UNDERGRADUATE THESIS

Implementation of Content-Based Filtering and HDBSCAN for Developer Recommendation in a Task Management Application (Case Study: PT Tunas Kreasi Digital)

MUHAMMAD FAIRUS RAMADHANI

NPM 21081010090

THESIS ADVISOR

Eva Yulia Puspaningrum, S.Kom, M.Kom
Fetty Tri Anggraeny, S.Kom, M.Kom

MINISTRY OF HIGHER EDUCATION, SCIENCE, AND TECHNOLOGY
UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAWA TIMUR
FACULTY OF COMPUTER SCIENCE
INFORMATICS STUDY PROGRAM
SURABAYA

2026

APPROVAL SHEET

Implementation of Content-Based Filtering and HDBSCAN for Developer Recommendation in a Task Management Application (Case Study: PT Tunas Kreasi Digital)

By :
Muhammad Fairus Ramadhani
NPM. 21081010090

Has been defended before, and accepted by, the Board of Assessors of the Thesis Examination of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, on Maret 13 2026

Approved

Eva Yulia Puspaningrum, S.Kom., M.Kom NIP. 19890705 2021212 002	.....	(Advisor I)
Fetty Tri Anggraeny, S.Kom. M. Kom NIP. 19820211 2021212 005	.....	(Advisor II)
Retno Mumpuni, S.Kom., M.Sc NIP. 19870716 2025 21 2045	.....	(Head Assessor)
Henni Endah Wahanani, ST, M.Kom NIP. 19780922 2021212 005	.....	(Assessor 1)

Akcnowledge by,
Dean of the Faculty of Computer Science

Prof. Dr. Ir. Novirina Hendrasarie, MT
NIP. 19681126 199403 2 001

APPROVAL SHEET

Implementation of Content-Based Filtering and HDBSCAN for Developer Recommendation in a Task Management Application (Case Study: PT Tunas Kreasi Digital)

By :
Muhammad Fairus Ramadhani
NPM. 21081010090

Approved to proceed to the Thesis Examination

Approved by,
Coordinator of Informatics Study Program
Faculty of Computer Science

Fetty Tri Anggraeny, S.Kom., M.Kom
NIP. 19820211 2021212 005

STATEMENT OF ORIGINALITY

I am the undersigned:

Student Name	:	Muhammad Fairus Ramadhani
NPM	:	21081010090
Degree Program	:	Bachelor (S1)
Study Program	:	Informatics
Faculty	:	Faculty of Computer Science

Hereby declares that this undergraduate thesis contains no part of any other scientific work that has been submitted to obtain an academic degree at any higher education institution. Furthermore, it does not contain any work or opinions previously written or published by others, except for those which are explicitly cited in this thesis and listed completely in references

And I declare that this scientific document is free from elements of plagiarism. If in the future indications of plagiarism are found in this Thesis, I am willing to accept sanctions in accordance with the applicable laws and regulations.

Thus, I made this statement without any coercion from anyone and to be used as it should.

Surabaya, May 13 2026
Declarant

Muhammad Fairus Ramadhani
NPM. 21081010090

ABSTRACT

Student Name / NPM	:	Muhammad Fairus Ramadhani / 21081010090
Thesis Title	:	Implementation of Content-Based Filtering and HDBSCAN for Developer Recommendation in a Task Management Application (Case Study: PT. Tunas Kreasi Digital)
Advisor	:	1. Eva Yulia Puspaningrum, S.Kom, M.Kom 2. Fetty Tri Anggraeny, S.Kom, M.Kom.

The process of assigning developers in software development is generally still performed manually, making it prone to subjective bias and inefficiency. This study implements a developer recommendation system based on Content-Based Filtering (CBF) combined with the HDBSCAN (Hierarchical Density-Based Spatial Clustering of Applications with Noise) algorithm in a web-based task management application at PT. Tunas Kreasi Digital. The data used were obtained from GitHub commit logs and the company's daily logs for the 2024–2025 period.The system works by clustering historical tasks using HDBSCAN based on the similarity of task description content, then applying Content-Based Filtering to recommend developers who previously handled tasks within clusters relevant to new tasks. The optimal HDBSCAN configuration was achieved with min_cluster_size = 2 and min_samples = 2, resulting in a Silhouette Score of 0.559 and the lowest noise percentage of 18.71%. Under this configuration, the system achieved a Hit Ratio of 0.88, Recall of 0.80, and Mean Reciprocal Rank (MRR) of 0.563.Testing on cosine similarity thresholds showed that using the entire historical dataset without filtering (4,505 records) produced the highest Hit Ratio and Recall values. Compared to the pure CBF method, the hybrid CBF+HDBSCAN approach outperformed almost all evaluation metrics, demonstrating that clustering developer expertise patterns can significantly improve recommendation accuracy. This system is considered feasible to implement as a decision-support tool for developer assignment in software projects.

Keywords: recommendation system, Content-Based Filtering, HDBSCAN, task management, developer, clustering

ACKNOWLEDGEMENT

All praise is devoted to Allah SWT for His blessings, guidance, and grace bestowed upon the author, so that the thesis entitled “Implementation of Content-Based Filtering and HDBSCAN for Developer Recommendation in a Task Management Application (Case Study: PT. Tunas Kreasi Digital)” could be completed successfully.

The preparation of this thesis is submitted as one of the requirements for obtaining a Bachelor’s degree in the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur. The author would like to express sincere appreciation to all parties who have provided support and contributions throughout the research process by dedicating their time, effort, and thoughts in guiding and motivating the author in completing this thesis. The author realizes that the completion of this thesis would not have been possible without the assistance, guidance, and encouragement, both morally, spiritually, and materially, from various parties. Therefore, the author would like to express sincere gratitude to:

1. Prof. Dr. Ir. Novirina Hendrasarie, MT., as the Dean of the Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur.
2. Fetty Tri Anggraeny, S.Kom., M.Kom., as the Head of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur and Second Supervisor, who has guided the author throughout the completion of this research.
3. Eva Yulia Puspaningrum, S.Kom., M.Kom., as the First Supervisor, who has guided the author throughout the completion of this research.
4. Retno Mumpuni, S.Kom., M.Sc., as the First Examiner, who has provided valuable insights and new perspectives for this research.
5. Henni Endah Wahanani, ST., M.Kom., as the Second Examiner, who has provided valuable insights and new perspectives for this research
6. Firza Prima Aditiawan, S.Kom., MTI., as the Academic Advisor, who has guided the author throughout the academic period and the completion of this research.

7. The lecturers and staff of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, for all the assistance provided in facilitating the completion of this research.
8. The author's father, mother, siblings, and relatives, who have continuously prayed for, encouraged, and provided material support to the author throughout the study period.
9. Friends who have provided support throughout the academic journey and the preparation of this research.

The author realizes that there are many shortcomings in the preparation of this thesis. Therefore, constructive criticism and suggestions from all parties are highly expected for the improvement and refinement of this thesis. Finally, despite the limitations possessed by the author, it is hoped that this thesis will be beneficial to all parties in general and to the author in particular.

Surabaya, May 13 2026

Author,

Muhammad Fairus Ramadhani

NPM. 21081010090

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE