ASSIGNMENT 2

TECHNOLOGY PARK MALAYSIA

CT095-6-M-RMCE
RESEARCH METHODOLOGY IN COMPUTING & ENGINEERING
&
CT087-3-M-RMCP
RESEARCH METHODOLOGY FOR CAPSTONE PROJECT

HAND OUT DATE: *See Online Assignment Submission*

HAND IN DATE: *See Online Assignment Submission*

WEIGHTAGE: 60%

INSTRUCTIONS TO CANDIDATES:

1   Submit your assignment Online via Moodle

2   Students are advised to underpin their answers with the use of references (cited using the APA System of Referencing)

3   Late submission will be awarded zero (0) unless Extenuating Circumstances (EC) are upheld

4   Cases of plagiarism will be penalized

Assignment 2: Project Proposal

1. Introduction

A project/research proposal is a concise and coherent summary of your proposed project. It sets out the central issues or questions that you intend to address. It outlines the general area of study within which the project falls, referring to the current state of knowledge and any recent debates on the topic. It also demonstrates the originality of the proposed project.

The proposal is the most important document that is submitted as part of the research process. It gives the student an opportunity to demonstrate that he/she has the aptitude for graduate level research, for example, by demonstrating the ability to communicate complex ideas clearly, concisely, and critically.

The aim of the proposal is to convince the university that:

- There is a need for research; it is significant and important.
- The project will contribute something original to the field.
- The topic is feasible in terms of availability of resources, equipment, supervisors, data, etc.
- The research can be completed in the expected time.
- Ethical issues have been considered and approval has been given for the research by the University.
- The topic matches the student's programme of study, interests, and capabilities.

In this assignment, the student will need to prepare a proposal for the proposed Project. The proposal will be in the form of a written report and there will also be an oral defence. The proposal helps the student focus the project/research aims, clarify its importance and the need, describe the methods, predict problems and outcomes, and plan alternatives and interventions.

2. Contribution

The project/research makes a worthwhile contribution to the field if it fulfils one or more of the following:

- It provides evidence to support or disprove a concept, theory, or model.
- It contributes new data/information, new or improved solution, analysis procedure or a new improved project/research methodology.
- It results in a new or improved concept, theory, model, framework, etc.

3. General Structure of a Project Proposal

The following sections are recommended for the proposal report. Check with the relevant lecturer or supervisor for optional sections, variations and additional sections that may be required:

Title Page
i. Abstract
ii. Table of Contents
iii. List of Figures
iv. List of Tables
v. *List of Abbreviations / Symbols / Terminology (if any)*

1. Introduction
2. Research Background
3. Problem Statement
4. Research Questions
5. Aim & Objectives
6. Scope of the Research
7. Significance of the Research

8. Research Methodology
9. Research Plan
10. Summary
References
Appendices (if any, typically Ethics Approval, Gantt Chart)

Note that other terms or headings may be used, for example 'Justification of the Study' instead of 'Significance of the Research', or 'Purpose of the Study' instead of 'Aim of the research', etc. However, the consistency in different sections of the proposal and final project report is strongly recommended.

In addition, some extra sections may be added to the proposal, if needed, such as Research Contribution, Deliverables, Intellectual Challenges, Ethics, Resources, etc., based to the nature of the project/research and topic. However, the order of contents is important.

3.1. Title Page

This can be a full cover page, including the following information:

- Module name and code
- The title of the project
- Student name and Student ID number
- Degree and programme of study (e.g. MSc in Data Science and Business Analytics)
- Module lecturer's name
- Supervisor's name
- Date (e.g. May 2021)

3.2. Abstract

One (1) paragraph that is a summary of the entire proposal, typically ranging from 150 to 250 words. It is different from a problem statement in that the abstract summarizes the entire proposal, not just mentioning the study's purpose or hypothesis. Therefore, the abstract should outline the proposal's major headings: the research question, theoretical framework, research design, sampling method, instrumentation, and data and analysis procedures. A good abstract accurately reflects the content of the proposal, while at the same time being coherent, readable, and concise. Do not add any information in the abstract that is not previously discussed throughout the proposal. Notice that this paragraph is not indented. Because it highlights the entire proposal, it would be wise to wait and write the abstract last. This way, one merely must reword information that was previously written. Put the abstract on a separate page, immediately following the title page.

