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|  | **MINISTRY OF EDUCATION AND TRAINING** |

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| **FPT UNIVERSITY** |
| Capstone Project Document |
| [Project name] |

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| **<Group Name>** | |
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| **Capstone Project code** |  |

- Hanoi, <month>/<year> -

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# Acknowledgement

*[Although not mandatory, a section thanking those who supported you during the project, including advisors, lecturers, friends, and family, can be included as an expression of gratitude.]*

We would like to show our sincere appreciation to everyone who supported us in completing this project. First and foremost, I would like to profoundly thank Teacher Tri, who critically supported us with insights, academic and knowledge guidance, and also gave us many constructive feedbacks that really helped us complete this project. Your expertise not only helped and shaped our understanding of the subject matter but also challenged us to think more critically and learn how to solve problems more effectively in understanding algorithm, finding the weakness and improving it. Second, I would like to say thanks to all members in my team and our parents, our friends who already supported us to the end, gave us power, strength and motivation to finish this project, and stood by our side even when hardest and most tired. At the end, we would like to say thank you to all teachers, professors from all over the world already published and brought many documents, researches for us to read, learn and research. Without those documents and research, we would not have this project today.

# Definition and Acronyms

*[A list of important terms and definitions used in the project. This ensures that all readers have a common understanding of the specialized terms used in the document.]*

|  |  |
| --- | --- |
| **Acronym** | **Definition** |
| AI | Artificial Intelligent |
| DL | Deep Learning |
| ML | Machine Learning |
| PM | Project Manager |
| PMP | Project Management Plan |
| WBS | Work Breakdown Structure |
| … | … |
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# List of tables

*[A list of all the tables presented throughout the document.]*

# List of figures

*[A list of all the figures presented throughout the document.]*

# I. Project Introduction

*[Provide the final project introduction information following the template as part II in the Report #1]*

## 1. Overview

### 1.1 Project Information

*[Provide the brief information of the project: project name, project code, group name, list out the details of the project team and supervisor (and stakeholders), etc.]*

### 1.2 Project Overview

*[A brief overview of the project, including the main parts that will be discussed in the document, to give readers a general view of the report's structure and content.]*

## 2. Project Background

*[Introduce the context and setting of the project. This may include why the project was chosen, which problem the project aims to address, and the importance of solving this issue. This helps the reader understand the cause and purpose of the project.]*

## 3. Project Objective

[The specific objectives of the project. This includes what the project hopes to achieve at the highest level. Objectives should be clear, measurable, and achievable. This guides the development of the project and the evaluation of its success.]

## 4. Problem Statement

*[A specific statement of the problem that the project intends to solve. This section should detail the issue, including its causes, impacts, and specific challenges associated with solving the problem]*

## 5. Significance of the Project

*[The importance of the project. This is where you describe the benefits that the project brings, both theoretically and practically, and its impact on the scientific community, industry, or society at large.]*

## 6. Project Scope & Limitations

*[The scope of the project as well as its limitations. This includes what the project will and will not cover. This section helps set expectations and prevent misunderstandings.]*

# II. Project Management Plan

*[Provide the final project plan information following the template as part II in the Report #2]*

## 1. Team Work

### 1.1 Team Structure and Roles

*[Describe the structure of the team and the roles of each member. This should include information about specific tasks, responsibilities, and communication methods between members.]*

### 1.2 Communication Plan

*[Describe how and how often project information will be communicated among team members and advisor (and other stakeholders).]*

## 2. Project Management Approach

### 2.1 WBS

*[Provide detailed descriptions for each task or duty within the WBS, including objectives, required resources, and assigned responsibilities.]*

### 2.2 Risk Management

*[Describe potential risks during the project execution and preventive measures or response plans for each risk.]*

### 2.3 Quality Management

*[Details on the measures and processes that will be applied to ensure the quality of the project, including testing and validation of the product or project outcomes.]*

### 2.4 Budget and Funding (Optional)

*[If applicable, describe the project budget and funding sources. This should include details on estimated costs and financial management throughout the project.]*

### 2.5 Change Management Process

*[Describe the process that will be followed for any changes in the project scope, schedule, resources, or other requirements.]*

### 2.6 Closure and Evaluation

*[Describe the process for closing and evaluating the project upon completion, including how experiences and lessons learned from the project will be summarized.]*

# III. Existing Systems/State of the Art

*[Provide the final existing systems following the template as part II in the Report #3]*

