

Inspect Data and Learn Structure

On this page, you can investigate your data, group your variables and learn the structure of the network. The grouping is inspired by the workflow within clinical routine. With this, you can investigate the causal flow within the model in comparison to the common process within clinical routine, simultaneously. Furthermore, you can include/exclude variables from Bayesian network (BN) learning by selecting them, integrate prior knowledge in the form of a whitelist (relations that are present in clinical knowledge) and blacklist (forbidden relations).

Clinical Workflow Steps/Groups

Controlling Factors

Management Interventions

Management Objectives

Data Overview

Number of Patients: 1000

Soil

Weather

Fertilizer_Application

Fungicide_Application

Heat_Treatment

Pesticide_Application

Trash_Burning

Water_Application

Yield

Amount_of_N_Fertilizer

Compound_D

Filter_Cake

Integrate Prior Knowledge

from Water_Application to Yield

Data-Driven Bayesian Network Structure

Contr...

Manag...

Manag...

Weather

Soil

Fungi...

Trash...

Heat...

Pesti...

Ferti...

Water...

Yield

Hand...

Mecha...

Potas...

Manur...

Type...

Imoun...

Nitro...

Herbi...

Weeds

Singl...

Compo...

Pests...

graph: 0

node count: 23

Weather, Herbicide_Application, Manure, Weeds, Fungicide_Application, Nitrogen, Fertilizer_Application, Filter_Cake, Amount_of_N_Fertilizer, Type_of_N_Fertilizer, Mechanical_Cultivation, Pests_and_Disease, Soil, Yield, Water_Application, Hand_Weeding, Potash, Compound_D, Single_Supers, Timing_of_Dressings, Trash_Burning, Heat_Treatment, Pesticide_Application

Notes/Comments

Insert your notes/comments here ...

from cause

to effect

reliability of the relation

Structure Validation

Structure Validation

Since the parametrization is highly dependent on the Bayesian network structure, you firstly have to validate the learnt nodes and relations. This especially includes the correct orientation of dependencies within the model.

You have following interactive validation functionalities:

- You can update the node names via double-click on the node label.
- You can click on a node, keep the mouse down, and draw a path to a child node (from cause to effect).

Contr...

Manag...

Manag...

Weather

Soil

Fungi...

Trash...

Heat...

Pesti...

Ferti...

Water...

Yield

Hand...

Mecha...

Potas...

Manur...

Type...

Imoun...

Nitro...

Herbi...

Weeds

Singl...

Compo...

Pests...

from cause

to effect

reliability of the relation

individual subgraphs having no relation to each other

Graphs

The learning algorithm has learnt following individual graphs using the best learning algorithm:

graph: 0

node count: 23

Weather, Herbicide_Application, Manure, Weeds, Fungicide_Application, Nitrogen, Fertilizer_Application, Filter_Cake, Amount_of_N_Fertilizer, Type_of_N_Fertilizer, Mechanical_Cultivation, Pests_and_Disease, Soil, Yield, Water_Application, Hand_Weeding, Potash, Compound_D, Single_Supers, Timing_of_Dressings, Trash_Burning, Heat_Treatment, Pesticide_Application

Edges

To validate the structure of the network, you need to validate following edges between nodes. It is always from left (cause) to right (effect).

Fungicide_Application

Soil

correct

wrong

turnaround

Herbicide_Application

Type_of_N_Fertilizer

Fungicide_Application

Yield

Manure

Fungicide_Application

Herbicide_Application

Yield

Notes/Comments

Insert your notes/comments here ...

0%

Model Validation

Model Validation

You have learnt the model using the validated structure and the available data for parametrization. Of course, this parametrization needs to be validated to handle biases from the data and check for plausibility.

To validate the parametrization, we are comparing the computed probability distributions resulting from our sets of patient-specific information, so called evidence items, with the given information in our training dataset. In case of differences between the recommendation and given information entity, the user needs to check for the plausibility of the computed result.

Contr...

Manag...

Manag...

Weather

Soil

Fungi...

Trash...

Heat...

Pesti...

Ferti...

Water...

Yield

Hand...

Mecha...

Potas...

Manur...

Type...

Imoun...

Nitro...

Herbi...

Weeds

Singl...

Compo...

Pests...

from cause

to effect

reliability of the relation

distinctions % between computed recomb. and given information

Nodes Ordered by their Topological Order (Beginning at Last Layer)

Node	Distinction Percentage	Number of Distinctions
Yield	100%	30
Water_Application	100%	30
Soil	23%	
Pests_and_Disease	13%	
Fertilizer_Application	10%	
Weeds	30%	
Weather	30%	
Trash_Burning	30%	9
Heat_Treatment	37%	11
Pesticide_Application	40%	12
Compound_D	33%	10
Single_Supers	43%	13
Filter_Cake	100%	10

Plausibility of Computed Recommendations per Patient Case Validation

To validate the model, we have to start with nodes having no children (impact to other nodes) since the children can have an indirect impact on the parents.

Node under validation: **Yield**

Evidence

Outcome

Relevance

Weather

unfavoura...

Herbicide... yes

Soil

good

Weeds

dirty

Pests_and...free

Water_App...250_75...

Fertilize... not_effec...

Heat_Trea...no

Pesticide... no

Compound_D

observed outcome:

0_to_70

computed outcome:

x__100

the probability distribution should be [in %]:

x0_to_70:

25

x70_to_100:

0

x__100:

75

Dependent on another variable

submit

Notes/Comments

Insert your notes/comments here ...

0%

Save

Structure Validation

Edges

To validate the structure of the network, you need to validate following edges between nodes. It is always from left (cause) to right (effect).

Fungicide_Application

Soil

correct

wrong

turnaround

Herbicide_Application

Type_of_N_Fertilizer

Fungicide_Application

Yield

Manure

Fungicide_Application

Herbicide_Application

Yield

Model Validation

Plausibility of Computed Recommendations per Patient Case Validation

To validate the model, we have to start with nodes having no children (impact to other nodes) since the children can have an indirect impact on the parents.

Node under validation: **Yield**

Evidence

Outcome

Relevance

Weather

unfavoura...

Weeds

dirty

Fertilize...

not_effec...

Soil

good

Water_App...250_75...

Pests_and...free

Trash_Bur...yes

Heat_Trea...no

Pesticide... no

Compound_no

Single_Su...no

observed outcome:

0_to_70

computed outcome:

x__100

the probability distribution should be [in %]:

x0_to_70:

22

x70_to_100:

33

x__100:

44

Dependent on another variable

submit