3.3. Introduction

Introduce the reader to the research proposal, including a brief introduction to the recognised general subject area and how the topic is related. Briefly point out why it is a significant topic and what contribution the work will make. At the end of the introduction, there could be a paragraph to explain the outline of the proposal, which is the skeleton of the proposal showing how various sections in the proposal are connected and gives the reader an indication of the logical development of the research proposal.

3.4. Project/Research Background

This section provides a brief literature review of the background for the research problem and illustrates to the reader that the researcher is knowledgeable about the scope of the theory. This part provides evidence that the problem that the project plans to work on does exist and needs to be solved. The background review should explain the relation of the topic and research aims to significant literature and recent (and current) research in the field. The form of the background review may vary according to the nature of the field: experimental, philosophical, theoretical, comparative, etc., but its purpose will be the same in all fields. The research background should place the proposed research topic clearly in its relevant research context and should demonstrate your awareness of significant similar or relevant research.

There needs to be critical review and qualitative judgements concerning the literature. Be careful not to allow the evaluation of previous work to become a large open-ended task. Consult with the project supervisors on the types

of questions that need to be asked and what boundaries should be placed on the literature review. In a sense, the background is an incomplete literature review for the project. There is a need to continue to expand and update the literature as the project progresses and as new publications are located. The final literature review will be included in the project report.

3.5. Problem Statement

The "Problem Statement" is an imperative part of the proposal, for research to be conducted, one must notice a problem in the existing literature that has not been previously addressed. For this section, the following questions should be answered: Why does this research study need to be conducted? What specific issues does this study raise that have not been observed in other literature pertaining to the topic? Answering these questions will allow readers to understand why this study is important and how the study will attempt to answer new, never-before asked questions. Problem statement should be strongly justified by literature. It is recommended to support the problem statement by recent, strong, and reliable references.

As a guide, formulate the main problem in a single sentence. This sentence can be used at the start of the section to provide the reader with a quick and concise understanding of the problem to be solved by the project. Then, continue to provide the justification etc. as indicated above.

3.6. Research Question/Hypothesis

It is important that the research questions for which the proposed investigation aims to find an answer are explicitly formulated. These are sometimes referred to as the sub-problems. In this regard, ensure that collectively, the sub-problems encapsulate the import of the main Problem Statement.

Research questions ask what relationships exist between the different variables in the study, while the hypothesis predicts the relationship between variables. List all the research questions in the study, and then include the researcher's hypothesis for the study (if any). This section can be formatted as below:

> For the purpose of this study, the following questions are addressed:
> 1. What are the main features and statistical characteristics of android binary codes?
> 2. How a binary code can be analysed and converted to be employed for training of an artificial neural network classifier model?
> 3. How an artificial neural network can be designed and trained to classify the morphed variants of android file?
> 4. How the proposed neural network can be tested and evaluated?

3.7. Aim and Objectives of the Project/Research

It is appropriate to include a sentence saying "*The main aim of this research is to …* " under this section. Clearly identify the goal of the study in one precise sentence. For example, the sentence could look like this: "*The main purpose of this study is to propose an improved artificial neural network model to classify the variants of morphed android files using statistical features of binary code*". Why is this an important area of study? Answer this question under this section, briefly.

The project has one overall aim. To achieve it, a number of objectives should be formulated. Each objective is a small, achievable and assessable unit, i.e. a sub-goal of the project. Objectives should be formulated in such a way that fulfilling the objectives leads to the overall aim being satisfied. Objectives may be listed as bullet points each should start with "*To …*".

