THESIS WRITING GUIDELINES 2026

MASTER'S PROGRAM IN

INFORMATION TECHNOLOGY

FACULTY OF COMPUTER SCIENCE

UPN "Veteran" Jawa Timur

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PREFACE

We praise and thank Allah SWT for His grace and guidance, through which the Thesis Writing Guidelines for the Master of Information Technology (MTI) Program, Faculty of Computer Science, UPN "Veteran" Jawa Timur, have been prepared. These guidelines are intended to assist MTI students in writing their theses while observing applicable publication requirements. They are intended to make publication writing an integral and primary part of the thesis. With these guidelines, students are expected to complete their thesis writing more efficiently and effectively.

We extend our appreciation to the drafting team for their hard and thoughtful work in completing these guidelines. We recognize that the guidelines may still have shortcomings and may need to be revised in the future to accommodate emerging developments and needs. We hope that these guidelines will be useful and contribute to improving the quality of the MTI Master's Program outputs.

Program Coordinator

Dr. Eng. Agussalim, S.Pd., MT.

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CHAPTER I
INTRODUCTION

The Master of Information Technology (MTI) Program, Faculty of Computer Science, UPN "Veteran" Jawa Timur, provides research-based master's education to produce graduates who can responsibly develop, evaluate, and apply Information Technology solutions. These guidelines support thesis quality in the areas of Intelligent Systems and Artificial Intelligence, Networks and Cybersecurity, and IT Strategy and Infrastructure Management.

Thesis preparation is a research-based learning process that equips MTI students with the ability to:

1) Demonstrate a scientific attitude, academic integrity, and professional responsibility in the development and use of Information Technology;
2) Master relevant research methodologies and engineering/analytical approaches to obtain, process, analyze, and validate data or IT artefacts;
3) Expand and deepen knowledge through state-of-the-art review, identification of research gaps, and formulation of scientific contributions in Information Technology;
4) Design, develop, or evaluate IT models, methods, systems, architectures, policies, or prototypes to solve relevant and measurable problems;
5) Communicate ideas, methods, validation results, and research contributions orally in scholarly forums and in writing through scientific articles/proceedings in accordance with applicable requirements.

A thesis is a master's-level scholarly work that MTI students are required to prepare as evidence of their mastery of research methodology and their ability to produce accountable contributions in Information Technology. Contributions may take the form of knowledge, models/methods, software or hardware artefacts, architectures, empirical evaluations, or validated strategic recommendations.

Thesis writing must follow scholarly conventions, including problem formulation, citation and referencing, source-data management, experiment

documentation, and traceable reporting of results. Authors must avoid plagiarism, fabrication, falsification, breaches of data confidentiality, and the use of AI tools without appropriate disclosure.

These guidelines are prepared to:

1) Standardize the substance and format of thesis writing in the Master of Information Technology Program at UPN "Veteran" Jawa Timur;
2) Provide guidance for students in planning, conducting, documenting, and publishing thesis research;
3) Provide guidance for the supervisory committee in directing the scientific quality, ethics, traceability of data/artefacts, and presentation of student theses.

The supervisory committee holds academic responsibility for its supervisees' theses, including the appropriateness of the problem, novelty/contribution, methodology, validation of results, integrity of data and research artefacts, and compliance with the required writing format.

CHAPTER II
RESEARCH PROPOSAL SEMINAR

2.1 Research Proposal

a) At the end of the master's program, students are required to complete a thesis;
b) Students may submit a thesis research proposal after completing two (2) semesters, with a minimum Grade Point Average (GPA) of 3.00 (three point zero zero) and at least 21 (twenty-one) completed credit units;
c) The thesis research proposal must be submitted no later than the curriculum milestones and period of study determined by the University;
d) The thesis research topic must align with the research road map of the Program/lecturers, partner or industry needs, and developments in Information Technology. The topic must have a clearly defined problem, a measurable scope, and potential for a scientific contribution or innovation.

2.2 Thesis Supervisors

a) The thesis supervisory committee consists of two (2) members: one main/first supervisor and one co-supervisor/second supervisor.
b) Requirements for the Main Supervisor are:
    1) A full-time lecturer at UPN "Veteran" Jawa Timur;
    2) Holds a doctoral degree and has an academic rank of at least Lektor (Lecturer);
    3) Has expertise relevant to the thesis topic, including intelligent systems and data, software engineering/information systems, networks and cybersecurity, IoT/infrastructure, or IT strategy and governance;
    4) Under special circumstances, the Dean may establish a policy allowing a doctoral degree holder with the academic rank of Asisten Ahli (Assistant Lecturer) to serve as Main Supervisor;
    5) Under special circumstances, the Dean may establish a policy allowing a supervisor approaching retirement age who is still supervising a thesis to complete duties as Main Supervisor.
c) Requirements for the Co-supervisor are:

1) A full-time or part-time lecturer at UPN "Veteran" Jawa Timur;
2) Holds a doctoral degree and has an academic rank of at least Lektor (Lecturer);
3) Under special circumstances, the Dean may establish a policy allowing a Co-supervisor who holds at least a doctoral degree with the rank of Asisten Ahli (Assistant Lecturer), or a master's degree with the minimum rank of Lektor (Lecturer), or an appropriately qualified practitioner in the required field of expertise.

b) The appointment of thesis supervisors as referred to in paragraph (1) shall take into account the number of students currently being supervised;
c) Each supervisor may not supervise more than five (5) students while the students under that supervisor have not yet completed their studies;
d) The composition of the supervisory committee may be proposed by the student with the approval of the Program Coordinator and shall subsequently be formalized by a Dean's Decree;
e) Where necessary, a co-supervisor may be drawn from an institution or organization outside the Faculty or University;
f) If all eligible Program lecturers are already supervising the maximum of five (5) students as referred to in paragraph (3), the Program Coordinator may determine an appropriate thesis supervisor for the student.

2.3 Authority and Duties of Supervisors

a) The authority of the thesis supervisory committee is to:
   1) Approve or reject a research proposal;
   2) Approve or reject a thesis.
b) The duties of the thesis supervisory committee are to:
   1) Supervise students regularly and continuously in preparing proposals, designing methods, conducting research/experiments, performing validation, and writing the thesis;
   2) Evaluate research progress, the feasibility of data and artefacts, the appropriateness of experimental/validation designs, and the quality of

student thesis writing, and report the results to the Program Coordinator;

3) Issue warnings when students neglect the completion of their thesis;
4) Guide students in preparing and publishing scientific articles that form an integral part of the thesis, in accordance with Program requirements.

