

## Hybrid Structure Learning Approach for Assessing the Phosphate Laundries Impact

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**Abstract :** Bayesian Network (BN) is one of the most efficient classification methods. It is widely used in several fields (i.e., medical diagnostics, risk analysis, bioinformatics research). The BN is defined as a probabilistic graphical model that represents a formalism for reasoning under uncertainty. This classification method has a high-performance rate in the extraction of new knowledge from data. The construction of this model consists of two phases for structure learning and parameter learning. For solving this problem, the K2 algorithm is one of the representative data-driven algorithms, which is based on score and search approach. In addition, the integration of the expert's knowledge in the structure learning process allows the obtainment of the highest accuracy. In this paper, we propose a hybrid approach combining the improvement of the K2 algorithm called K2 algorithm for Parents and Children search (K2PC) and the expert-driven method for learning the structure of BN. The evaluation of the experimental results, using the well-known benchmarks, proves that our K2PC algorithm has better performance in terms of correct structure detection. The real application of our model shows its efficiency in the analysis of the phosphate laundry effluents' impact on the watershed in the Gafsa area (southwestern Tunisia).

**Keywords :** Bayesian network, classification, expert knowledge, structure learning, surface water analysis

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