

Mixture tree model for network inference

Draft JOBIM

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- 1 Motivation
- 2 Graphical models
- 3 Mixture tree
- 4 With count data

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Ecological networks

Rising interest in **jointly analysed** species abundances:

- Metagenomics
- Microbiologie
- Ecology

Objective

Understand species interactions allows for resilience analyses, pathogens control, ecosystem comparison, reaction prediction...

Example

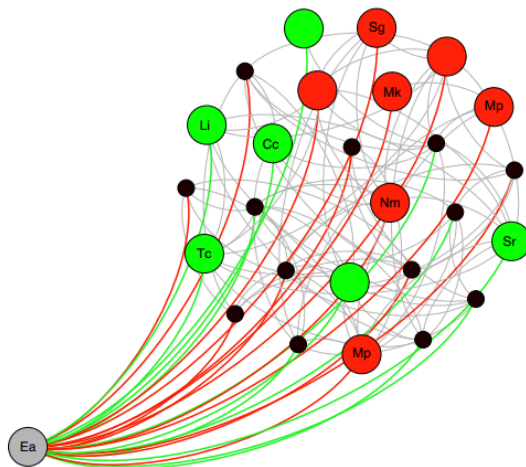
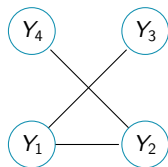


Figure: *Erysiphe althitoides* pathobiom on oak tree leaves.

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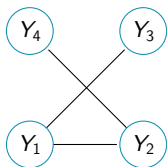
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Tree averaging

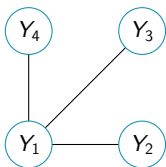


$$P\{T = T_1 | Y\}$$

Tree averaging

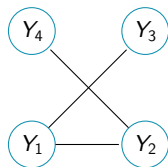


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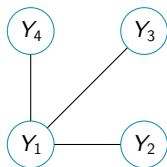


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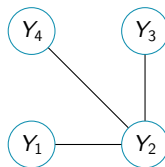
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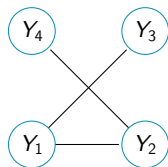


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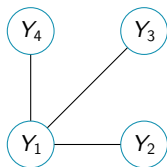


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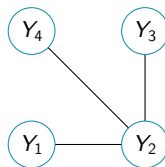
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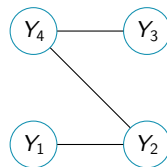
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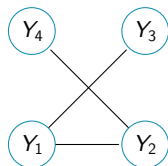
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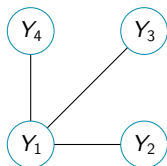
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...

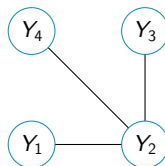
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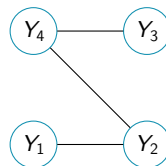
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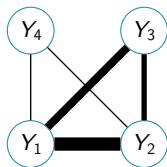
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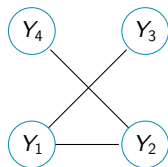
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Edge posterior probabilities:

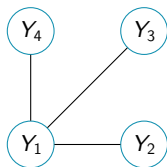


$$P\{(j, k) \in T|Y\}$$

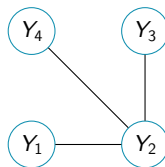
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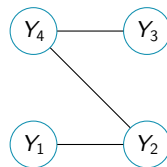
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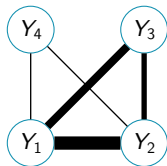
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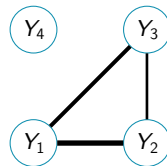
...

Edge posterior probabilities:



$$P\{(j, k) \in T|Y\}$$

Thresholding probabilities:



$$P\{(j, k) \in T|Y\}$$

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