2.4 Change of Supervisors

a) If the main supervisor or co-supervisor is permanently unable to continue, the Dean, upon the proposal of the Program Coordinator, shall appoint a replacement supervisor;
b) A change in the supervisory committee may also be proposed when obstacles arise between the main supervisor and co-supervisor, or between a supervisor and the student;
c) A replacement supervisor as referred to in point (a) must consider and prioritize the continuity of the proposal approved by the Program Coordinator;
d) Any change to the composition of the supervisory committee must be based on the approval of the previous supervisory committee and the Program Coordinator, and be determined by the Dean;
e) If the previous supervisor does not agree, the Program shall propose a replacement candidate based on the results of a Program meeting and the candidate shall be determined by the Dean;
f) The approval of the previous supervisory committee as referred to in paragraph (4) is not required if the person concerned has died.

2.5 Research Proposal Seminar

a) A thesis research proposal approved by the supervisory committee shall be presented in a research proposal seminar. The proposal manuscript shall at least include the IT problem and context, a state-of-the-art review, the research gap, research objectives/questions, the targeted contribution, methodology, data or artefact design, evaluation plan, and research

schedule.

b) Where revisions and improvements to the research proposal are required, students must submit the revised proposal to the Program no later than one (1) month after the seminar and before commencing the research;
c) A research proposal declared unacceptable may be repeated once (1), no later than three (3) months after the research proposal seminar;
d) Students who will present at a research proposal seminar must:
    a. Have completed at least 21 (twenty-one) credit units with a minimum GPA of 3.00 (three point zero zero);
    b. Fulfil the prescribed administrative requirements, including the TOEFL score;
    c. Submit a research proposal manuscript approved by the supervisory committee, including the evaluation design, success metrics, and a data/artefact management plan where relevant;
    d. Attend at least five (5) colloquia and/or research results seminars in the relevant Program or another Program, with a seminar attendance card.

CHAPTER III
THESIS REQUIREMENTS

3.1 Thesis Writing

a) During the thesis research process, students are required to:
   1) Conduct thesis research in accordance with the approved proposal; any substantial change to the problem, data, method, or evaluation must receive the approval of the supervisory committee;
   2) Participate actively and regularly in supervision and document research progress, design decisions, experimental results, and manuscript revisions in the Supervision Evidence Form (LBB);
b) Submit a thesis approved by the supervisory committee to the Program for examination, accompanied by relevant supporting artefacts such as curated datasets, source code, experimental configurations, prototypes, or system documentation;

3.2 Thesis Format

a) The thesis shall follow scholarly writing conventions and contain evidence-based arguments, documentation of methods and evaluation, and discussion demonstrating a contribution in Information Technology;
b) The thesis shall be written in proper Indonesian, with abstracts in Indonesian and English;
c) In certain circumstances, a thesis may be written in English or another foreign language as determined by the University;
d) The thesis format shall follow the Thesis Writing Guidelines prescribed by the Program and the University.

3.3 Research Results Seminar

a) The research results seminar shall present the problem, method, implementation/artefact, data or test scenarios, evaluation results, comparison with a baseline or related research, limitations, and research contribution. Attendance requirements shall follow the provisions of the Program;
b) If the requirements for the research results seminar referred to in point (a) are not met, the seminar shall be declared cancelled and rescheduled;

c) Students who do not pass the research results seminar must repeat the seminar no later than three (3) months after the first research results seminar.

3.4 Thesis Examination

a) The thesis examination shall be conducted before the end of the study period in accordance with University regulations. It shall be held as a panel examination in a closed session attended by the examination panel;

b) Requirements for the thesis examination are:
   1) Complete courses with the number of credits required by the Program curriculum;
   2) Be registered as an active student in the relevant semester;
   3) Register for the Thesis course;
   4) Have English-language proficiency equivalent to a minimum TOEFL score of 475;
   5) Have a thesis approved by the thesis supervisory committee and acknowledged by the Program Coordinator;
   6) Have a minimum Cumulative Grade Point Average (GPA) of 3.00 (three point zero zero);
   7) Fulfil the administrative requirements determined by the Program and Faculty;
   8) The thesis report must include an officially issued similarity-check result from the UPN "Veteran" Jawa Timur Library and meet the threshold determined by the University/Program;
   9) Submit evidence of a scientific article accepted or published in a journal/proceeding recognized by the Program. The article must form an integral part of the thesis and reflect the research contribution in Information Technology;

c) The article title need not be identical to the thesis title, but its problem, method, data/artefacts, and results must be traceable as part of the thesis;

d) Academic recognition, adjustments to examination procedures, or grade determination for reputable publications shall be implemented in accordance with applicable University regulations and Program decisions;

3.5 Thesis Examination Panel:

a) The panel consists of one (1) Chair and three (3) members, comprising the

supervisory committee and examiners;

b) The examination Chair referred to in point 1 shall not be a member of the supervisory committee;

c) The examination panel shall be determined by the Dean upon the proposal of the Program Coordinator.

d) The thesis examination shall be conducted as a panel examination and attended by at least the Chair and two (2) examiners;

e) If the minimum number referred to in point (d) is not met, the Program Coordinator may appoint a replacement examiner;

f) If the requirements for the thesis examination referred to in point (d) are not met, the thesis examination must be rescheduled;

3.6 Thesis Examination Assessment

a) The assessment criteria shall at least include the appropriateness of the problem and state-of-the-art review, novelty/contribution, appropriateness of the method, quality of implementation or artefact, validation and reproducibility of results, depth of discussion, organization/language, presentation, and mastery of the material;

b) The thesis shall be assessed through the thesis examination, with the following outcomes:

   1) Pass without revisions;

   2) Pass with revisions;

   3) Fail and be given an opportunity to repeat;

c) The minimum passing grade is B.

3.7 Thesis Revisions and Re-examination

a) A student declared to have passed with revisions as referred to in Section 3.6 point b number 2 (two) shall be given an opportunity to complete the revisions no later than one (1) month from the date of passing the thesis examination;

b) A student declared to have failed the thesis examination as referred to in Section 3.6 point b number 3 (three) shall be given one (1) opportunity to repeat the examination no later than three (3) months from the thesis examination date;

c) A student who has not or cannot fulfil the provisions of paragraph (10), points a and b, shall have the thesis manuscript declared void;

d) A student declared to have passed, passed with revisions, or passed after a re-examination must submit the revised thesis manuscript in accordance with the applicable Faculty/Program provisions;
e) A student declared to have failed the re-examination as referred to in point c shall be declared to have failed the program.

