Błażej Miasojedow

Calculus of variation for Machine Learning Problems

This project focuses on advancing the mathematical understanding and improvement of algorithms used in artificial intelligence, in particular neural networks and Langevin Monte Carlo (LMC) methods. Neural networks, the foundation of modern machine learning, will be analysed using advanced mathematical tools such as the calculus of variations. This approach will provide insights into optimisation and techniques to avoid model overfitting. Research on Langevin Monte Carlo methods will aim to improve their performance in solving sampling problems in high-dimensional spaces, especially for complex and irregular functions.

The project will develop both theoretical foundations and practical algorithms, leading to improved efficiency in machine learning systems. The results are expected to have an impact on a wide range of fields, from data analysis and statistical modelling to bioinformatics and statistical physics. This research will contribute to a deeper understanding of modern artificial intelligence algorithms and the creation of novel mathematical and computational tools applicable to science and technology.