

**LSTM AND CNN-BASED DETECTION OF AI-GENERATED
CLASSICAL MUSIC FROM MIDI FEATURES**



PUBLICATION THESIS

**MAECYNTHA IRELYNN TANTRA
00000055038**

**INFORMATICS STUDY PROGRAM
FACULTY OF ENGINEERING AND INFORMATICS
UNIVERSITAS MULTIMEDIA NUSANTARA
TANGERANG
2025**

**LSTM AND CNN-BASED DETECTION OF AI-GENERATED
CLASSICAL MUSIC FROM MIDI FEATURES**



PUBLICATION THESIS

Submitted to fulfill one of the requirements
to obtain the title of
Bachelor of Computer Science

**MAECYNTHA IRELYNN TANTRA
00000055038**

**INFORMATICS STUDY PROGRAM
FACULTY OF ENGINEERING AND INFORMATICS
UNIVERSITAS MULTIMEDIA NUSANTARA
TANGERANG
2025**

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Student ID : 00000055038
Study Program : Informatics

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Full Name : Maecyntha Irelynn Tantra
Student ID : 00000055038
Study Program : Informatics
Faculty : Engineering and Informatics

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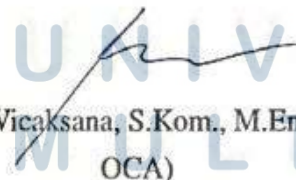


(Yustinus Widya Wiratama, S.Kom., M.Sc.)

NIDN: 0305128901

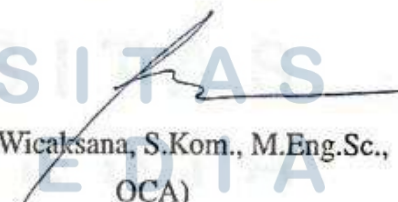
Supervisor / Mentor

Head of Informatics,



(Arya Wicaksana, S.Kom., M.Eng.Sc.,
OCA)

NIDN: 0315109103



(Arya Wicaksana, S.Kom., M.Eng.Sc.,
OCA)

NIDN: 0315109103

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I hereby,

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PREFACE

All praise and gratitude to God Almighty for His blessings and grace, which have enabled the completion of this thesis report titled: LSTM and CNN-Based Detection of AI-Generated Classical Music from MIDI Features. This thesis is submitted as one of the requirements to obtain a Bachelor of Computer Science degree in the Informatics Program at the Faculty of Engineering and Informatics, Universitas Multimedia Nusantara. I realize that without the help and guidance from various parties throughout my studies and during the writing of this thesis, it would have been very difficult for me to complete it. Therefore, I would like to express my sincere gratitude to:

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4. My family, who has provided both material and moral support, enabling the completion of this thesis.
5. Friends and peers throughout this journey who have consistently provided encouragement, support, and motivation throughout the process of completing this thesis.

Hopefully this scientific work contributes as a source of information and inspiration for others.

Tangerang, July 2, 2025



Maecyntha Irelynn Tantra

DETEKSI MUSIK KLASIK BUATAN AI BERDASARKAN FITUR MIDI MENGUNAKAN LSTM DAN CNN

Maecyntha Irelynn Tantra

ABSTRAK

Seiring dengan meningkatnya kemampuan kecerdasan buatan (AI) dalam menyusun komposisi yang menyerupai karya manusia, mendeteksi musik klasik yang dihasilkan oleh AI menjadi tantangan yang semakin besar. Penelitian ini mengeksplorasi penggunaan metode *deep learning* LSTM dan CNN untuk mengklasifikasikan apakah suatu komposisi musik klasik dibuat oleh AI atau manusia. Klasifikasi dilakukan dengan mempertimbangkan fitur sekuensial yang diekstraksi dari *file* MIDI, yang meliputi data statistik dari *pitch*, *velocity*, dan *duration* pada setiap segmen. Model dilatih menggunakan dataset yang terdiri dari komposisi buatan AI dan komposisi manusia, lalu model tersebut disempurnakan lebih lanjut melalui proses *fine-tuning* untuk mengoptimalkan performa model. Hasil penelitian menunjukkan bahwa model LSTM yang diusulkan mencapai akurasi sebesar 99,00% pada data uji utama, dan 98,70% pada dataset tambahan yang digunakan untuk menguji generalisasi model setelah pelatihan selesai. Sementara itu, model berbasis CNN memperoleh akurasi masing-masing sebesar 97,00% dan 97,10% pada dataset utama dan tambahan. Hasil *confusion matrix* dan laporan klasifikasi menunjukkan efektivitas kedua model dengan tingkat kesalahan klasifikasi yang rendah. Penelitian ini menunjukkan bahwa meskipun LSTM dan CNN sama-sama mencapai performa klasifikasi yang tinggi dalam mendeteksi musik klasik buatan AI, model LSTM memberikan hasil yang lebih unggul. Sejalan dengan studi ini, penelitian selanjutnya dapat mengeksplorasi deteksi dengan penambahan fitur musikal lainnya dan penggunaan dataset yang lebih beragam, sehingga meningkatkan kemampuan model dalam menghadapi variasi musik yang lebih luas.