CHAPTER IV
MANUSCRIPT WRITING GUIDELINES

4.1 Materials, Typeface, and Manuscript Size

The thesis manuscript uses A4 paper (21 x 29.7 cm). If a printed copy is required, use HVS paper of at least 70 gsm; the final manuscript must also be submitted digitally in accordance with Program requirements. Times New Roman is used throughout: 14 pt bold for chapter titles, 13 pt bold for subheadings and lower-level subheadings, and 12 pt for body text. The thesis hard cover is orange and bears the author's name and thesis title on the spine.

4.2 Margins

The typing area is set 4 cm from the left edge, 3 cm from the top edge, 3 cm from the bottom edge, and 3 cm from the right edge. Page numbers are printed at the upper right outside the text area. Page numbers are not printed on the first page of each chapter, but are included in the page numbering sequence.

4.3 Line Spacing

Use 1.5 line spacing for body text, the table of contents, lists of tables, lists of figures, and lists of appendices. Use single spacing for abstracts, direct quotations, titles, and the reference list.

4.4 Writing Chapter Titles, Subheadings, Lower-Level Subheadings, and Subsequent Levels

A chapter title is used as the chapter heading and begins on a new page. The word CHAPTER and the chapter number (for example, CHAPTER III) are written in bold capital letters, centered at the top margin. The chapter title text is written in bold capital letters, centered one single-spaced line below the word CHAPTER. The first sentence after the title begins as a new paragraph, two spaces below the last line of the title. Both the chapter label and title use 14 pt bold Times New Roman.

A subheading (for example, 1.2 Problem Formulation) is aligned with the left

margin, two spaces below the preceding line (single-spaced), and written in title case, except for conjunctions and prepositions; all words are bold. A subheading does not end with a period. Use 13 pt Times New Roman. The first sentence after a subheading begins as a new paragraph (10 character spaces), with no additional space below the subheading.

A lower-level subheading (for example, 3.2.1 Experimental Design) begins at the left margin, two spaces below the preceding line (single-spaced), uses an initial capital letter for the first word, and is bold without a final period. Use 13 pt Times New Roman. The first sentence after a lower-level subheading begins as a new paragraph (10 character spaces), with no additional space below the lower-level subheading. Subsequent numbering follows the same pattern.

4.5 Page Numbering

The preliminary section of the thesis, from the preface through the lists of tables/figures, uses lowercase Roman numerals (i, ii, iii, iv, v, vi, etc.). Chapter I, Introduction, through the Appendices uses Arabic numerals (1, 2, 3, 4, etc.). Page numbers are placed in the upper right corner of the page.

4.6 Writing Tables, Figures, and Equations

4.6.1 Tables

Table titles use 12 pt Times New Roman with single spacing and begin with the word Table followed by an Arabic number in the order of appearance. Numbering runs consecutively from Table 1 to the last table according to the total number of tables (for example, Table 4), followed by the table title.

Use concise, informative, and consistent table titles. Capitalize the first letter of the first word of the title and do not end the title with a period. Place the title above the table. Units, metrics, or test conditions need not be included in the title if they can be clearly explained in the column headings or table notes. The word "Table" and its number are bold. If a table continues onto the next page, repeat the column headings. Example: Table 6. Model evaluation results on test data.

Give each column a clear and consistent heading; state units or metrics in the

column heading, for example, Latency (ms), Throughput (Mbps), Accuracy (%), Data Size (GB), or F1-score. Use landscape orientation for wide tables where necessary. Tables reproduced from another source must state the source in a table note or at the end of the title according to the citation style used.

Table 3. LSTM model validation results on test data

Trial ID	LSTM Units	(Layer 1)	(Layer 2)	Loss	Val Loss	Best Step
0	512	LSTM	Dense	0.0116863	0.0121117	31
1	96	LSTM	Dense	0.0116927	0.0122242	30
2	384	LSTM	Dense	0.0116792	0.0121779	24
3	192	LSTM	Dense	0.0116736	0.0121582	24
4	448	LSTM	Dense	0.0117497	0.0121425	15
5	128	LSTM	Dense	0.01166	0.0121712	29
6	224	LSTM	Dense	0.0116457	0.0122376	38
7	160	LSTM	Dense	0.0117289	0.0122447	18
8	288	LSTM	Dense	0.0116452	0.0121969	48
9	32	LSTM	Dense	0.0116899	0.0122063	41

4.6.2 Figures

A figure title must be concise and informative and be placed below the figure. In MTI theses, figures may include system architectures, flowcharts, network topologies, conceptual models, data visualizations, interfaces, experimental results, or security diagrams. Graphs must have axis labels, units/metrics, legends, and adequate explanatory information. If a figure is not the author's own work, cite its source.

Figure titles use 12 pt Times New Roman with single spacing and begin with the word Figure followed by an Arabic number in the order of appearance. Figure numbering runs consecutively from Figure 1 to the last figure according to the total number of figures (for example, Figure 3), followed by the figure title.

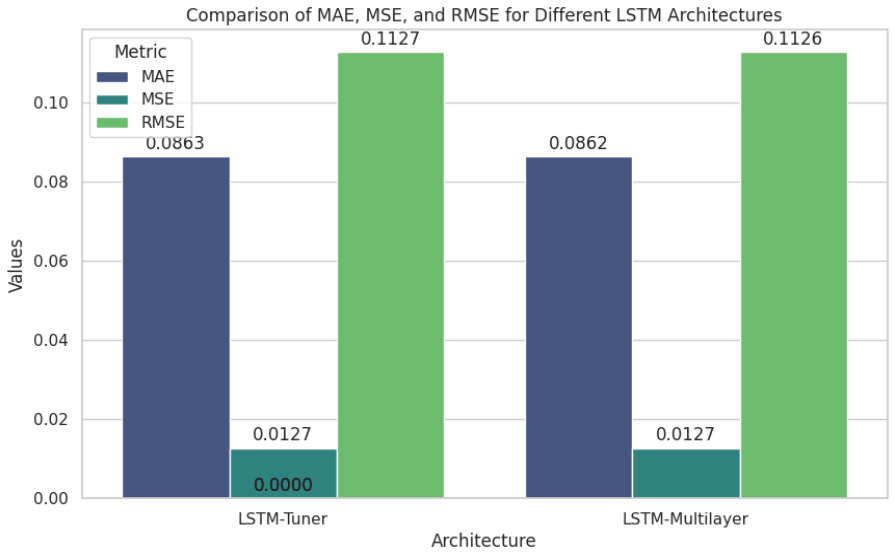

Figure 3. Comparison of MAE, MSE, and RMSE values for LSTM architectures

Use consistent figure titles that do not end with a period. Place titles directly below the figure as text, not as part of the image file. Metrics or units such as ms, Mbps, %, bytes, or evaluation metric values must be shown on the axes, in the legend, or in the figure annotation, not in the title.

