**Drug Interaction Prediction**

**Abstract**

Drug interactions can result in adverse effects that compromise patient safety, making their prediction a critical task in healthcare. This paper presents a machine learning-based approach to predict drug-drug interactions (DDIs), leveraging various data sources such as drug properties, molecular structures, and existing drug interaction databases. Our proposed model integrates feature extraction techniques with advanced machine learning algorithms to identify potential interactions between drug pairs. We explore the use of multiple models, including random forests, support vector machines, and deep learning architectures, to optimize prediction accuracy. The model is trained on a curated dataset, incorporating both labeled interaction pairs and negative samples to ensure robustness. Preliminary results demonstrate that our model achieves high predictive performance, suggesting its potential utility in clinical decision support systems. This approach can significantly aid healthcare professionals in prescribing safer drug combinations and contribute to the development of personalized medicine. Future work will focus on refining the model’s accuracy, integrating real-world data, and exploring the applicability of this method in predicting interactions for newly developed drugs.