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Convolutional Kolmogorov Arnold Networks as an accurate alternative to Convolutional Neural Networks for rule discovery in Game of Life

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The interpretability of artificial neural networks (ANNs) remains a challenge, particularly as they grow deeper and incorporate millions of parameters. Kolmogorov-Arnold Networks (KANs) address this issue by using fewer parameters than traditional ANNs and representing functions as symbolic formulas, while maintaining comparable performance.

John Conway's Game of Life (GoL) serves as an example of reverse-engineering the rules underlying simple natural processes. We trained several networks, including KANs, Convolutional KANs (CKANs), and traditional Convolutional Neural Networks (CNNs), on a dataset of GoL-generated images and compared the learned kernels with expected ones.

Our findings show that both CKANs and CNNs can recover the rules of simple processes like GoL while validating model performance against traditional CNNs.

Authors: MICHALSKI, Maciej (Student); Mr FERENC, Patryk (inżynier); Mr GÓRKA, Sebastian (inżynier)

Presenters: MICHALSKI, Maciej (Student); Mr FERENC, Patryk (inżynier); Mr GÓRKA, Sebastian (inżynier)

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