4.6.3 Equations

Sequential equation numbers used to explain models, objective functions, algorithms, evaluation metrics, or statistical calculations are written in Arabic numerals in parentheses and aligned with the right margin. Use Equation Editor or compatible equation software, and define all variables used.

$$F1 = 2 \times (Precision \times Recall) / (Precision + Recall) \quad (1)$$

Where:

F1 = F1 score, a measure of the balance between precision and recall
Precision = the proportion of correct positive predictions
Recall = the proportion of positive data correctly identified by the model
Definitions of variables must be adjusted to the context of the method or model used.

Equation numbers follow the order in which equations appear (1, 2, 3, etc.), according to the number of equations.

4.6.4 Citations

Use one citation style consistently, namely Harvard author-date, and manage citations with reference-management software. In the manuscript, use authors' surnames; for three or more authors, use "et al." according to the citation style.

a. One or two authors. Example: Santoso and Putri (2024) show that evaluation across multiple test scenarios is necessary to assess the robustness of a model.
b. Three or more authors. Example: Rahman et al. (2025) compare several anomaly-detection approaches for network data.

The reference list must be generated automatically with reference-management software. The completeness of metadata must be checked, particularly author names, year, title, source title, volume/issue, pages, DOI, URL, software version, or dataset identifier where available.

There are several ways of citing sources in a literature review:

a. At the beginning of a sentence:

   Rahman (2024) explains that data quality and evaluation protocols determine the credibility of research results.

b. In the middle of a sentence:

   This approach is consistent with the findings of Putri and Wijaya (2025), who report improved performance after optimizing the model configuration.

c. At the end of a sentence:

   Evaluation results need to be compared with an appropriate baseline (Kurniawan et al., 2024).

d. Citing two authors:

   Santoso and Wijaya (2024) show performance differences among model architectures on the same dataset.

e. Citing more than two authors:

   Deep-learning models may require adequate data and computing resources

(Putri et al., 2024).

f. Citing more than two sources:

According to Santoso (2023), Rahman and Putri (2024), and Wijaya et al. (2025), the selection of evaluation metrics must suit the objectives and characteristics of the problem.

g. Citing a secondary source:

Citation of secondary sources should be avoided. Authors must access and cite the most relevant primary source or official version; if the primary source is unavailable, the secondary source must be explained transparently in accordance with the citation style.

4.6.5 Reference List Formatting

The reference list must be dominated by reputable scientific articles relevant to the research topic (at least 60%). Prioritize primary and recent sources, especially from the last five years, without disregarding genuinely necessary foundational works. Non-scholarly sources may be used only when authoritative and relevant.

The reference list shall consistently follow the Harvard (author-date) style using reference-management software, such as Mendeley or Zotero.

Ensure that every citation in the manuscript has a corresponding reference-list entry and that every reference-list entry is actually cited in the manuscript.

a. The reference list is arranged alphabetically by the surname of the first author. Line spacing within a reference is single-spaced. The spacing between one reference and the next is one space.
b. The first line of each reference begins at the left margin. The second and subsequent lines of each reference use a 1 cm hanging indent.
c. The author's surname is written first and followed by a comma, then the initials of the first and middle names (if any), followed by a period. When there is a second and subsequent author joined by "and," each author name is written in the same manner as the first author's name.
d. The publication year in parentheses follows the author names, followed by the reference title. Further bibliographic information depends on the type of source.

e. References with the same author and year use the letters a, b, c, and so on after the year.

Examples of reference formatting are as follows:

Example journal-article format: [Surname], [Initials]. ([Year]). [Title of an Information Technology article]. [Journal Title], [Volume]([Issue]), [Pages]. https://doi.org/[DOI]

Example conference-paper format: [Surname], [Initials]. ([Year]). [Title of an Information Technology conference paper]. In [Conference Name] (pp. [Pages]). [Publisher]. https://doi.org/[DOI]

Reference formats by source type may be divided as follows:

i. Journal or Magazine

[Surname], [Initials]. ([Year]). [Title of an article about a model, system, data, network, security, or IT governance]. [Journal Title], [Volume]([Issue]), [Pages]. https://doi.org/[DOI]

ii. Book

[Surname], [Initials]. ([Year]). [Title of an Information Technology book] ([Edition]). [Publisher].

iii. Scholarly paper in conference proceedings

[Surname], [Initials]. ([Year]). [Title of conference paper]. In [Conference Name] (pp. [Pages]). [Publisher]. https://doi.org/[DOI]

If the proceedings have a DOI, ISBN, or another publication identifier, include it to facilitate source retrieval.

iv. Internet

- Official website or online document

[Organization/Author]. ([Year]). [Title of page or document]. [Website Name]. URL (accessed [date]).

- Dataset or data repository

[Creator/Organization]. ([Year]). [Dataset name] (Version [version]) [Dataset]. [Repository]. DOI or URL.

- Software or source-code repository

[Developer/Organization]. ([Year]). [Software name] (Version [version]) [Software]. URL or DOI. For source code, include the repository name, tag/commit, and access date where relevant.

