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Graph theory applied to agroforestry system co-design

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Better knowledge of the system

Traditional way
(Space and time) Designs are not easy to share

Our method

Each element is transformed into a node
= Apple tree
= Walnut
= Wheat

Processed digital twin of the mockup

Visualization of the agroforestry system with ecosystem services

Digital twin is translated into a graph
2 elements are neighbors -> an edge

Search of known patterns
1 pattern = structure supporting ecosystem services

= limiting water stress by tree shadow

Hierarchical graph
Higher level elements are identified

= vegetal cover

Results and discussion

A novel way to describe agroforestry systems based on graphs

To compare agroforestry systems

To model temporal evolution of ecosystem services

To share a more precise common view

Better knowledge of the system