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Domains
Structural Learning in Object Oriented
Old McDonald has a farm with two milk cows and two meat cows. He wants to make a model to determine the meat and milk production of these cows. The cows are modeled by OOBN classes.
other instantiation of that class.

one instantiation of a class are 'identical' to the corresponding CPTs of all

The OO assumption: The domain is object oriented; i.e., the CPTs of

OOBN framework (cont'd)
Elicitation of prior information (encoded in $p(M)$).

Need to calculate $p(D|W)$ (Cooper and Herskovits, 1991).

The search space is huge (hyper-exponential in the number of nodes).

Issue:

Find the model $M \in \mathcal{M}$ that maximizes

$$p(D|W) \propto p(D|M) \cdot p(M).$$

Structural Learning in BNS
Learning is mainly performed in the class specifications.

Prior knowledge is naturally specified in the OOBN language.

Learning in OOBNs is similar to learning in BNs, except that:

Structural learning in OOBNs
object-oriented domain, and they can naturally be encoded in an ODB.

These extra types of prior information are easy to elicit in an

- The ODB assumption.

- Classification of nodes in classes and instantiations.

- Links to exclude.

- Links to include.

- The prior knowledge, which is encoded in $P(M)$, includes:

  - Elitionation of prior knowledge in ODB.
should lead to a better model.

class level. This corresponds to having more available data, which in turn

Main idea: Cases from the instatntiations are treated as virtual cases at the

are assigned to classes.

All variables in the database are assigned to instatntiations. All instatntiations

Structural Learning in ODBNS
The search space in the OO setting
Asking the domain expert to restrict the input sets.

We target this problem during the elicitation of prior knowledge by

Finding the input sets is, however, **not** local to the instantiation.

To find the input sets we need to look in the instantiations.

Searching for the input sets
Comparison, stock-domain, 25% missing data

- By making the OO assumption, the KL divergence is decreased by a factor of 1.6 compared to conventional learning.
- The quality of the result with ‘restricted input sets’ is 1.03 better than what is obtained without this information.
The proposed learning algorithm exploits an intuitive way of expressing learning in the OOBN framework. We have proposed a method for domain-structured learning in object-oriented domains. The learning algorithm is based on the OOBN model.