For each research question, an objective may be formulated to answer that question. There should be a direct relationship between the research questions and research objectives.

3.8. Scope of the Project/Research

As each project is focused, the extent to which the solution needs to be developed should be specified. Information in this section may be used to limit the expectations of the outcomes of the particular research work by specifying the limited target group/region (e.g. a particular category of users or country), type of outcome / deliverables (e.g. simulation vs. enterprise development), precision level etc.

3.9. Significance of the Project/Research

This section also known as 'rationale' or 'justification' of the study is crucial because it is one place in which the student tries to convince the supervisor, second marker, external examiners, or examination panels that the project is worth doing. This section describes the potential value of study and findings. It therefore, should identify the audience for the study and how the result will be beneficial to them. Remember research is conducted to add to the existing knowledge base, and/or to solve a problem. How a particular project will do this should be articulated in this section. Note that the justification of the project should be strongly supported by literature. Using reliable recent references is the best way to support the statements.

3.10. Project/Research Methodology

Describe the proposed methods in sufficient detail so that the reader is clear about the following:
- What kind of information will be used?
- From what sources will the information be obtained?
- What resources will be required?
- What methodology will be used?
- Why has this approach been selected?
- What ethical and safety issues have been identified and what mitigating actions would be taken to proceed with the project?

This section is essential to most good research proposals. How to study a problem is often as important as the results collected. This section includes a description of the general means through which the goals of the study will be achieved: methods, materials, procedures, tasks, etc. Typically, a **flowchart** or other related diagrams of the chosen methodology would be given, along with appropriate explanation of the specifics related to your project.

An effective methodology section should:
- Introduce the overall methodological approach for each problem, question, or objective. Is the study qualitative or quantitative? Is a special approach to be taken, such as action research, or use case studies?
- Indicate how the approach fits the overall research design. The methods should have a clear connection with the research objectives, research questions and/or hypotheses. In other words, make sure that the methods will answer the questions. Note that the most common reason for the rejection of professional proposals is that the proposed tests, or methods, or scientific procedures are unsuited to the stated objective.
- Describe the specific methods of data collection to be used — e.g. experiments, surveys, interviews, questionnaires, observation, archival or traditional library research.
- Explain how the results are to be analysed and interpreted. Will statistical analysis be used? Will specific theoretical perspectives be used to help analyse a text or explain observed behaviours?
- If necessary, provide background and rationale for methodologies that are unfamiliar for the readers.
- If applicable, there may also be a need to provide a rationale for subject selection (particularly if not already provided). For instance, if the proposal includes the use of interviews and questionnaires, how to select the sample population? If analysing literary texts, which texts have been chosen, and why?
- Address potential limitations. Are there any practical limitations that could affect the data collection? How will the project attempt to control for potential confounding variables and errors?

3.11. Project/Research Plan

Can be written as Research Timeline, Schedule, Milestone, **Gantt chart**, etc. This will usually be from the date the research began to the expected submission of the completed project report. The timeline can be formatted as a table or a list, or any other standard form of project scheduling format. Include when the start and finish of important aspects of the research would be, such as: literature research, required training or attending courses, stages of experiments or investigations, beginning and completing chapters, reviews and seminars to be presented, and completing the project report.

3.12. References

List all publications cited in the proposal. Only publications cited in the proposal should be listed in the References list. Use only the correct APA referencing system (see the APU library website).

Use very recent and reliable references from journal articles, conference proceedings, books, theses, etc. it is recommended to use a reference manager (such as EndNote, Mendeley, etc.) to help in formatting the references and save time. However, do note that these tools may not be perfect and ultimately, **the student is responsible to ensure that the references are cited, and complete information is written correctly**.

4. Final Submission

The student should revise, proofread, and edit the report themselves – several times! The submission SHOULD NOT BE A FIRST DRAFT. It is encouraged to ask a friend / classmate to read over the proposal and give feedback before turning it in.