- Technical documentation, API, or online standard

[Organization]. ([Year]). [Title of technical documentation, API, or standard]. URL or DOI (accessed [date]).

v. Other data, software, or digital media

Use a citation format that includes the creator, year, title, version, source type, repository/publisher, and DOI/URL where available.

vi. Standard/manual

[Standards Organization]. ([Year]). [Code and title of standard/manual]. [Publisher/Organization]. URL or DOI.

vii. Dissertation

[Surname], [Initials]. ([Year]). [Title of thesis/dissertation] (Master's thesis/doctoral dissertation). [Institution]. URL where available.

viii. Research Report

[Organization/Author]. ([Year]). [Title of technical report]. [Publisher/Organization]. URL or report number.

ix. Newspaper Article

[Surname], [Initials]. ([Year, date]). [Title of news article]. [Media title]. URL.

x. Audiovisual Material

[Creator/Organization]. ([Year]). [Title of multimedia material] [Video/podcast/demonstration]. [Publisher/Platform]. URL.

xi. Material to be Published (In Press)

[Surname], [Initials]. ([Year]). [Article title]. [Journal Title], in press. DOI or URL where available.

CHAPTER V
THESIS STRUCTURE

The thesis writing structure consists of three parts: the preliminary section, the main section, and the final section.

5.1 Preliminary Section

The preliminary section of the thesis begins with the outer cover and ends with the list of abbreviations, terms, and symbols. Its components are as follows:

1. Front Cover Page
2. Inner Cover Page
3. Title Page
4. Submission Page
5. Approval Page
6. Statement of Research Originality
7. Preface
8. Abstract (in Indonesian)
9. Abstract (in English)
10. Table of Contents
11. List of Tables
12. List of Figures
13. List of Appendices
14. List of Abbreviations, Terms, and Symbols

5.1.1 Front Cover Page

The thesis title in Indonesian and English;

1. The author's full name without academic degrees;
2. The UPN "Veteran" Jawa Timur emblem (2.5 cm wide and 2.5 cm high), downloaded from https://www.upnjatim.ac.id/lambang-logo/
3. The words MASTER OF INFORMATION TECHNOLOGY PROGRAM
4. The words FACULTY OF COMPUTER SCIENCE;

5. The words UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAWA TIMUR;
6. The words SURABAYA;
7. The year of passing the examination.

All words are printed in black capital letters. The words on this page are centered within the text area and balanced left to right. The thesis hard cover is orange. An example front cover page is provided in Appendix 1.

5.1.2 Inner Cover Page

The inner cover has the same content and writing format as the front cover, but is printed on white paper. For a thesis, the words are printed in black capital letters.

5.1.3 Title Page

The title must be concise and specific, and reflect the problem, object/artefact, and research context. Avoid non-standard abbreviations; standard IT abbreviations such as AI, ML, IoT, API, URL, or DOI may be used where necessary.

5.1.4 Submission Page

The submission page contains:

1. Thesis title
2. The words "A thesis submitted in partial fulfilment of the requirements for the master's degree"
3. The name of the study program

4. The words Prepared and submitted by
5. The author's signature
6. The author's full name without academic degrees
7. The words submitted to
8. The words FACULTY OF COMPUTER SCIENCE
9. The words UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAWA TIMUR
10. The words SURABAYA
11. The year of passing the examination

This page is numbered ii, without displaying the page number, but is included in the numbering. An example submission page is provided in Appendix 2.

5.1.5 Approval Page

This page contains:

1. The word THESIS
2. Thesis title
3. The words prepared and submitted by
4. The student's name without academic degrees
5. Student identification number
6. The words "has been defended before the Thesis Examination Committee on"
7. Examination date
8. The words and has been declared to have fulfilled the requirements
9. The names and signature spaces of the Supervisory Committee. The approval page is signed by the Main Supervisor on the left and the Co-supervisor on the right; the Program Coordinator's signature is placed on the left and the Dean of the Faculty of Computer Science's signature is placed on the right.

10. The approval page uses white paper with a proportionally sized UPN "Veteran" Jawa Timur emblem as a background and a border in accordance with the official Faculty template. This page is numbered iii, does not display the page number, but is included in the page numbering.

5.1.6 Statement of Research Originality

On this page, the thesis author must declare and sign a statement that this research and thesis manuscript are original and that all cited sources have been acknowledged. The author also declares that, if any part of the thesis is proven not to be original and plagiarism is found, the thesis shall be declared void. This statement is dated and signed by the student, is assigned page number iv, and an example is provided in Appendix 4a.

5.1.7 Preface

The preface must not exceed two pages. It is the author's personal expression, but must be written in ethical, formal language in a logical sequence: beginning with academic matters (supervision and institution), followed by the conduct of the research, and ending with personal acknowledgements. The Program may adjust the context to its needs. This page begins with lowercase Roman numerals (for example, v, vi, according to the preceding page number). An example preface is provided in Appendix 5.

5.1.8 Abstracts (Indonesian and English)

The Indonesian abstract and English abstract contain the author's identity and thesis title, followed by a one-paragraph research summary of no more than 300 words. The summary includes the context/problem, objective, data or research object, method, principal evaluation results, and contribution or conclusion. The keywords consist of no more than five words and represent the main concepts or technologies of the research.

5.1.9 Table of Contents

The table of contents is arranged in order by page number and includes the following items together with their page numbers.

- The words TABLE OF CONTENTS are typed in capital letters without a final period, placed exactly at the top margin and centered between the left and right margins. The page-number heading is aligned with the right margin, two spaces below the words TABLE OF CONTENTS.
- The table of contents and page numbers are generated automatically using the "Table of Contents" feature available in word-processing applications, such as MS Word. An example table of contents page is provided in Appendix 7.

5.1.10 List of Tables

The list of tables is arranged in sequence according to table number and page number. It is generated automatically using the "Table of Figures" feature under the "References" menu in a word-processing application (for example, MS Word), then its title is changed to List of Tables. The words LIST OF TABLES are typed in capital letters without a final period and placed at the top margin in the center of the text area, symmetrically between the left and right margins. The number is typed from the left margin and the page number is aligned with the right margin, two spaces below the words LIST OF TABLES.

The title of a table is typed with a capital letter at the beginning of the first word, beginning three character spaces after the period following the table number and ending one character space before the letter p in the word page. The spacing between table titles is single-spaced. If one title requires two or more lines, the line spacing is single and the first character of the second and subsequent lines is typed without indentation from the beginning of the first line. An example List of Tables is provided in Appendix 8.

5.1.11 List of Figures

Figures include charts, curves, diagrams, maps, photos, sketches, and schematics. The list of figures is placed after the list of tables and contains figure titles and page numbers in sequence. It uses the same format as the list of tables. An example List of Figures page is provided in Appendix 9.

