Heidelberg University
Institute of Computer Science

Project report for the lecture Advanced Machine Learning

Prediction of the next SARS-CoV-2 variants

https://github.com/nilskre/AML-covid-project

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Member contributions

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List of Abbreviations

ReLU Rectifier Linear Unit

0 Project Setup

For a detailed description of how to set up the project, please have a look at `https://github.com/nilskre/bomberman_rl/blob/master/README.md`.

1 Introduction

2 Fundamentals and Related Work

2.1 From Language Models to modeling Evolution Theory

2.2 GISAID EpiFlu

2.3 Domain-Specific Methodologies to create Evolutionary Datasets for Mutation Prediction

2.4 Domain-Specific Methodologies to create Evolutionary Datasets for Mutation Prediction

2.5 Sequence2Sequence Models based on Long Short-Term Memory

- Covid-Paper: https://www.hindawi.com/journals/mpe/2021/9980347/
- LSTM: https://www.researchgate.net/publication/13853244_Long_Short-term_Memory
- Seq2Seq: https://arxiv.org/abs/1409.3215

2.6 Applying Generative Adversarial Networks

- Covid-Paper: https://arxiv.org/pdf/2008.11790.pdf

2.7 Transformer and Attention Mechanism

- Improvement: https://arxiv.org/abs/1706.03762

2.8 Other Techniques

- NNs/SVMs: https://bsb-eurasipjournals.springeropen.com/articles/10.1186/s13637-016-0042-0
- BiLSTM: https://science.sciencemag.org/content/371/6526/284

3 Approach

3.1 Dataset Creation

3.2 Data Preprocessing

3.3 Model Architecture

3.4 Training Process

4 Experimental results

5 Conclusion