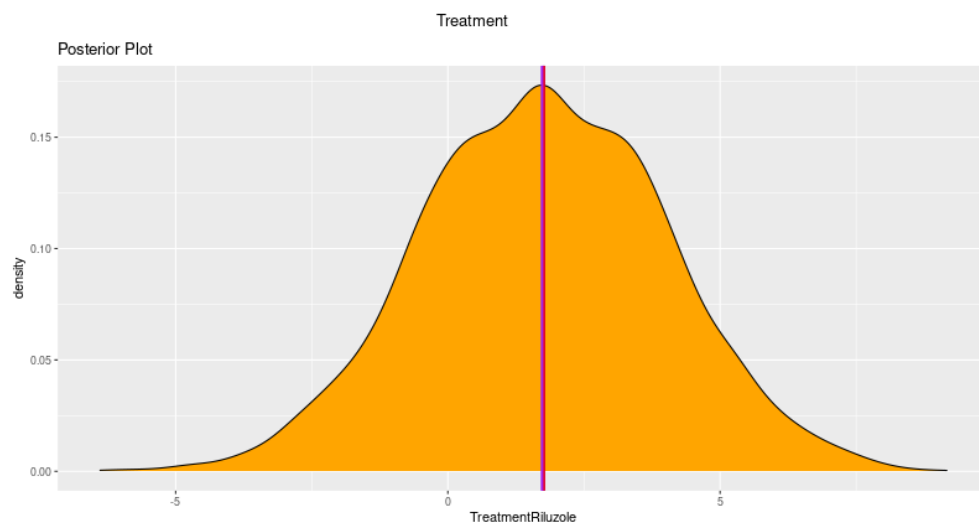
SUMMARY PLOT

This is a distribution plot of the raw data for the outcome measure of interest grouped based on treatment received. The red numbers above each group indicate the number of patients in that group.

POSTERIOR PLOT

This is a probability distribution plot represents the probability of different values of the outcome chosen given the treatment. Blue line is the mean, Red is the median and purple is the mode.
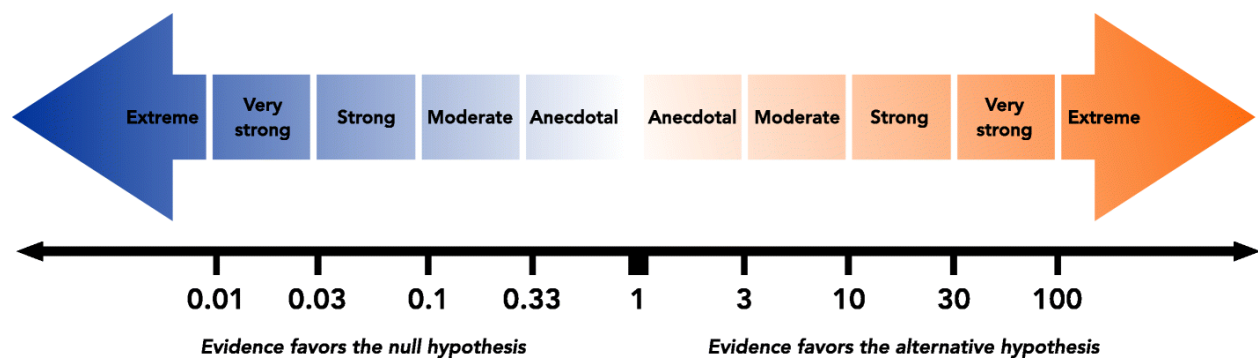
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Bayes Factors for Model Comparison

