UNVEILING THE DYNAMICS OF NO_2 POLLUTION: INSIGHTS FROM SENTINEL-5P TROPOMI MONITORING WITH KNN (K-Nearest Neighbour) AND SVM (Support Vector Machine) WITH RBF (Radial Basic Function) KERNEL ANALYSIS

THESIS REPORT

FEBI TAUFIK FATURRAHMAN

41518010032

Submitted as one of the requirements for obtaining a bachelor's degree

INFORMATICS ENGINEERING STUDY PROGRAM

FACULTY OF COMPUTER SCIENCE

UNIVERSITAS MERCU BUANA

JAKARTA

2024

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Judul Laporan Skripsi	: Unveiling the Dynamics of NO2 Pollution: Insights from Sentinel-5P TROPOMI Monitoring with KNN (K-Nearest Neighbor) and SVM with RBF kernel Analysis.

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Jakarta, 06 Februari 2024

Febi Taufik Faturrahman

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It has been successfully defended at a hearing before the Board of Examiners and accepted as part of the requirements required to obtain a bachelor's degree in Informatics Engineering, Faculty of Computer Science, Mercu Buana University.

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FOREWORD

Praise be to the presence of Almighty God, for all His grace and blessings so that the author can complete the final assignment which is one of the requirements for graduation from the Undergraduate Study Program (S1) in the Department of Informatics Engineering, Mercu Buana University.

The author realizes that this final assignment is still far from perfect, because true perfection belongs only to God Almighty. Therefore, the author always accepts constructive suggestions and input with pleasure. And thanks to the support, motivation, assistance, guidance and prayers from many parties, the author would like thank's to:

1. Mr. Prof. Dr. Andi Adriansyah, M.Eng. a Rector of Universitas Mercu Buana.
2. Mr. Dr. Bambang Jokonowo, S.Si., MTI as Dean of the Faculty of Computer Science.
3. Mr. Dr. Hadi Santoso, S.Kom., M.Kom. as Head of the Informatics Engineering Study Program Universitas Mercubuana.
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Finally, the author hopes that God Almighty will reward us with kindness and always shower grace, guidance and long life on all of us, amen. Thank You.

Jakarta, 06 Februari 2023

Febi Taufik Faturrahman

HALAMAN PERNYATAAN PERSETUJUAN PUBLIKASI TUGAS AKHIR UNTUK KEPENTINGAN AKADEMIS.

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Nama	: Febi Taufik Faturrahman
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Febi Taufik Faturrahman

ABSTRAK

Nama	: FEBI TAUFIK FATURRAHMAN
NIM	: 41518010032
Program Studi	: Teknik Informatika
Judul	: Mengungkap Dinamika Polusi NO2: Wawasan dari Pemantauan Sentinel-5P TROPOMI dengan KNN (K-Nearest Neighbour) dan SVM (Support Vector Machine) dengan Analisis kernel RBF (Radial Basic Function)
Advisor	: Dr. Hadi Santoso, S.Kom., M.Kom.

Jurnal ini mengungkap dinamika pencemaran NO2 di Jakarta melalui pemantauan menggunakan teknologi Sentinel-5P TROPOMI dan analisis algoritma KNN dan SVM dengan kernel RBF. Dalam evaluasi data pada bulan Juli hingga September 2019, baik model SVM maupun KNN secara konsisten memberikan hasil yang dapat diandalkan. SVM mencapai Kappa 0,93, akurasi 0,96, dan F1-Score 0,61, menjaga ketahanan selama periode Februari hingga Juli 2023. KNN menunjukkan kinerja luar biasa pada Juli-September 2019, dengan peningkatan akurasi dan presisi pada Februari-Juli. Studi ini menekankan peran penting teknologi pemantauan satelit dan algoritma pembelajaran mesin dalam memahami dan mengatasi masalah polusi udara perkotaan. Temuan ini memberikan kontribusi wawasan berharga bagi komunitas ilmiah dan mengadvokasi penerapan teknologi tersebut untuk meningkatkan pemantauan lingkungan dan strategi pengelolaan di wilayah perkotaan.

Keywords: *KNN, SVM, RBF, Polusi, Jakarta, Remote Sensing, GEE*

ABSTRACT

Name	: FEBI TAUFIK FATURRAHMAN
NIM	: 41518010032
Study Program	: Informatics Engineering
Title	: Unveiling the Dynamics of NO_2 Pollution: Insights from Sentinel-5P TROPOMI Monitoring with KNN (K-Nearest Neighbour) and SVM (Support Vector Machine) with RBF (Radial Basic Function) kernel Analysis
Advisor	: Mr. Dr. Hadi Santoso, S.Kom., M.Kom.

This journal unveils the dynamics of NO2 pollution in Jakarta through monitoring using Sentinel-5P TROPOMI technology and analysis of KNN and SVM algorithms with RBF kernel. In the evaluation of data from July to September 2019, both SVM and KNN models consistently provided reliable results. SVM achieved a Kappa of 0.93, accuracy of 0.96, and an F1-Score of 0.61, maintaining resilience during the period of February to July 2023. KNN demonstrated remarkable performance in July-September 2019, with increased accuracy and precision in February-July. The study emphasizes the crucial role of satellite monitoring technology and machine learning algorithms in understanding and addressing urban air pollution issues. The findings contribute valuable insights to the scientific community and advocate for the adoption of such technologies to enhance environmental monitoring and management strategies in urban areas.

Keywords: *KNN, SVM, RBF, Pollution, Jakarta, Remote Sensing, GEE*

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