Modeling Prologue

BIO401-01/598-02

22 Feb 2021

Predictive Modeling

Spring

Model Matrix

$$\underbrace{\begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_n \end{pmatrix}}_{\boldsymbol{Y}\ (dependent)} \qquad \underbrace{\begin{pmatrix} X_{11} & X_{12} & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & X_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ X_{n1} & X_{n2} & \dots & X_{nn} \end{pmatrix}}_{\boldsymbol{X}\ (independent\ variables)}$$

$\boldsymbol{Y}$: response variable

$\boldsymbol{X}$: features, descriptors, attributes, etc.

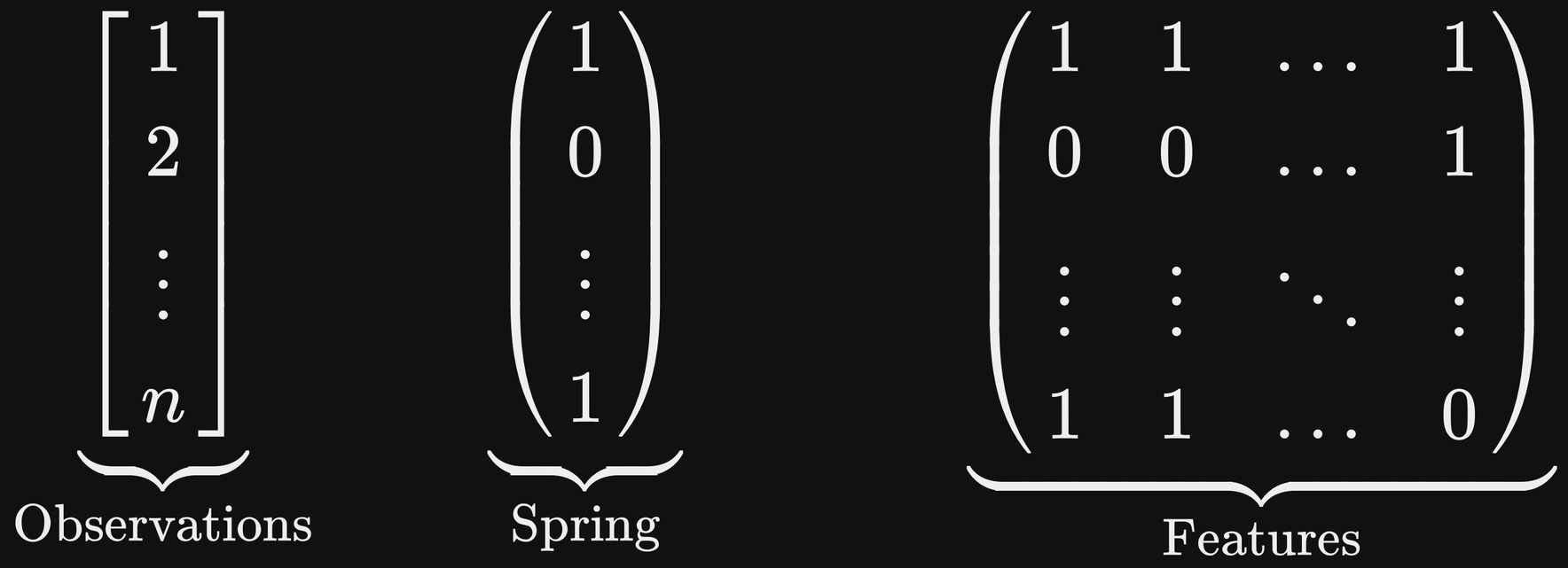
Model Matrix

establish a link between $\boldsymbol{Y}$ and $\boldsymbol{X}$

$\boldsymbol{Y}$ = f($\boldsymbol{X}$)

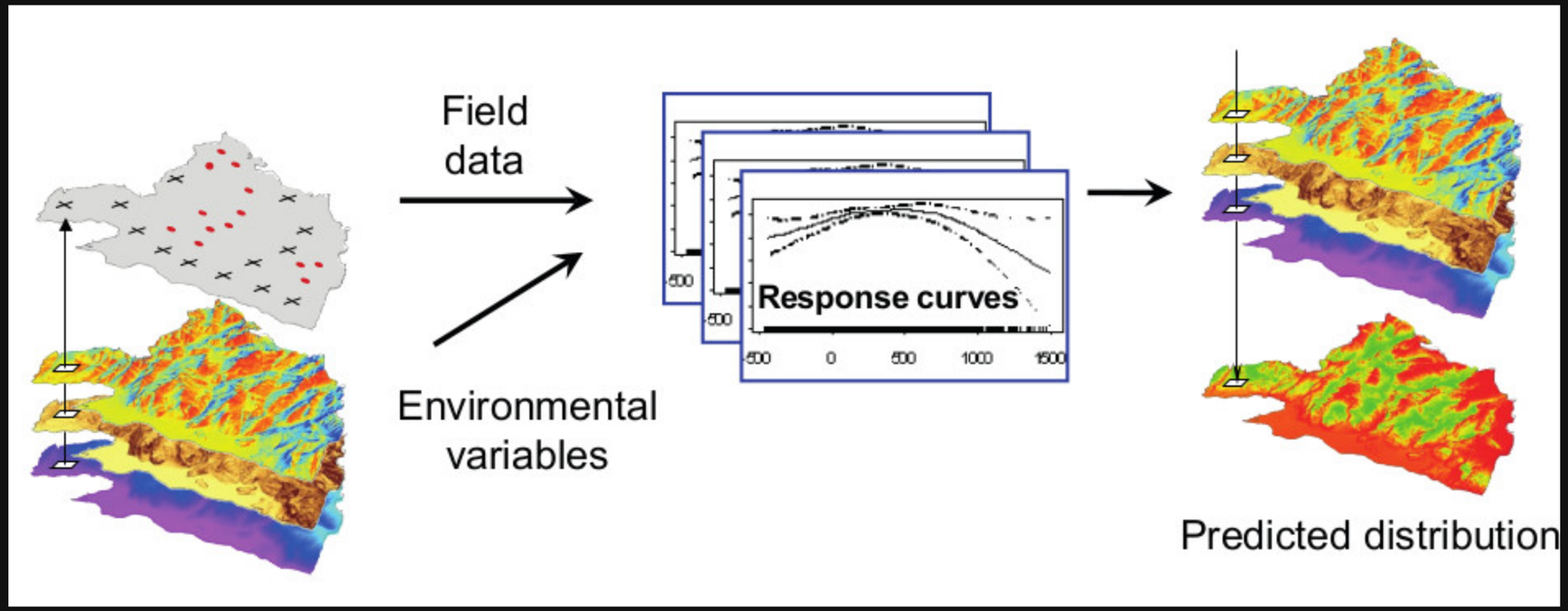
$$\text{Geo Modeling} \begin{cases} Y_i & = & f(geoLoc) \\ X_{ij} & = & f(geoLoc) \end{cases}$$

