Tasks

Introduction to structural equation modeling and mixed models in R

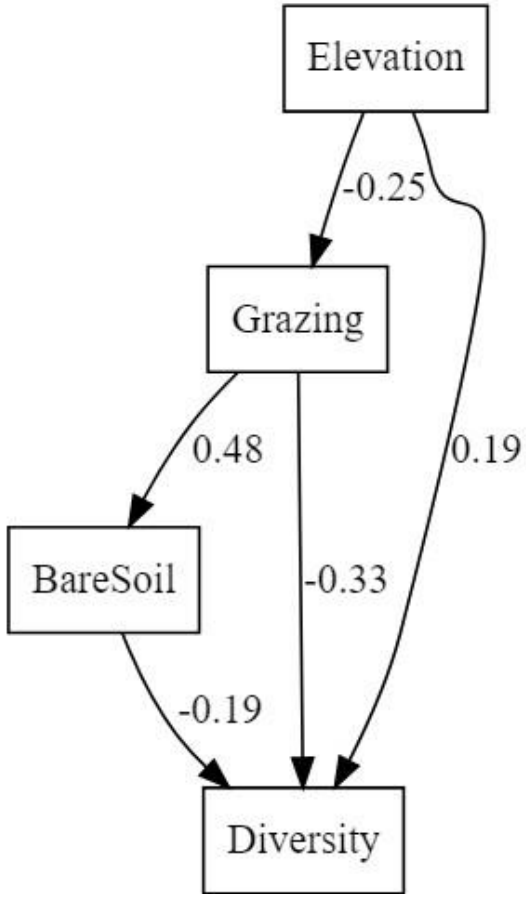
Day 3: SEM

Oksana Buzhdygan

oksana.buzh@fu-berlin.de

Day 3 Task 1

Effects of grazing on plant diversity along elevation gradient




```
# data
data <- read.csv("Grassl_data.csv")
```

Day 3 Task 1

For the model on Fig. 1:

1. Calculate the standardised direct, indirect and total effects of ***grazing*** on ***diversity*** (do this in lavaan in R)
2. Define the exogenous and endogenous variables in the model
3. For each endogenous variable get the following:
   - the variance explained by the model
   - the error variance
   - the effect of the error (path coefficient with the error variance).

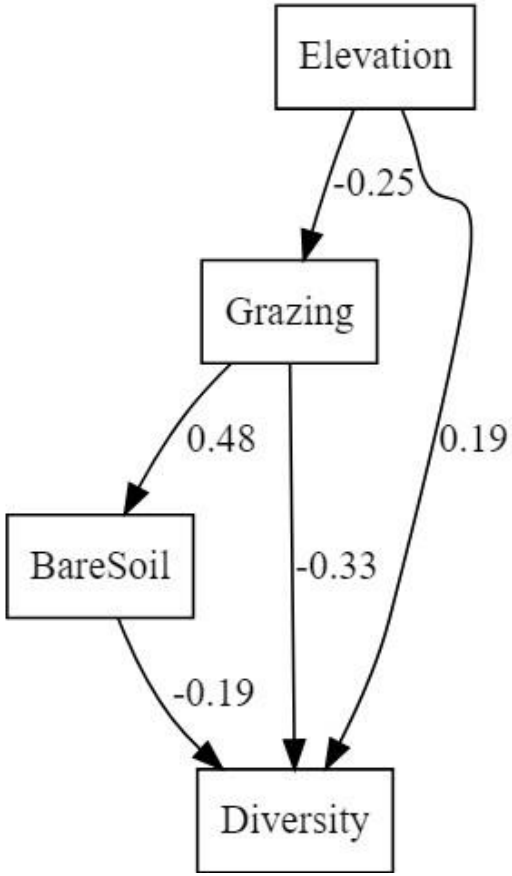


Fig. 1

Day 3 Task 1

For the model on Fig. 1:

1. Calculate the standardised direct, indirect and total effects of ***grazing*** on ***diversity*** (do this in lavaan in R)
2. Define the exogenous and endogenous variables in the model
3. For each endogenous variable get the following:
   - the variance explained by the model
   - the error variance
   - the effect of the error (path coefficient with the error variance).

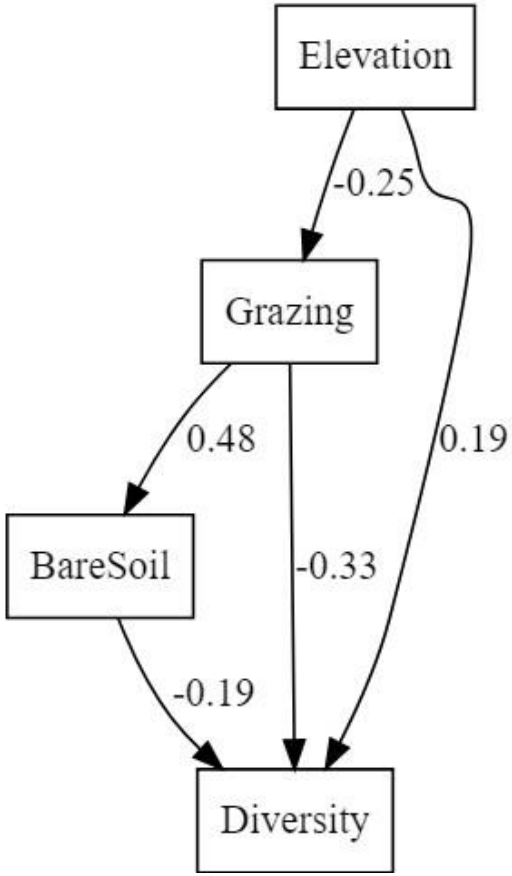


Fig. 1

Day 3 Task 2

California, USA.

