

Building Bayesian Influence Ontologies

Annotated Bibliography

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References

- [1] R. Ajoodha and B. Rosman, “Tracking influence between nave bayes models using score-based structure learning,” in *2017 Pattern Recognition Association of South Africa and Robotics and Mechatronics (PRASA-RobMech)*. IEEE, November 2017.

Aim: To present a method that learns the high-level influence structure present between a set of independently learned naïve Bayes models.

Summary: This paper presents an algorithm for learning the influence structure between naïve Bayes models (NBMs). The algorithm achieves this by first learning a set of independent NBMs (i). It then computes a score used to evaluate the fitness of the network (ii). This approach makes use of a modified Bayesian information criterion (BIC) for scoring, which provides an acceptable trade-off between model complexity and data fitting. The algorithm then refines the model given the new influence structure using expectation maximisation (iii). After this, the candidate network is subjected to a graph operation (edge addition, reversal or deletion) chosen to improve the network’s score (iv). This is achieved using a greedy hill-climbing heuristic, which guarantees monotonically improving score between iterations. Finally, steps (ii) to (iv) are repeated until an optimum is found. The result is a method which, in the authors’ tests achieved 60-82% accuracy when compared to the ground truth structure. Additionally, the method outperformed the random structure and the structure with no conditional independence assertions, and tended towards the true structure as the number of samples increased.

- [2] D. Koller and N. Friedman, *Probabilistic Graphical Models - Principles and Techniques*. The MIT Press, 2009.