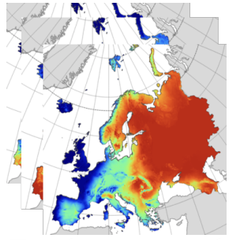
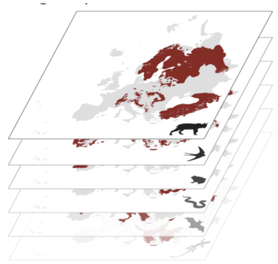
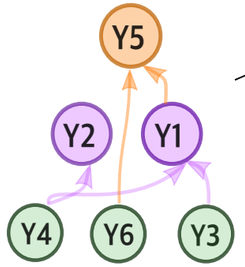
(a) Input data



Environmental variables



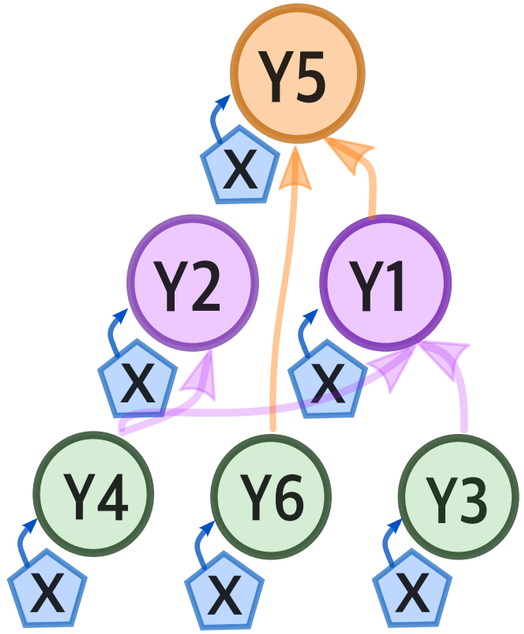
Species distribution data



Metaweb

(b) Model fitting

$$Y_{ij} \sim f\left(\sum_{k=1}^{K} \beta_{jk} x_{ik} + \sum_{j'<j;(j,j')\in E} \alpha_{jj'} Y_{ij'}\right)$$



(c) Predictions at new sites

Order species

$$\sigma(\{\mathbf{Y}_1, \ldots, \mathbf{Y}_6\}) = \mathbf{Y}_4, \mathbf{Y}_6, \mathbf{Y}_3, \mathbf{Y}_2, \mathbf{Y}_1, \mathbf{Y}_5$$

Sequentially predict

$$\hat{Y}_4 \sim f(\beta_4 x_{\text{new}})$$
$$\hat{Y}_6 \sim f(\beta_6 x_{\text{new}})$$
$$\hat{Y}_3 \sim f(\beta_3 x_{\text{new}})$$
$$\hat{Y}_2 \sim f(\beta_2 x_{\text{new}} + \alpha_{24} \hat{Y}_4)$$
$$\hat{Y}_1 \sim f(\beta_1 x_{\text{new}} + \alpha_{14} \hat{Y}_4 + \alpha_{13} \hat{Y}_3)$$
$$\hat{Y}_5 \sim f(\beta_5 x_{\text{new}} + \alpha_{56} \hat{Y}_6 + \alpha_{51} \hat{Y}_{31})$$