ML - Week 4 Assignment

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- Topic Description

Bayesian learning represents a branch of machine learning whose inference has foundations in statistics. The algorithm initially receives already known information regarding the state of the world. It makes probabilistic assumptions regarding our hypothesis of interest and as it receives new evidence, these assumptions suffer modifications. The whole process happens using the Bayes theorem of probabability.

Since their existence, they have proven to be competitive with both traditional (support vector machines, decision trees) and novel (deep neural networks) learning techniques. These appear in various fields such as: medical diagnosis, finance and natural language processing. It is widely known most of these approaches use a 'black-box' paradigm, where models improve unbeknownst to the designers, however, bayesian networks' inference can in fact be understood given it is based on a statistical formula.

The chosen topic for this research report will surround how bayesian networks approach medical diagnosis and their advantages and drawbacks compared with the previously mentioned techniques. More specifically, these networks are used in diagnosis ranging from cardiovascular diseases, pregnancy disorders to even psychological and psychiatric disorders. The applications are far and wide, which only serve to underline the importance and versatility of these kinds of networks.

- Research Report Title

Bayesian Learning in Medical Diagnosis

- References

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- Julia Flores, M., Nicholson, A.E., Brunskill, A., Korb, K.B., Mascaro, S., 2011. Incorporating expert knowledge when learning bayesian network structure: A medical case study. Artificial Intelligence in Medicine 53, 181-204.
- McLachlan, S., Dube, K., Hitman, G.A., Fenton, N.E., Kyrimi, E., 2020. Bayesian networks in healthcare: Distribution by medical condition. Artificial Intelligence in Medicine 107, 101912.
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- Presentation Date - Week 9 lecture hours, Tuesday 16-18, C310