Random effects ANOVA
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Contents

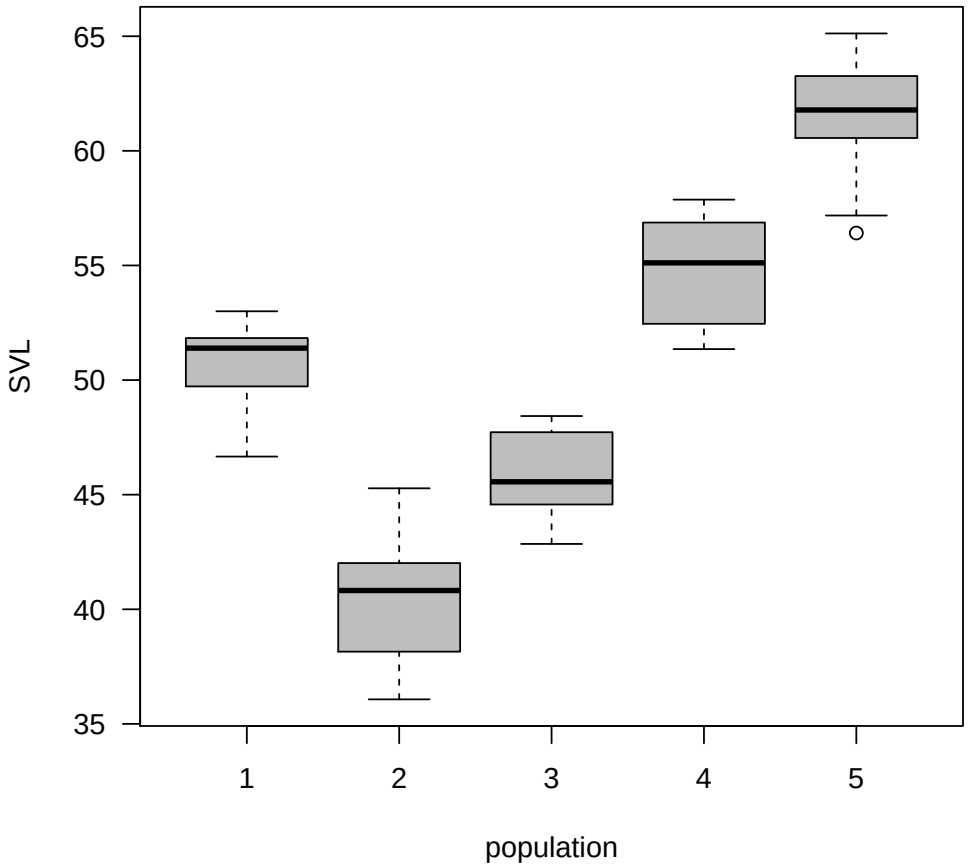

Figure 1: The distributions of the five populations of snakes with respect to snout-vent-length

0.1 Problem and data

This is an example from Marc Kery's book "Introduction to WinBUGS for ecologists. Here we explore a random effects model with ANOVA (a t-test applied more than two groups). First we generate the data—five populations of snakes each with $n = 10$ and a single measured co-variate. See the function `generateData.R`.

0.2 Fixed effects ANOVA

0.2.1 Maximum likelihood analysis

```
data = read.csv("svl.csv")
print(anova(lm(data$y~as.factor(data$x))))
cat("\n")
print(summary(lm(data$y~as.factor(data$x)))$coeff,dig=3)
```

```
[1] "..."
Analysis of Variance Table

Response: data$y
```

```
                Df Sum Sq Mean Sq F value Pr(>F)
as.factor(data$x) 4 2640.49 660.12 112.32 < 2.2e-16 ***
Residuals 45 264.48 5.88
---
Signif. codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

                 Estimate Std. Error t value Pr(>|t|)
(Intercept) 50.54 0.767 65.92 2.07e-46
as.factor(data$x)2 -10.32 1.084 -9.51 2.42e-12
as.factor(data$x)3 -4.83 1.084 -4.45 5.54e-05
as.factor(data$x)4 4.29 1.084 3.95 2.70e-04
as.factor(data$x)5 10.77 1.084 9.93 6.42e-13
```