5.1.12 List of Appendices

The list of appendices is placed after the list of figures and contains appendix titles and page numbers in sequence. It uses the same format as the list of tables and figures. An example List of Appendices page is provided in Appendix 10.

5.1.13 List of Terms, Abbreviations, and Symbols

For research that uses many technical terms, abbreviations, mathematical symbols, metrics, or acronyms such as AI, IoT, API, QoS, or IDS, the author must include a list of terms, abbreviations, and symbols so that readers can understand the manuscript quickly.

5.2 Final Section

The final section complements the preliminary and main sections. For MTI theses, appendices may contain a data dictionary, data-collection instruments, experimental configurations, test scenarios, code excerpts or repository links, API documentation, additional test results, a prototype user guide, and evidence of publication outputs as needed.

Supplementary information that is important for completing the main data and information, but disrupts the main flow if placed in a results chapter, is placed in an appendix. Appendices may include questionnaires, interview transcripts, detailed tables, experiment logs, software/hardware configurations, code documentation, statistical-test results, or repository links accessible subject to permissions and data-confidentiality provisions.

CHAPTER VI

THESIS WRITING STRUCTURE

6.1 Thesis Research Proposal

The structure of a thesis research-proposal manuscript consists of three parts: the preliminary section, the main section, and the final section.

- **Preliminary Section**

  The preliminary section of a research proposal consists of:

  1. Front Cover Page
  2. Inner Cover Page
  3. Approval Page
  4. Table of Contents Page
  5. List of Tables Page
  6. List of Figures Page
  7. List of Appendices Page
  8. List of Abbreviations and Symbols

- **Main Section**

  The main section consists of:

  CHAPTER I INTRODUCTION: IT problem context, urgency, problem formulation/research questions, objectives, benefits, scope, and targeted contribution.

  CHAPTER II LITERATURE REVIEW: concepts/theories, relevant prior studies, state-of-the-art analysis, research gap, and conceptual framework or solution design.

  CHAPTER III RESEARCH METHODOLOGY: research design, data sources and management, model/system design, experimental environment, variables, baselines, metrics, evaluation protocol, and traceability/reproducibility plan.

- **Final Section**

  The final section consists of:

  1. References
  2. Appendices

6.2 Thesis Research

The thesis writing structure consists of three parts:

- **Preliminary Section**

  The preliminary section of the thesis consists of:

  1. Front Cover Page
  2. Title Page
  3. Submission Page
  4. Approval Page
  5. Endorsement Page
  6. Statement of Originality (Bearing Stamp Duty)
  7. Preface Page
  8. Abstract Page
  9. English Abstract Page
  10. Table of Contents Page
  11. List of Tables Page
  12. List of Figures Page
  13. List of Appendices Page
  14. List of Abbreviations and Symbols

- **Main Section**

  The main section consists of:

  CHAPTER I INTRODUCTION: IT problem context, urgency, problem formulation/research questions, objectives, benefits, scope, and targeted contribution.

  CHAPTER II LITERATURE REVIEW: concepts/theories, relevant prior studies, state-of-the-art analysis, research gap, and conceptual framework or solution design.

  CHAPTER III RESEARCH METHODOLOGY: research design, data sources and management, model/system design, experimental environment, variables, baselines, metrics, evaluation protocol, and traceability/reproducibility plan.

  CHAPTER IV RESULTS AND DISCUSSION: implementation or artefact, evaluation results, comparison with baselines/related research, analysis, limitations, and implications of results.

  CHAPTER V CONCLUSIONS AND RECOMMENDATIONS: answers to

the problem formulation, research contributions, limitations, and directions for subsequent research/development.

- **Final Section**

  The final section consists of:
  1. References
  2. Appendices

6.3 Main Section

An MTI thesis is a research-based scholarly work that demonstrates mastery of Information Technology theory, methods, and practice. A thesis is not sufficient if it consists only of implementing an application; students must demonstrate a relevant problem, a clear contribution, an accountable method design, and evidence-based evaluation.

6.4 Introduction

6.4.1 Background

The background presents the problem context in the Information Technology domain, stakeholder conditions or needs, preliminary evidence, and the reasons why the research is important. The discussion must link prior studies to the knowledge, data, method, system, or practice gap that the thesis will address.

6.4.2 Problem Formulation

In this subsection, the problem or research questions are formulated clearly, with focus and in a manner that can be evaluated. Definitions, assumptions, limitations, data, computing environment, architecture, security threats, or success criteria may be explained as required by the research.

6.4.3 Research Objectives

This section states the research objectives and targets concisely, clearly, and consistently with the problem formulation. Objectives may include designing or developing a method/system, data analysis, performance evaluation, security testing, optimization, or the formulation of measurable strategic recommendations.

6.4.4 Research Benefits

This section states the expected benefits or impacts, including scientific contributions, technical contributions in the form of methods/systems/artefacts, and practical benefits for users, organizations, industry, or society.

6.4.5 Scope

The scope includes problem limitations, application domain, data source/characteristics, platform or computing environment, method, test scenarios, metrics, and relevant security/ethical constraints.

6.5 Literature Review

The literature review chapter contains relevant concepts, theories, technologies, standards, and prior research. The review must critically compare existing approaches to demonstrate the state of the art, research gap, and basis for selecting the method or solution design.

6.5.1. Concepts and Theories

This section explains the scientific foundations that underpin the research.

- Describe the definitions of the principal concepts used.
- Explain relevant theories, methods, algorithms, standards, or technologies.
- Use credible and up-to-date scholarly sources.
- Do not merely copy definitions; explain their relationship to the research.

6.5.2. Relevant Prior Studies

This section discusses previous research with related topics, methods, data, or objectives.

- Select genuinely relevant research, particularly recent publications.
- Explain the problem, method, data/scenario, and main results of each study.
- Show their strengths and limitations.
- Provide a summary in a table to facilitate comparison.

6.5.3. State-of-the-Art Analysis

This section maps recent developments in the research field and the position of the thesis research among other studies.

- Compare the principal existing approaches.
- Identify the most frequently used methods, recent trends, and their evaluation metrics.
- Explain which approach is most appropriate for the research problem.
- Avoid merely listing articles; conduct a comparative analysis.

6.5.4. Research Gap

This section explains unanswered problems or limitations of previous research that will be addressed by the thesis.

