Applications of Autonomous Machine Learning Algorithms for Automated Development of Online Assignments

Evelyn Fang[1] and Andrew Pownuk[2]

[1] Student, El Paso Community College
[2] Mentor, University of Texas at El Paso

Abstract

By using Turing complete computer languages (Java, C/C++, Python, etc.) it is possible to express a wide class of algorithms that cover much of the known scientific knowledge. In education it is necessary to study fundamental scientific principles and create online assignments that are related to various topics (computer programming, mathematics, engineering, etc.). With machine learning, new features of existing software can be predicted and a better version can be developed.

Introduction

To create online assignment in automated/autonomous way it is possible to use approximation properties of various machine learning methods and data generated by appropriate software. In some cases instead of predictions it is more convenient to use the Monte Carlo tree search. Large language models can produce code which can be used in the development of online assignments.

Predictions and Reasoning

Future Work

Some parts of the code and related web applications can be created in fully automated and autonomous way using approximation/prediction/classification, inference, and LLMs. It is necessary to constantly optimize the quality of the final code and integrate with new software, hardware, and scientific knowledge to find optimal tools for development of software used in science, engineering, and education.

Background

Online assignments can be related to wide range of topics which are present in academic textbooks. By using Turing complete programming languages (C/C++, Java, Python etc.) it is possible to describe wide class of algorithms related to computer science, mathematics, engineering, etc.. Online assignments are computer programs which are related to various scientific and engineering problems.

Autonomous Software

Publication

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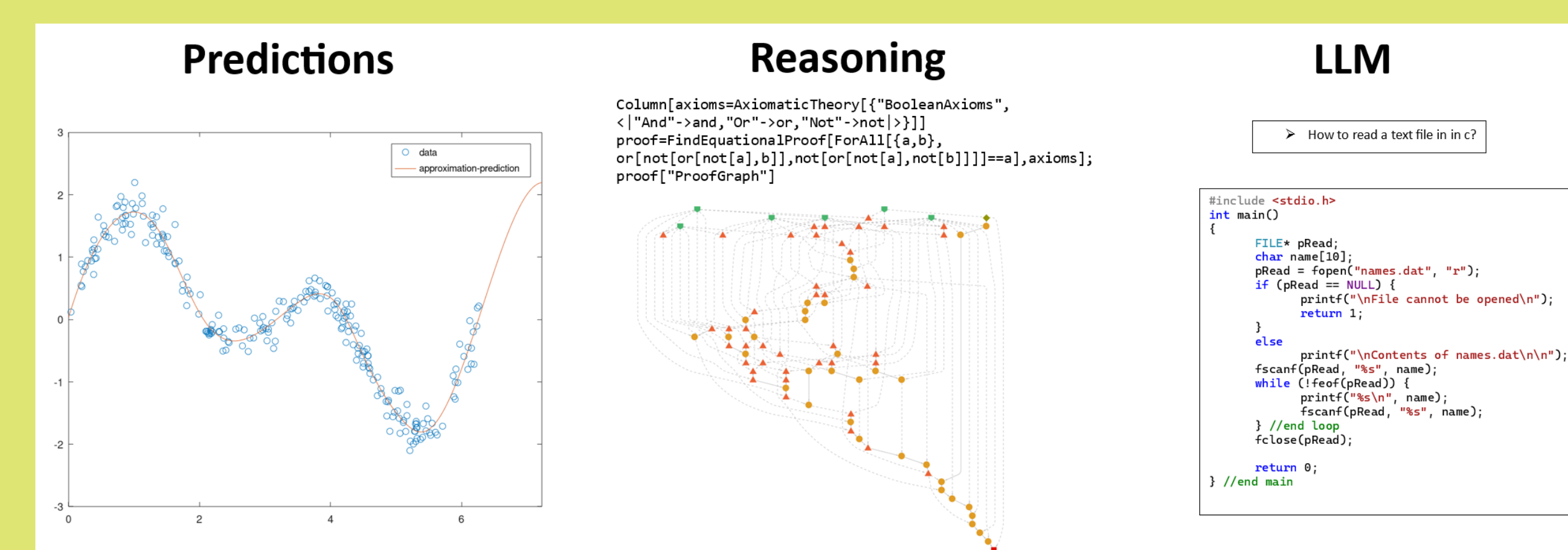
Methodology

- Applications of machine learning to predict future form of scientific theories and related code from data.
- Applications of automated reasoning for autonomous development of online web-applications.
- Applications of large language models to generate code and build library of common assignments.
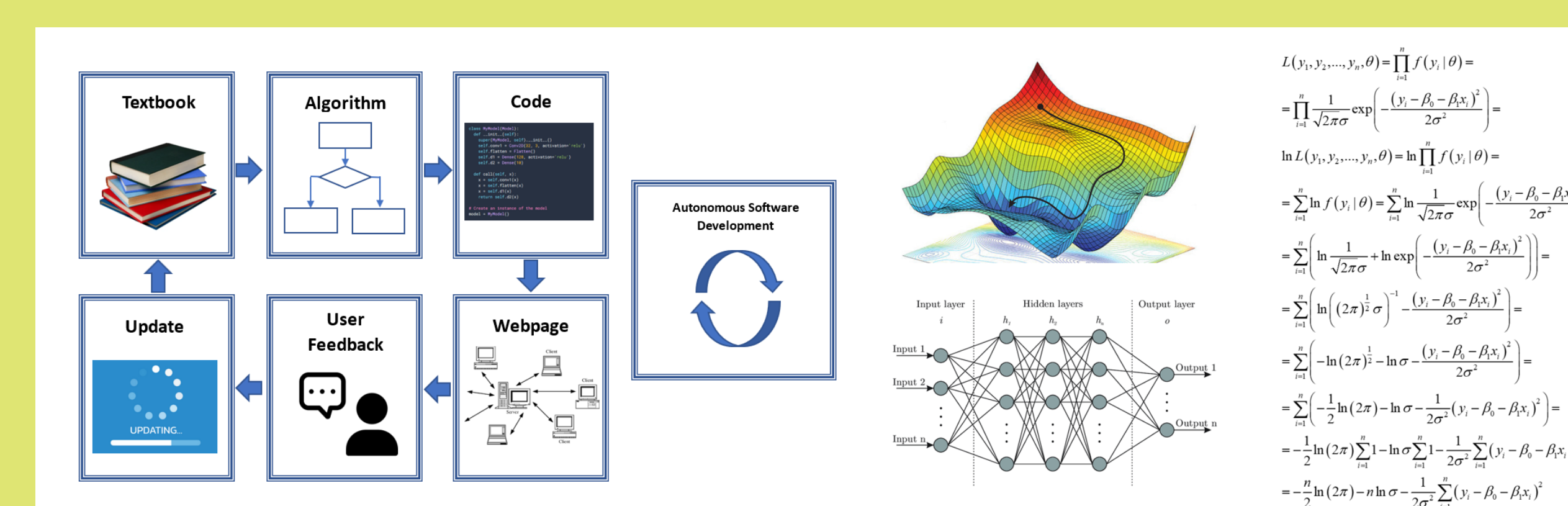
Conclusions

Based theoretical research, literature review, and computational experiments it is possible to efficiently approximate large class of assignments (scientific problems) based on available data and use model prediction to create online assignment in autonomous way (in part). In some experiments autonomous methods for code development were much faster than traditional methods of software development.

Acknowledgments

References

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