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Automation of the gamma-ray spectrometry setups using Kolmogorov-Arnold Networks (KAN)

In a variety of applications, such as medical diagnostics, nuclear safety, and environmental monitoring, γ-ray spectrometry is essential for the analysis of radioactive isotopes. The goal of this research is to create a γ-ray spectrometry system that is improved by Kolmogorov-Arnold Networks (KAN), a machine learning algorithm renowned for its effectiveness with complex data and universal approximation capabilities. Key radionuclides, such as primordial (^{40}K), anthropogenic (^{60}Co,^{137}Cs,^{152}Eu), and cosmogenic (^{22}Na) isotopes, can be identified and analyzed by the system. By utilizing KAN, the suggested model seeks to minimize classification errors and enhance the precision and effectiveness of γ-ray spectrum analysis by differentiating between isotopic signatures. The potential of KAN for advanced spectrometry applications is demonstrated by preliminary results that show encouraging improvements in identifying radionuclide activity and energy peaks. The methodology, system performance, and implications for automated radioactive monitoring in industrial and environmental settings will all be covered in this poster.

Keywords: γ-Ray Spectrometry, Kolmogorov-Arnold Networks, Radioactive Isotopes, Machine Learning, Environmental Monitoring

Primary author: MALULEKE, Vuako (University of venda)

Co-authors: Dr NKADIMENG, Edward (iThemba LABS); Dr NEMANGWELE, Fhulufhelo (University of venda); Dr NDABENI, Ntombizikhona Beaulah (iThemba LABS)

Presenter: MALULEKE, Vuako (University of venda)

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