    Model          BF
[2] (rho != 0) 0.276

* Against Denominator: [1] (rho = 0)
*   Bayes Factor Type: JZS (BayesFactor)
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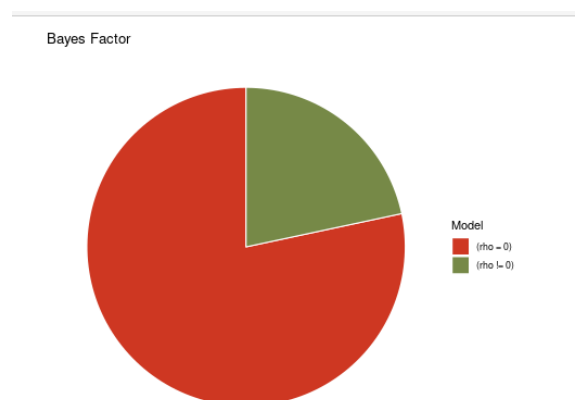
A Bayes factor is **the ratio of the likelihood of one particular hypothesis to the likelihood of another.**

$$\frac{likelihood\ of\ data\ given\ H_1}{likelihood\ of\ data\ given\ H_0} = \frac{P(D\,|H_1)}{P(D\,|H_0)}$$
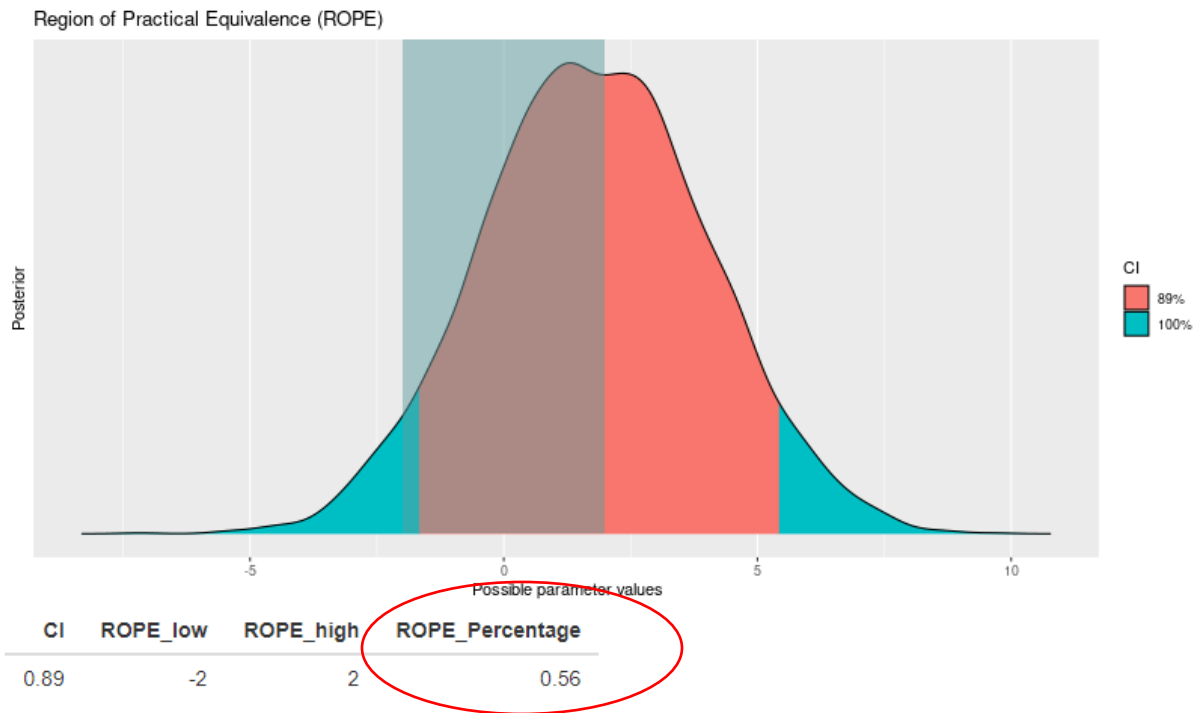
In our example the null hypothesis is there is no correlation between treatment and the outcome and alternative is that there is a correlation between treatment and outcome

We also have a plot to visalize this in the output where Red is evidence for the null hypothesis and green is evidence for the alternative hypothesis

Bayes Factor

Model
(rho = 0)
(rho != 0)

Region of Practical Equivalence (ROPE)