- Formulate the gap based on the analysis of prior studies.
- The gap must be specific, testable, and relevant to the research problem.
- Distinguish between scientific, methodological, data, and implementation gaps.
- Use the gap as the basis for the problem formulation and thesis contribution.

6.5.5. Conceptual Framework or Solution Design

This section explains the research line of reasoning and the solution design to be developed.

- Depict the relationship among the problem, theory, method, data, process, and expected results.
- Explain the system components or research stages.
- Show how the solution design addresses the research gap.
- Include a conceptual-framework diagram, system architecture, or method flow where necessary.
- The design must be evaluable using clear metrics.

6.6 Research Methodology

This chapter explains how the research is conducted systematically, measurably, and accountably. The description must be sufficiently clear for readers to understand the research process and, where possible, repeat the evaluation.

6.6.1. Research Design

This section explains the type, approach, and overall flow of the research.

- State the type of research, for example, an experiment, system development, case study, survey, design science, or a combination.
- Explain the main stages from problem identification through evaluation of results.
- Align the design with the research objectives and questions.
- Include a research flowchart where necessary.

Brief example:

This research uses an experimental design to develop and evaluate a YOLO-based plant leaf-disease detection model. The stages include image-data collection, preprocessing, model training, testing, and results analysis.

6.6.2. Data Sources and Management

This section explains the origin of the data, how they were obtained, their quality, and their management.

- State the data type: images, text, network logs, IoT sensor data, questionnaires, interviews, or organizational documents.
- Explain the data source, number of records, collection period, selection criteria, and permissions.
- Describe the cleaning, labeling, anonymization, normalization, or data-splitting process.
- Explain privacy protection, confidentiality, and data-use rights.

Brief example:

The research data consist of 3,000 rice-leaf images obtained from an experimental field and an open dataset. The images were labelled by an agricultural expert, cleaned of duplicates, and divided into 70% training, 15% validation, and 15% test data.

6.6.3. Model or System Design

This section explains the solution developed or applied to address the research problem.

- Explain the architecture of the model, system, application, network, or framework used.
- State the principal components, the function of each component, and the

data or process flow.

- Explain the algorithms, methods, technologies, software, or hardware used.
- Show the relationship between the solution design and the identified research gap.

Brief example:

The system consists of an image-acquisition module, preprocessing, a YOLO disease-detection model, an identification-results database, and a web dashboard. The model produces a disease class and confidence score for each tested image.

6.6.4. Experimental or Implementation Environment

This section explains the technical conditions under which the research is conducted and evaluated.

- State the hardware, such as computer specifications, GPU, server, IoT devices, gateway, or network devices.
- State the software, operating system, programming language, libraries, frameworks, simulators, and versions.
- Explain important configurations, such as network parameters, server configuration, or model settings.
- If the research is conducted in the field, explain the location, conditions, and test scenarios.

Brief example:

The experiment was conducted on a computer with an NVIDIA RTX 4060 GPU, 32 GB RAM, Python 3.11, PyTorch 2.3, and Ultralytics YOLOv8. Training was conducted for 100 epochs using 640 x 640 pixel images.

6.6.5. Research Variables

This section explains the factors controlled, observed, or measured in the research.

- Determine the independent variables, namely the factors that are changed or compared.
- Determine the dependent variables, namely the outcomes or performance measures.
- Determine control variables to ensure that the experiment is fair.

- For non-experimental research, variables may be replaced by aspects, indicators, or dimensions of analysis.

Brief example:

The independent variables are the YOLO model architecture and training-data size. The dependent variables include precision, recall, and F1-score. The control variables include the test dataset, number of epochs, image size, and hardware used.

6.6.6. Baseline or Comparator

This section explains the method, system, or comparator condition used to demonstrate the value of the research contribution.

- Select a relevant and commonly used baseline in the research field.
- Explain the rationale for selecting the baseline.
- Ensure that the baseline is tested with equivalent data and conditions.
- If an algorithmic baseline is not used, use the pre-implementation condition, a manual procedure, or the existing system as the comparator.

Brief example:

The proposed YOLOv8 model is compared with YOLOv5 and Faster R-CNN. All three models are tested using the same test dataset so that differences in results reflect method performance rather than data differences.

6.6.7. Evaluation Metrics

This section explains the measures of research success.

- Select metrics appropriate to the research objectives and type.
- Explain the definition of each metric and how it is interpreted.
- Use more than one metric when a single metric is insufficient to describe performance.
- For qualitative research or IT governance research, use clear indicators, such as the degree of compliance, maturity, satisfaction, risk, or process effectiveness.

Brief example:

Model performance is evaluated using precision, recall, F1-score, and mean

Average Precision (mAP). Precision indicates the correctness of positive predictions, whereas recall indicates the model's ability to find all relevant objects.

6.6.8. Evaluation Protocol

This section explains the testing procedure so that evaluation results are objective and fair.

- Explain the test scenarios, number of repetitions, and division of training, validation, and test data.
- State the parameters used for each method.
- Explain the procedure for comparison with the baseline.
- Include additional analysis, such as statistical tests, error analysis, sensitivity testing, or evaluation under normal and extreme conditions.

Brief example:

Each model is trained three times using different random seeds. Final results are reported as the mean and standard deviation. Error analysis is conducted on images with low lighting, overlapping leaves, and similar disease symptoms.

6.6.9. Traceability and Reproducibility Plan

This section explains how the research process and results can be traced or repeated.

- Document the dataset version, code, parameters, configurations, and experimental environment.
- Store training logs, test results, and important changes made during the research process.
- Explain the availability of source code, datasets, prototypes, or system documentation.
- If data are confidential, provide appropriate documentation, sample data, or an access procedure.
- Disclose the use of generative AI tools if they were used in research processing or writing.

Brief example:

The source code, training configurations, and list of random seeds are stored in a Git repository. The restricted dataset is not published, but the data structure, labeling procedure, and anonymized sample data are provided so that the research

can be traced and replicated.

6.7 Results and Discussion

This chapter presents evidence that the proposed solution or method has been implemented and evaluated. Students must not merely display result tables or graphs; they must explain the meaning of the results, the reasons behind them, and their contribution to the problem formulation.

6.7.1. Implementation or Artefact

This section explains the tangible output produced by the research.

