ToothGrowth Exploratory Analysis

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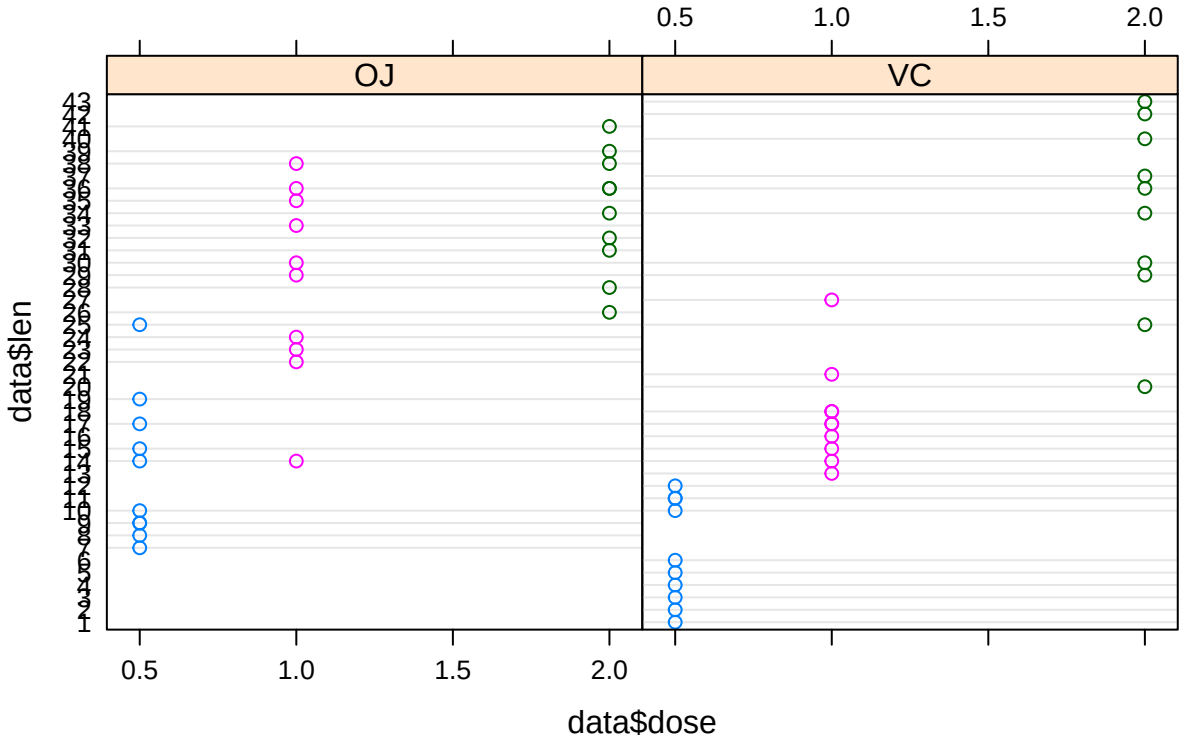
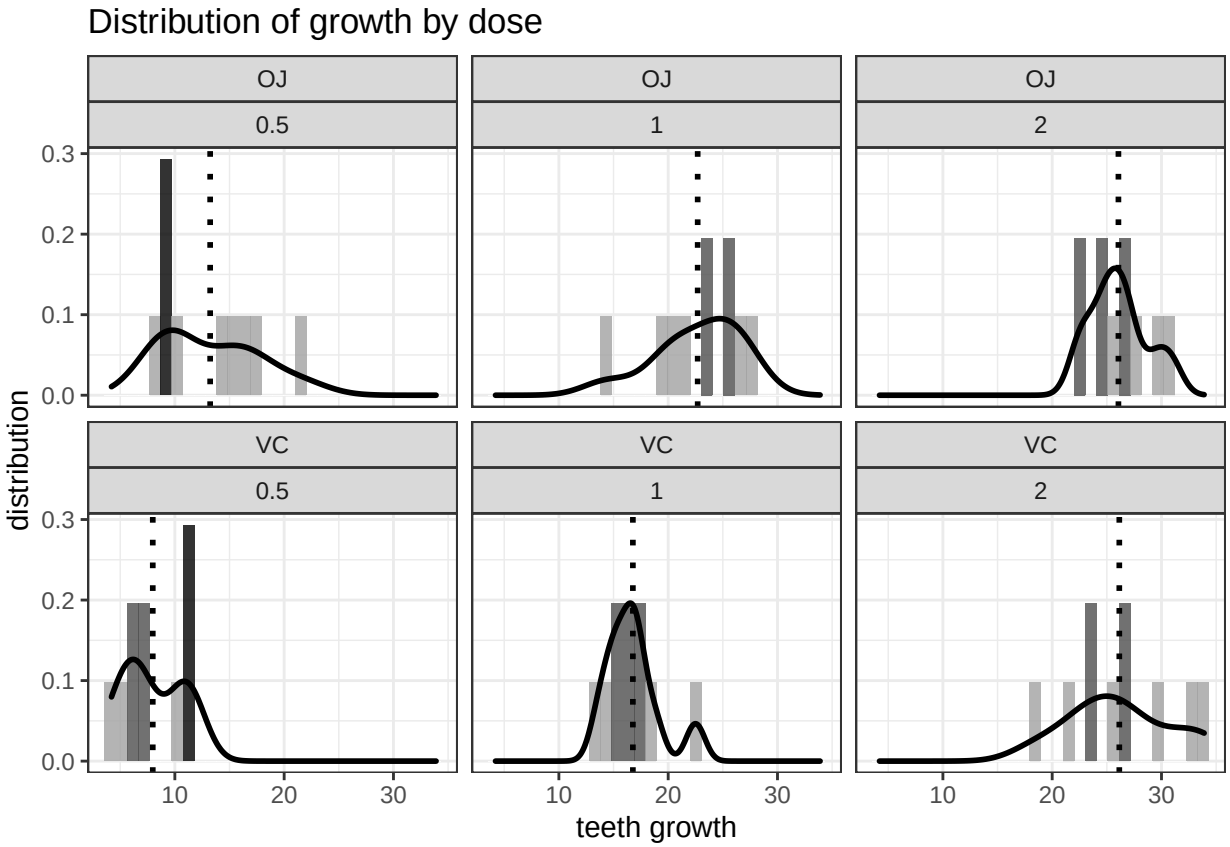
```
## Load the dataset
data = ToothGrowth
```