Model Matrix



Species Distribution Modeling

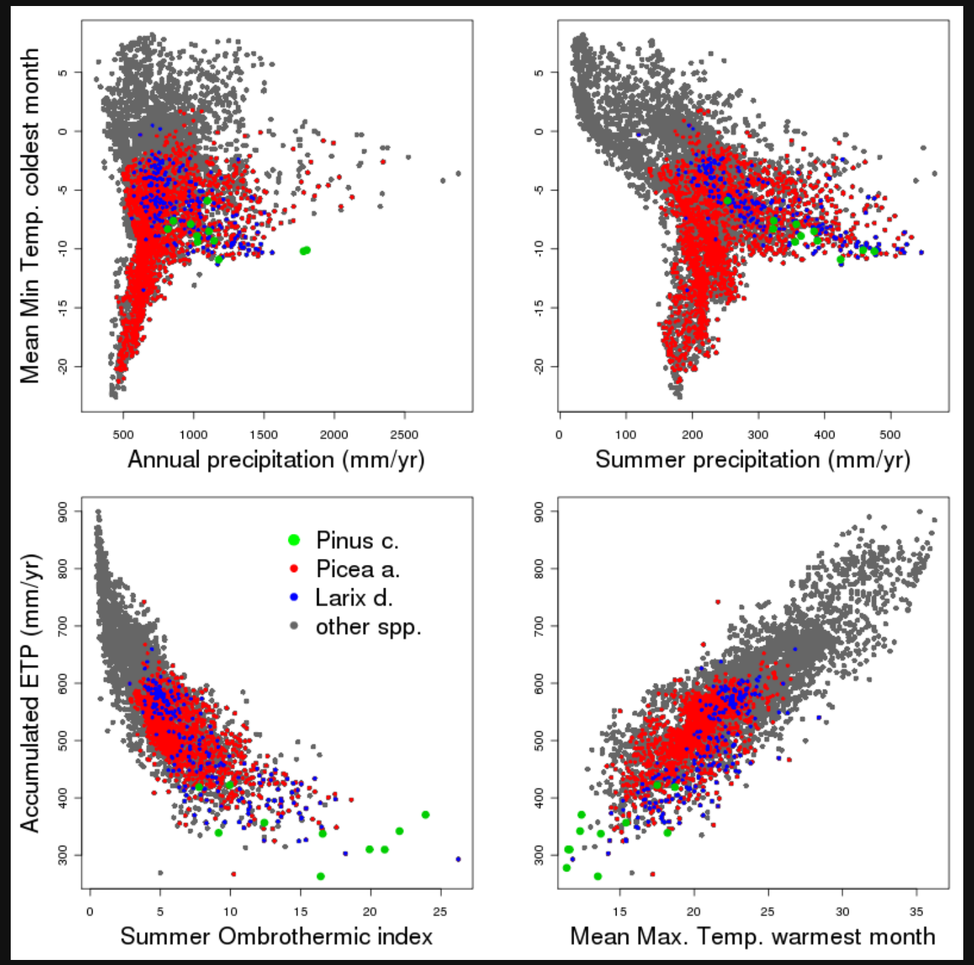
Species Distribution Modeling



Credit: Prof. Antoine Guisan, University of Lausanne, Switzerland.

https://www.thenakedscientists.com/articles/science-features/can-computers-help-us-conserve-biodiversity

Species Distribution Modeling



forest ecology and management (2010) 259, 750

GeoStats

Lectures

- Self-conherent
- Reference books (optional)

References

- Statistics for Spatial Data (1991) by Noel Cressie
- Spatial Data Analysis, theory and practice (2004), by Robert Hanning
- Statistical Analysis and Modelling of Spatial Point Patterns (2007), by Janine Illian
- Spatial Analysis Using Big Data Methods and Urban Applications (2019) by Yamagata and Seya
- Mathematical Techniques in GIS, 2ed (2004) by Peter Dale
- Multivariate Geostatistics (2003) by Hans Wakernagel
- Geostatistics Modeling Spatial Uncertainty, 2ed (2012) by Chiles and Delfiner

Acknowledgement

Thanks for Your Attention