*[This Section is usually titled "Literature Review" or "Related Work". For projects related to specific technologies or systems, you might call this section "Existing Systems" or "State of the Art". Choose a title that fits the content and context of your project.]*

## 1. Overview of the Field

*[Provide an overview of the field of study related to your project. This helps place your project within the broader context of that field.]*

## 2. Historical Context

*[Provide some historical background or developments in the field, especially those directly related to your project.]*

## 3. Key Studies and Theories

*[Describe and assess key studies, theories, and published works related to your topic. This includes both fundamental and applied research.]*

## 4. Technological Advancements

*[Discuss recent or significant technological advancements in your field, and how they affect your project.]*

## 5. Comparison of Existing Systems

*[If your project involves systems or technology, compare and contrast existing systems or technologies, including their advantages and disadvantages compared to your project.]*

## 6. Gaps in the Literature/Technology

*[Identify gaps or limitations in the current research or technological systems, and how your project intends to address or improve upon these issues.]*

## 7. Justification for the Project

*[Based on the above information, highlight the necessity and uniqueness of your project. Explain why your approach to the problem is important and how it differs from or improves upon existing research or systems.]*

*[Note: This section is not just a list of studies but an analysis and evaluation part where you connect existing systems/research and works to your project, showing their linkage and impact on your work.]*

# IV. Methodology

*[Provide the final methodology following the template as part II in the Report #4]*

*[This section will detail how you will approach the project, with a focus on applying and implementing AI techniques. The team is allowed to customize the content of this section, however, the team needs to provide a detailed view of the methods and techniques used. To ensure that the reader understands the scientific and systematic approach that you apply to your capstone project in the field of AI. Below are two sample templates for this section that you can choose from or customize.]*

# IV. Methodology (sample 1)

## 1. Research Questions and Objectives

*[Identify the specific research questions and objectives that the project will address through the application of machine learning.]*

## 2. Data Collection and Preprocessing

*[Describe how you will collect data, including the sources of data, methods of collection, and any selection criteria. Information about the sample size, diversity, and representativeness of the data should be included.]*

*[Detail how the data will be processed before analysis, including cleaning data, handling missing data, transforming data, and normalization.]*

## 3. Feature Selection and Engineering

*[Describe the process of selecting and creating features that will be used for the machine learning model, as well as the reasons for these choices.]*

## 4. Model Training and Validation

*[Describe the machine learning models considered and the reasons for the final model choice, including technical specifications and configurations of the model.]*

*[Detail how the model will be trained and validated, including information on data splitting methods, cross-validation techniques, and the metrics used for evaluation.]*

## 5. Evaluation Metrics

*[Identify the metrics that you will use to assess the performance of the model, such as accuracy, F1 score, ROC AUC, etc.]*

## 6. Implementation Plan

*[Describe in detail how the model will be implemented, as well as any tools or technologies used to support this process.]*

## 7. Ethical Considerations

*[Discuss ethical issues that may arise when applying machine learning, including data privacy, accuracy, and how to handle data fairly.]*

# IV. Methodology (sample 2)

## 1. Project Objectives and RL Challenges

*[Clearly identify the project objectives and the specific challenges that reinforcement learning aims to address, such as learning to optimize decisions in an uncertain environment.]*

## 2. Environment Setup

*[Describe the environment in which the reinforcement learning agent will operate, including parameters, states, and rewards.]*

## 3. Agent Design and States

*[Describe the design of the RL agent, including states, actions, and policies it may adopt.]*

## 4. Reward System

*[Detail the reward system, including how rewards and penalties are defined to guide the behavior of the agent.]*

## 5. RL Algorithm

*[Describe the reinforcement learning algorithm used, including any variations from standard methods such as Q-learning, Deep Q-Networks (DQN), Policy Gradients, etc. Mention how the algorithm will be applied to allow the agent to learn from experience.]*

## 6. Training and Evaluation Strategy

*[Describe the training and evaluation process for the agent, including how and how often the agent will explore and exploit the environment to learn. Information on how the performance and learning of the agent are tested in different situations should be included.]*

## 7. Implementation Details

*[Provide details on the implementation, including the software development environment, tools, and libraries used.]*

## 8. Ethical and Safety Considerations

*[Discuss ethical and safety issues related to the deployment and testing of the RL agent, especially in scenarios that might impact the real world.]*

*[Note: By adjusting and supplementing the content appropriately for the "Methodology" section, you will help ensure that this part accurately reflects the approach and specific challenges of the AI capstone project.]*

# V. System Design and Implementation

*[Provide the final system design and implementation following the template as part II in the Report #5]*