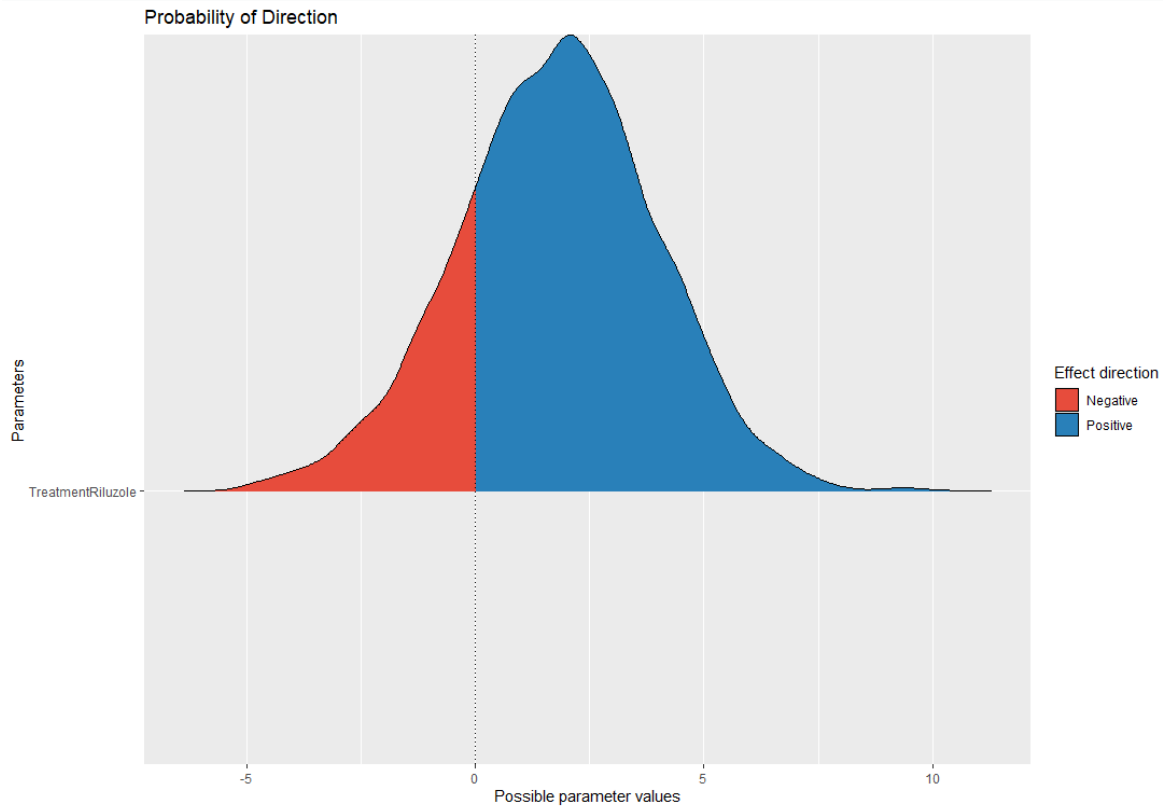| CI	ROPE_low	ROPE_high	ROPE_Percentage
0.89	-2	2	0.56

This plot is a probability distribution of the outcome data from the posterior plot. The blue box is highlighting the defined **region of practical equivalence (ROPE)**. The confidence interval is also highlighted in pink (In Bayesian its standard to use a 89& CI). The data outside the box are hence clinically viewed to be relevant.

The ROPE Percentage indicates the percent of data that is IN the rope and hence viewed to be of not relevant importance.

Interpreting the %

- > **99%** in ROPE: negligible (we can accept the null hypothesis)
- > **97.5%** in ROPE: probably negligible
- <= **97.5%** & >= **2.5%** in ROPE: undecided significance
- < **2.5%** in ROPE: probably significant
- < **1%** in ROPE: significant (we can reject the null hypothesis)

Parameter	pd	Effects	Component
(Intercept)	1.00	fixed	conditional
TreatmentRiluzole	0.79	fixed	conditional

This represents the the certainty associated with the most probable direction. So the PD (blue in the graph) is the certainty that the treatment is associated with a positive change in the outcome.

- $pd <= 95\%$ ~ $p > .1$: uncertain
- $pd > 95\%$ ~ $p < .1$: possibly existing
- $pd > 97\%$: likely existing
- $pd > 99\%$: probably existing
- $pd > 99.9\%$: certainly existing