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IJBLS 2023; 2(2):311-311

International Journal of BioLife Sciences

Abstract

Machine Learning Approaches for Predicting Antimicrobial Resistance in Bacteria

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***Received**: 24 September 2023* ***Revised**: 3 October 2023* ***Accepted**: 8 October 2023*

Abstract

Background and aim: The emergence and spread of antimicrobial resistance (AMR) in bacterial pathogens represent a significant global health threat. Predicting AMR is essential for guiding effective treatment decisions and antibiotic stewardship. Traditional methods have limitations in predicting resistance patterns accurately. In recent years, machine learning (ML) approaches have shown promise in AMR prediction.

Methods: A systematic methodology is employed, incorporating key terms such as machine learning, predictive modeling, antimicrobial resistance, bacteria, and computational methods. Reputable databases like Google Scholar and PubMed are utilized for the literature search, encompassing articles published in English from inception until the present. Studies focusing on machine learning approaches for predicting antimicrobial resistance in bacteria, utilizing computational methods for predictive modeling, are included based on predetermined criteria. Exclusion criteria encompass non-English articles and those lacking sufficient information. The search strategy involves the combination of key terms using Boolean operators, and the article selection encompasses initial screening based on titles and abstracts, followed by a full-text review of selected articles for relevance.

Results: Machine Learning Approaches for Predicting Antimicrobial Resistance in Bacteria are of paramount importance in contemporary biomedical research and healthcare. As the global challenge of antimicrobial resistance continues to escalate, the ability to forecast bacterial resistance patterns becomes crucial for effective treatment strategies. Machine learning models, by leveraging complex datasets and patterns, offer a predictive framework that enhances our understanding of the evolving dynamics of antimicrobial resistance.

Conclusion: In conclusion, ML approaches have demonstrated significant potential in predicting antimicrobial resistance in bacteria. These models hold promise for improving antibiotic prescribing practices, reducing treatment failures, and combating the global threat of AMR. As ML continues to evolve, its integration with microbiology and clinical practice will be essential in addressing this critical healthcare challenge.

Keywords: *Machine learning, Antimicrobial resistance, Bacteria*

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