## 1. AI Model Integration

*[Describe how the AI model is integrated into the larger system, including the interface and data exchange between the AI model and other system components.]*

## 2. Data Flow and Processing

*[Illustrate and describe the data flow through the system, from data collection, processing, to data analysis and result presentation.]*

## 3. Deployment Strategy

*[Detail how the system will be deployed, including the deployment environment and deployment procedures.]*

## 4. Scalability and Maintenance

*[Discuss how the system is designed to handle growth and future maintenance, including system updates, scalability, and version management.]*

*[Note: By providing a detailed view of the AI solution's design and implementation in this section, you will help readers understand the technical and systematic approach you have applied to your capstone project.]*

# VI. Results and Discussion

*[Provide the final results and discussion following the template as part II in the Report #6]*

## 1. Results and Analysis

*[Present the results obtained from executing the project, including numerical data, graphs, diagrams, and supportive imagery. This may include the outcomes of machine learning models, such as accuracy, confusion matrices, ROC curves, and other evaluation metrics.]*

*[Provide a detailed analysis of the results obtained, explaining their significance and impact on the project. This might include comparing the performance of different models, error analysis, and interpreting the features of the model.]*

## 2. Discussion

*[Discuss the results, including how they address the research questions and hypotheses, their alignment with results from related studies, and the broader context of the project. Mention any limitations or challenges encountered during the project.]*

## 3. Recommendations

*[Offer recommendations based on the findings, including suggestions for further research, system improvements, or practical applications.]*

## 4. Personal Reflection (Optional)

*[A section reflecting personally on the project process, lessons learned, and how improvements could be made in the future.]*

*[Note: The "Results and Discussion" section is an essential part of the capstone project document, where you evaluate the success of your project based on data and analysis. This is also an opportunity for you to reflect and discuss the larger significance of the work you have done, as well as to identify any opportunities for further research or development.]*

# VII. Conclusion

*[Provide the final conclusion following the template as part II in the Report #7]*

## 1. Summary of Findings

*[Summarize the main findings of the project, including how the research questions have been answered and how the project goals were achieved.]*

## 2. Contributions and Reflections on the Project

*[Highlight the specific contributions of the project to the field of study, community, or industry. This could include technical advancements, new knowledge, or practical applications.]*

*[Reflect on the project process, including what worked well and what could be improved. This is also an opportunity to acknowledge the level of challenge and learning from the project.]*

*[Provide some final thoughts or conclusion, expressing hopes or vision for the future of the research or the problem addressed by the project.]*

## 3. Limitations and Future Work

*[Acknowledge any limitations of the project and how they may affect the results and conclusions. This includes factors such as data, methods, or assumptions.]*

*[Suggest directions for future research or development based on the results and limitations of the project. This helps guide others who may build upon your work.]*

*[Note: The "Conclusion and Future Work" section is not only a place to summarize the completed work but also an opportunity to highlight the importance of the project and propose next steps. This helps readers understand the impact and potential of the work you have done.]*

# VIII. References

*[Provide the final references following the template as part II in the Report #8]*

*[Formatting: Ensure that all references are listed in a uniform and correct format, following the guidelines of the citation system you have chosen (e.g., APA, MLA, Chicago, etc.). This helps ensure accuracy and ease of source verification.]*

*[Order: Typically, reference items are arranged in alphabetical order for easy lookup. Make sure that all sources are listed comprehensively and without omission.]*

*[Completeness: For each reference, provide enough information so that readers can find and review the source material. This includes the author's name, year of publication, title of the work, publisher name or journal name, and other relevant information such as page numbers or URL.]*

*[Accuracy: Carefully check to ensure that all information about the references is correct and up-to-date.]*

*[Relevance: Only include sources that were actually cited or used in your project. This helps maintain the integrity and accuracy of the project.]*

*[Note: The "References" section is an indispensable part of any academic project. It not only proves that you have conducted careful and grounded research but also allows future generations of students to check and expand their projects from the sources you have cited.]*

# IX. Appendices

*[Provide the final appendices following the template as part II in the Report #9]*

*[If there is any supplementary information that does not fit into the main sections of the document but is still important and useful for a full understanding of the project, you can include it in the appendices. This might include raw data, source code, full versions of surveys, more detailed diagrams, or other supporting documents for your main content.]*

*[Note: After including all these sections, ensure that all parts of the document are logically and coherently organized, and that you have thoroughly checked for language, spelling, and grammar errors.]*