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AIMS: An Automatic Semantic Machine Learning Microservice Framework to Support Biomedical and Bioengineering Research

Hong Qing Yu [1,†,‡], Sam O'Neill [1,‡] and Ali Kermanizadeh [1,*]

[1] University of Derby; h.yu@derby.ac.uk
* Correspondence: h.yu@derby.ac.uk;
† Current address: Markeaton St, Derby, UK, DE22 3AW.
‡ These authors contributed equally to this work.

Abstract: The fusion of machine learning, biomedical, and bioengineering research offers novel ways to understand, diagnose, and treat various health conditions. However, the complexities of biomedical and bioengineering data, coupled with the intricate process of developing and deploying machine learning solutions, often pose significant challenges to researchers in these fields. We introduce a new Automatic Semantic Machine Learning Microservice Framework (AIMS) that addresses these challenges by automating key aspects of the machine learning pipeline, from data preprocessing to model evaluation. Our proposed framework emphasizes model interpretability, the integration of domain knowledge, and the efficient handling of biomedical data. Furthermore, it incorporates self-supervised knowledge learning strategies, enabling the automatic generation, optimization, and continuous adaptation of machine learning models in response to new tasks and data. We illustrate the potential of our framework through three case studies in biomedical research, showcasing its capacity to streamline research processes, improve scientific exploration quality, and provide a foundation for significant breakthroughs.

Keywords: AI automation; Biomedical; Machine learning; Microservices; Knowledge Graph; Semantic Web Services