

## Constructing a Bayesian Network for Solar Energy in Egypt Using Life Cycle Analysis and Machine Learning Algorithms

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**Abstract :** In an era where machines run and shape our world, the need for a stable, non-ending source of energy emerges. In this study, the focus was on the solar energy in Egypt as a renewable source, the most important factors that could affect the solar energy's market share throughout its life cycle production were analyzed and filtered, the relationships between them were derived before structuring a Bayesian network. Also, forecasted models were built for multiple factors to predict the states in Egypt by 2035, based on historical data and patterns, to be used as the nodes' states in the network. 37 factors were found to might have an impact on the use of solar energy and then were deducted to 12 factors that were chosen to be the most effective to the solar energy's life cycle in Egypt, based on surveying experts and data analysis, some of the factors were found to be recurring in multiple stages. The presented Bayesian network could be used later for scenario and decision analysis of using solar energy in Egypt, as a stable renewable source for generating any type of energy needed.

**Keywords :** ARIMA, auto correlation, Bayesian network, forecasting models, life cycle, partial correlation, renewable energy, SARIMA, solar energy

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