ABSTRAK

KLASIFIKASI GEN ESENSIAL PADA DNA DAN PROTEIN *DROSOPHILA MELANOGASTER* MENGGUNAKAN METODE CATBOOST

Oleh

RIKA NINGTIAS AZHARI

Gen esensial berperan penting dalam keberlangsungan hidup organisme, namun identifikasinya secara eksperimental membutuhkan biaya tinggi dan waktu yang lama. Oleh karena itu, pendekatan machine learning seperti CatBoost menjadi alternatif yang lebih efisien. Penelitian ini bertujuan untuk mengimplementasikan CatBoost dalam klasifikasi gen esensial berdasarkan sekuens DNA dan Protein pada *Drosophila melanogaster*, serta membandingkan performanya dengan metode lain seperti Random Forest dan XGBoost pada penelitian terdahulu. Penelitian ini menggunakan dataset Celullar Essential Gene (CEG) dan Organismal Essential Gene (OEG). Penelitian ini diharapkan dapat lebih akurat dan efisien, serta dapat memperluas penerapan machine learning dalam bidang bioinformatika.

Kata Kunci: Gen esensial, DNA, Protein, *Drosophila melanogaster*, CatBoost

ABSTRACT

CLASSIFICATION OF ESSENTIAL GENES IN DNA AND PROTEIN SEQUENCES OF *DROSOPHILA MELANOGASTER* USING THE CATBOOST METHOD

By

RIKA NINGTIAS AZHARI

Essential genes are fundamental to the survival of living organisms; however, their identification through experimental approaches is often time-consuming and costly. As a result, machine learning techniques such as CatBoost offer a more efficient and scalable alternative. This study aims to implement the CatBoost algorithm for the classification of essential genes based on DNA and protein sequences in *Drosophila melanogaster*. Furthermore, the performance of CatBoost is compared with other established methods, including Random Forest and XGBoost, as reported in previous studies. The research utilizes the Cellular Essential Genes (CEG) and Organismal Essential Genes (OEG) datasets. The results of this study are expected to yield improved accuracy and efficiency, thereby enhancing the application of machine learning in the field of bioinformatics.

Kata Kunci: Essential genes, DNA, protein, *Drosophila melanogaster*, CatBoost