LS23-053 - Determinants of mRNA Lifetime and Translation Efficiency

Zusammenfassung

Human cells need to precisely regulate the amount of proteins produced from each gene. Many of the regulatory mechanisms are governed by specific properties of the messenger RNA (mRNA). However, only a few of these properties have been studied in detail. This project employs deep learning to identify new and relevant RNA features that impact translation and stability. Deep learning models will be trained to predict the lifetime of an mRNA and its protein expression from mRNA sequence and structure information. The models will then be analysed using techniques from the field of explainable AI to extract which mRNA features were crucial for the prediction. Novel features will be validated experimentally to uncover the underlying biological mechanisms. The project will deepen our understanding of gene regulation, with practical applications to the effect of mutations in diseases, such as cancer, and optimizing synthetic mRNAs for medical and biotechnological use.

Wissenschaftliche Disziplinen:
Bioinformatics (40%) | Machine learning (30%) | Molecular biology (30%)

Keywords:
Gene regulation, RNA structure, Informed Machine Learning

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Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter
https://wwtf.at/funding/programmes/ls/LS23-053/