Exploratory analysis

Quick exploration using the lattice library to visulize patterns for the exploratory analysis



There seems to appear a pattern between the doses and the length of teeth, however, is clearer that the VC supplement is more sensitive to the dose amount.



The distribution comparison by supplement appears to be optimally distributed with 2 mg/day of orange juice or 1 mg/day of ascorbic acid, showing a better effectiveness distribution. However, the means are increasing with the increase of the dose, regardless of the supplement.

Confidence interval

The confidence intervals from the means have been calculated and presented as a matrix, showing the means for each dose and supplement and respective confidence intervals from their respective means.

We decided to have a confidence interval of 95% using the Z value to be 1.960 or using the quantile function of the normal distribution for 0.975. Another known value is n which correspond to the `length()` of the sample population, which is 60 and the σ that is calculated accordingly for each calculation using the `sd()` function. The final formula used, is then represented as follow: $\bar{X} \pm_{1,-1} \times Z \times \frac{\sigma}{\sqrt{n}}$

```
ci.matrix
```

```
##      OJ-mean OJ-lower OJ-upper VC-mean VC-lower VC-upper
## d0.5   13.23    10.47    15.99    7.98     6.28     9.68
## d1.0   22.70    20.28    25.12   16.77    15.21    18.33
## d2.0   26.06    24.41    27.71   26.14    23.17    29.11
```

Based on the matrix provided:

- Given lower dose (0.5 and 1.0 mg/day), OJ provides more teeth growth than VC;
- Given 2.0mg/day dose, the teeth growth is the same for both supplement methods;
- Higher dosages give more growth, independent from the supplement method.