Photos credit: USFS, and Jon Keeley, USGS

doi.org/10.1186/s42408-019-0041-0

doi.org/10.1071/WF07049

Postfire recovery of plant communities in California shrublands

Following fires, 90 plots were established 20x50m.

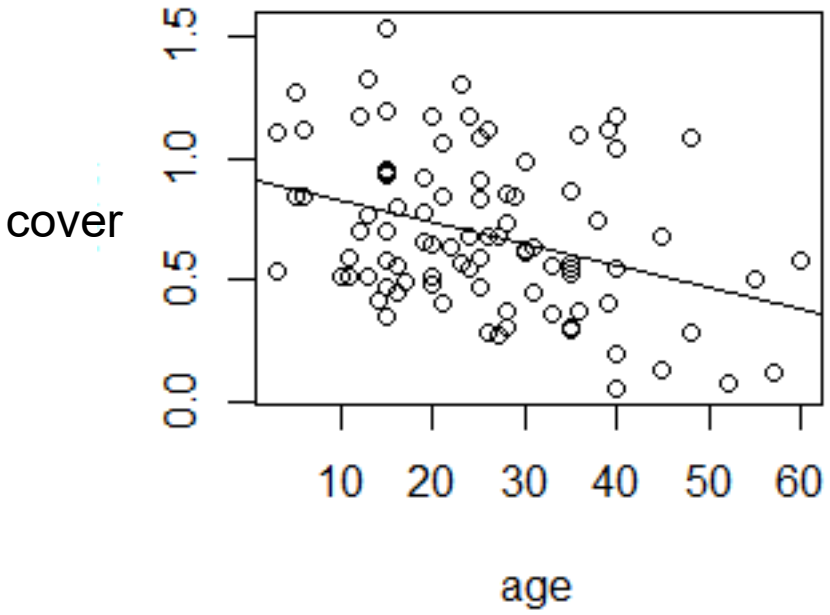
A number of measures were taken, including:

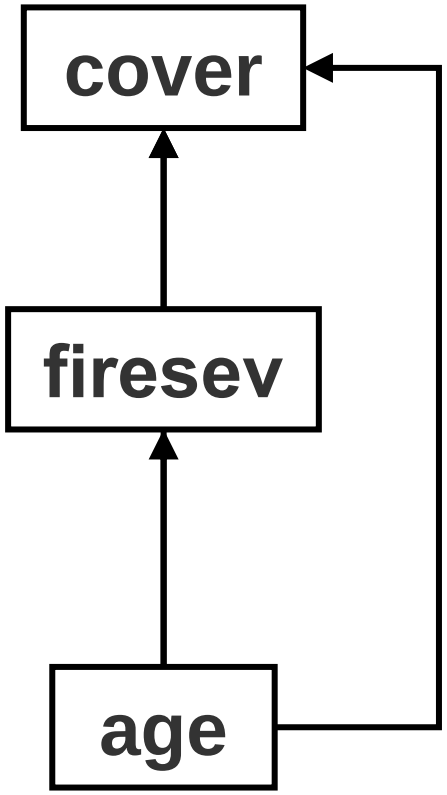
- Vegetation cover **"cover"**
- Age of stands that burned **"age"**
- Fire severity **"firesev"**

```
# Keeley data
library(piecewiseSEM)
data(keeley)
```

Data: Grace, J.B. and Keeley, J.E. 2006. A structural equation model analysis of postfire plant diversity in California shrublands. Ecological Applications 16:503-514

Day 3 Task 2





Data: Grace, J.B. and Keeley, J.E. 2006. A structural equation model analysis of postfire plant diversity in California shrublands. Ecological Applications 16:503-514

Day 3 Task 2

For the model on **Fig. 1**:

1. Check what is the model identifability status:
   - identified, underidentified, or overidentified model?
   - saturated or unsaturated model?
   - recursive or non-recursive?
2. Assess if the sample size is enough to fit this model?
3. Fit the model in 'lavaan' and get the path coefficients.
4. Get the fit indices and assess goodness of fit.
5. Test if link from "age" to "cover" is missing (see **Fig 2**)

For this use a Likelihood Ratio Test (χ^2 – difference test)

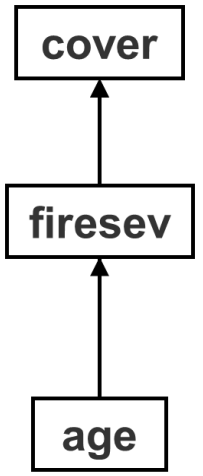


Fig. 1

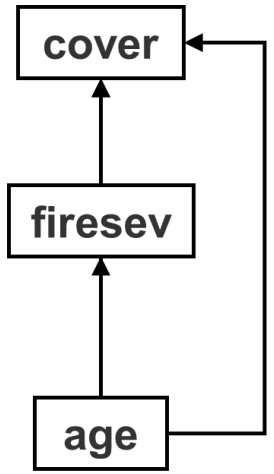


Fig. 2