- Describe the artefact developed, such as a model, application, IoT prototype, network architecture, dashboard, algorithm, or IT governance recommendation.
- Explain the main components and their respective functions.
- Present an architecture diagram, interface screenshots, example system output, or device schematic where relevant.
- Focus on features or components directly related to the research contribution.
- Avoid presenting only program code or screenshots without explanation.

Brief example:

The research artefact is a web application for detecting rice-leaf diseases. The system receives a leaf image from the user, performs inference using a YOLOv8 model, and then displays the disease class, object location in the image, and prediction confidence.

6.7.2. Evaluation Results

This section presents test results based on the metrics and protocol explained in CHAPTER III.

- Present results in tables, graphs, matrices, or visualizations that are easy to

read.

- Explain the test condition or scenario for each result.
- Report the main metric values consistently.
- Select the results most relevant to answering the research objectives.
- Avoid presenting all raw experiment output; detailed data may be placed in appendices or a repository.

Brief example:

The test results show that the model achieved mAP of 89.4%, precision of 91.2%, recall of 87.6%, and F1-score of 89.3%. The lower recall compared with precision indicates that some diseased leaves were not yet detected successfully.

6.7.3. Comparison with a Baseline or Related Research

This section shows whether the proposed solution improves on other methods.

- Compare with the baseline specified in CHAPTER III.
- Ensure that the data, scenarios, devices, and test metrics are equivalent.
- Explain both the strengths and weaknesses of the proposed method.
- Compare with prior research carefully; differences in datasets or environments must be stated.
- Do not claim that a method is the best if the evaluation conditions are not truly comparable.

Brief example:

YOLOv8 with adaptive augmentation achieved an F1-score of 89.3%, higher than the 84.7% obtained by the YOLOv8 baseline without augmentation. The improvement is most apparent in images with varying illumination, although training time increased by approximately 18%.

6.7.4. Analysis and Discussion

This section explains why the results occurred and what they mean for the research problem.

- Link the evaluation results to the objectives and problem formulation.
- Explain the factors that caused performance to improve or decline.
- Discuss result patterns, successful cases, failed cases, and unexpected findings.
- Conduct error analysis, parameter-sensitivity analysis, or an ablation study where relevant.
- Compare the findings with the theory and prior studies in CHAPTER II.

Brief example:

The higher F1-score indicates that adaptive augmentation helps the model recognize variations in field conditions. However, errors are still found for leaves with small spots and blurred images. This indicates that image quality and object size affect the model's detection capability.

6.7.5. Research Limitations

This section explains the limitations of the research results honestly and academically.

- State limitations of the data, method, devices, test scenarios, or implementation scope.
- Explain the effect of these limitations on the interpretation of results.
- Distinguish research limitations from research failure.
- Use the limitations as the basis for recommendations for further research.
- Avoid claims that exceed the evidence from the evaluation results.

Brief example:

The research uses image data from two agricultural locations, so the model's generalizability to regions with different soil types, plant varieties, and lighting conditions still requires further testing. In addition, the system has not been tested on mobile devices with limited computing resources.

6.7.6. Implications of Results

This section explains the benefits and consequences of the research results, both scientifically and practically.

- Explain the scientific contribution, such as an improved method, model, architecture, or new empirical evidence.
- Explain the technical contribution, such as a prototype, system, dataset, or evaluation procedure.
- Explain the practical benefits for users, organizations, industry, or society.
- State the conditions for application so that the results are not interpreted too broadly.
- Link the implications to directions for subsequent development or research.

Brief example:

The results show that the model can be used as an initial component of a web-based plant-health monitoring system. In practical terms, the system could help farmers conduct initial identification of leaf diseases, but its broad use requires additional field data and testing on mobile devices.

6.8 Conclusions and Recommendations

This chapter summarizes the final answers of the research. Conclusions must be drawn from the results and discussion in CHAPTER IV and must not introduce new data, analysis, or claims.

The following example uses a YOLO-based leaf-disease detection study; the topic may be adjusted to the MTI thesis field.

Answers to the Problem Formulation

This section states the answer to each problem formulation concisely and directly.

- Organize the conclusions according to the order of the problem formulation in CHAPTER I.
- State the answer based on evidence from the evaluation results.
- Use firm, objective, and non-exaggerated statements.
- Do not repeat all tables, graphs, or technical explanations from CHAPTER IV.
- Avoid including new findings that have not been discussed previously.

Brief example:

YOLOv8 with adaptive augmentation improves the detection of rice-leaf diseases compared with the baseline without augmentation. The model achieved a higher F1-score and better recognized leaf images under varying lighting conditions.

Research Contributions

This section explains the added value or novelty produced by the research.

- State the scientific contribution, for example, the development of a method, model, evaluation framework, or empirical evidence.
- State the technical contribution, for example, an application, prototype, algorithm, architecture, dataset, or documentation.
- State the practical contribution for users, organizations, industry, or society.
- Ensure that the contribution aligns with the research objectives and is supported by evaluation results.
- Distinguish the contribution from merely implementing an application.

Brief example:

The scientific contribution of this research is an evaluation of the effect of adaptive augmentation on YOLOv8 performance for rice-leaf images under field conditions. Its technical contribution is a web-application prototype for leaf-disease detection. Practically, the system can support initial identification of plant diseases by farmers or agricultural extension workers.

Research Limitations

This section explains limitations that need to be considered when interpreting the research results.

- State limitations related to data, methods, test environments, devices, scenarios, or scope.
- Briefly explain the impact of these limitations on the results.
- Be honest and academic; limitations do not mean that the research failed.
- Do not repeat the entire discussion of limitations from CHAPTER IV.
- Use limitations as the basis for formulating recommendations.

Brief example:

The research still uses data from two agricultural locations, so the model's ability to generalize to other plant varieties and environmental conditions cannot yet be assured. Testing was also conducted on a computer with a GPU, so system performance on mobile devices has not yet been evaluated.

Recommendations for Subsequent Research or Development

This section provides specific and actionable directions for follow-up.

- Base recommendations on the limitations and findings of the research.
- Distinguish recommendations for further research from recommendations for system development.
- Propose relevant additional data, methods, scenarios, devices, or

evaluations.

- Avoid overly general recommendations, such as "future research is expected to be better."
- Recommendations need not be numerous; the important point is that they are relevant and measurable.

Brief example:

Future research may use datasets from more regions and growing seasons to test model generalizability. Subsequent development may optimize the model to run on mobile devices or edge devices and add disease-management recommendations based on detection results.

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