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«High-Dimensional Explainable AI for Cancer Detections»

The goal of this research is to use Shapley values from cooperative game theory to build explainable algorithms for anomaly detection in machine learning, and to propose a Bi-level approach for dealing with high-dimensional input data.

In the course for this work, the following results were achieved:

1. Two of the modern algorithms for anomaly detection problems, the ANN and Isolation forest algorithms, are considered.
2. Implemented a program using the Python language and compared it to an existing explained model on the same dataset.
3. Parts of this paper are included in the International journal Artificial Intelligence.

The two-level approach developed in this work is a method based on cooperative game theory. The paper presents global and local explanations using the two-level approach. This approach emerged from the "two-level cooperation" proposed by N.V. Kolabutin and L.A. Petrosyan. This method divides the cooperative alliance into a two-tiered structure. The first layer is an alliance of participants. The second layer treats the alliance as a participant, thus forming a larger alliance. After the alliance with dynamic stability, a stable 'two-tiered cooperation' is formed.

As part of the research study, the author first sorted out the two anomaly detection algorithms, combined the Shapley method with the anomaly detection method, BI-level method, to build an algorithm to interpret the anomaly detection algorithm, and implemented it independently in Python, obtaining good results for the Isolation forest XAI method.

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