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Opponent Review

"Comparative Study of Fuzzy Logic, Artificial Neural Network, and Neuro-Fuzzy System in Medical Diagnosis "An Approach towards a Medical Expert System"

Harvey Ngoe Kolle

Reviewer: Prof. Dr. Andreas Berl

The thesis is motivated by the ongoing requirement for accurate medical diagnosis in various regions around the world, where access to trained physicians may be limited. The thesis proposes the use of AI systems to assist with medical diagnosis and compares the effectiveness of fuzzy logic, artificial neural networks (ANNs), and neuro-fuzzy systems (a combination of fuzzy logic and ANNs). The hypothesis that fuzzy systems provide better interpretability than other machine learning approaches is explored, with analysis focused on fuzzy logic and fuzzy systems. To compare the different AI systems, publicly available datasets for diabetes, heart disease, and hepatitis are utilized.

The master's thesis is well-organized and uses precise language, with clearly stated research questions and goals. There are several open issues.

- The thesis introduces XAI (Explainable AI) an important feature in the second section. However, XAI is never mentioned again in the thesis. It seems this has only been added to fill some pages.
- The "Results" section reports accuracy, sensitivity, and specificity for all three AI systems for each of the three diseases. However, confidence intervals or standard deviations are not provided.
- Why is the configuration of the three systems exactly the way that it has been done? There are descriptions on how everything has been set up, but not why it has been set up like this. Aren't there other designs possible? What are the advantages or disadvantages of the chosen designs?
- What kind of ANN has been used – and why? There are many kinds of ANN available. What training algorithm has been used? These are important questions that are not been answered in the thesis.

All in all, the thesis is of good quality, despite the open issues.

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