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## Using Bayesian Network for Soil Organic Carbon Prediction despite its Incredible Complexity

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In this research, static Bayesian networks (BN) is presented for predicting Soil Organic Carbon (SOC) in the complex and open soil systems. BN is a graphical computational model which provides a simple technique to define the nonlinear dependencies and, therefore, to implement a compact representation of the complex systems. Moreover, the BN is used as a simulation tool for effective processing of the complex system outcomes by probability propagation methods. This permits evaluation and potential intervention in complex soil systems and determines the dependencies between different variables. We use a BN to identify key factors in predicting England and Wales SOC. Then, we explore the relationships between different key factors such as geographical, environmental or climate and their roles individually in predicting SOC, particularly to identify those which have the highest impact. The proposed BN is also used to calculate the effectiveness of these interventions where the uncertainties associated with these casual relationships at the same time. This approach works with data from the variety of sources and handles a mix of subjective and objective data and can incorporate variables which differ across the contexts. The effectiveness of the technique is demonstrated with a case study to predict SOC.