Kata kunci: Bach, CNN, deteksi, LSTM, MIDI, musik *AI-generated*, musik klasik

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LSTM AND CNN-BASED DETECTION OF AI-GENERATED CLASSICAL MUSIC FROM MIDI FEATURES

Maecyntha Irelynn Tantra

ABSTRACT

Detecting AI-generated classical music is a growing challenge as artificial intelligence continues to improve its ability to compose pieces that closely resemble human compositions. This study explores the use of deep learning methods like LSTM and CNN to classify whether a set of classical music is generated by AI or humans. The classification is based on sequential features extracted from MIDI files using beat-based segmentation, capturing statistical data of pitch, velocity, and duration over segments. The model was trained on a dataset comprising both AI-generated and human compositions, incorporating fine-tuning for optimal performance. Experimental results demonstrate that the proposed LSTM-based model achieves 99.00% accuracy on the primary test set, with an additional evaluation on an auxiliary dataset yielding 98.70% accuracy, confirming its reliability and strong generalization ability. Meanwhile, the CNN-based model attains accuracy scores of 97.00% and 97.10% on the primary and auxiliary datasets, respectively. Evaluation using confusion matrices and classification reports further validate both models' effectiveness, showing minimal misclassification rates. These findings suggest that while both LSTM and CNN achieve high classification performance in detecting AI-generated classical music, LSTM outperforms CNN in classification accuracy. Future research could explore integrating additional musical features or testing the model by expanding the dataset to cover a broader range of compositions, further improving model robustness and applicability.

Keywords: *AI-generated music, Bach, classical music, CNN, detection, LSTM, MIDI*

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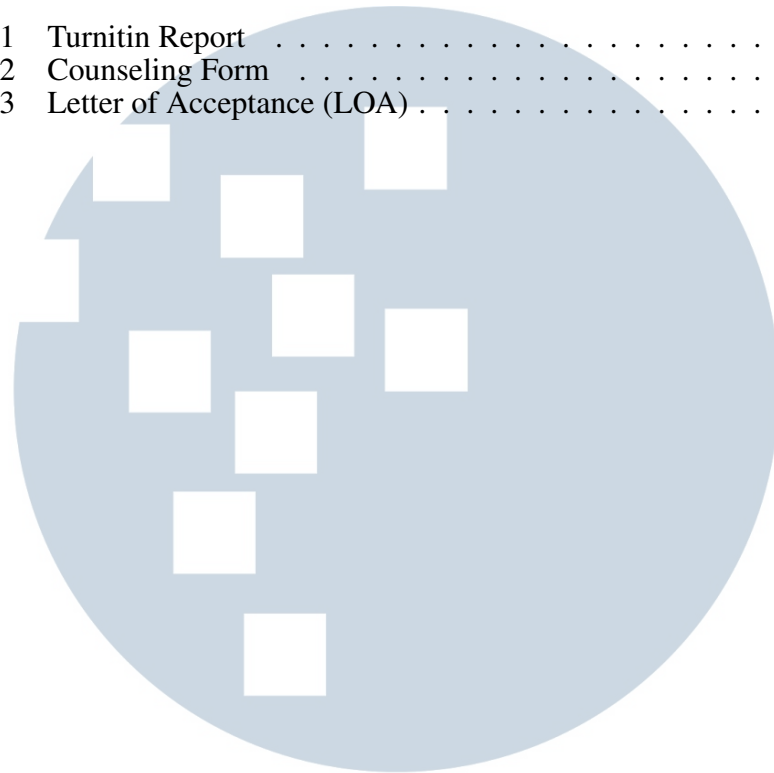
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