5. Format

Typed answers only. Please use the prescribed format for the proposal, which follows the general formatting of the body of the report as specified in the **Thesis Handbook** (see template available on **APU Knowledgebase**). As a guideline, the proposal should be around **3,000** words, excluding references.

6. Presentation

The student will undertake an oral defence of the project proposal with their **Supervisor**. The main aim of this assessment is to assess the ability of the student in effectively communicating the intended project. During the presentation, the student would need to convince the university that:

- There is a need for the project/research; it is significant and important.
- The project/research will contribute something original to the field.
- The topic is feasible in terms of availability of resources, equipment, supervisors, data, etc.
- The project/research can be completed in the expected time.
- The topic matches the student's programme of study, interests, and capabilities.

The presentation would be an oral defence aided with presentation slides. The **slides would need to be submitted online by the submission deadline.** The oral presentation may be conducted **face-to-face, online or via recording, as determined by the respective supervisors**.

6.1.   General Structure of the Presentation

The following sections are recommended for the presentation. Check with the relevant lecturer or supervisor for optional sections, variations and additional sections that may be required:

1. Introduction
2. Project/Research Background
3. Problem Statement
4. Research Questions
5. Aims and Objectives
6. Scope of the Project/Research
7. Significance of the Project/Research
8. Project/Research Methodology
9. Project/Research Plan

7. Plagiarism

Basically, 'plagiarism' means representing someone else's work as if it is one's own. This is a very serious academic offence for all students within the University regulations and is particularly reprehensible for a researcher. Please do not even consider it. Remember that accidental plagiarism (or the appearance of it) may be avoided by referencing the work properly. This **gains** the student credit, not loses it! The simple rule is that one must not represent the ideas of other people (whether they are published works or the work of other students) as their own.

The golden rule on plagiarism is **DO NOT DO IT!**

8. Assessment Criteria and Marking Scheme

Criteria	Weight	Distinction	Merit	Pass	Fail
		75 - 100	65 - 74	50 - 64	0 - 49
Proposal structure, Format, English Writing, Grammar, and Spelling	5	A very good Proposal have been produced showing no deficiencies in organisation. The work will be of a professional standard. Excellent and professional writing, few grammatical or spelling mistakes.	A reasonable Proposal have been produced with all required sections. In areas, there will be minor deficiencies such as layout or poor referencing. Generally good writing, some errors, inconsistent spellings.	The created report is weak in its presentation. Sections required will be present but not addressed at a suitable level. Writing is not very good, but still understandable, with some errors and inconsistencies.	The report is very poor in presentation with its construction lacking elements of the report (e.g. unsuitable structuring). Poor, grammar sometimes makes meaning difficult to interpret, Inconsistent spelling, or grammar.
Introduction and Background of the Project/Research	10	Outstanding evidence of systematic review using multiple searches, multiple databases.	Evidence of reviewing, possibly complete, and using appropriate approaches.	Incomplete and not system-atic, but adequate to iden-tify part of the literature.	Fails to identify enough of the literature to yield an in-formative review.
Problem Statement and Research Questions	10	The research problem is clearly defined, and relevant to the programme of study. PS supported by very recent references. RQs are very clear and relevant to the PS.	The research problem is moderately clear and rele-vant, but it is not strongly supported by LR, and need some adjustments. RQ could be written better.	The research problem is un-derstandable, but not very clear and relevant to the programme of study. It is not sufficiently supported by LR. RQ need to be modified.	The research problem is not clear or relevant to the pro-gramme of study. It is not supported by LR. RQs are not related to the PS and should be revamped.
Aim and Objectives	10	Aim and objectives are con-cisely elaborated. Original and highly relevant ROs are clearly articulated.	Aim and objectives are identified and mostly rele-vant to project. Relevant ROs outlined but could be tighter in their focus.	Aim and Objectives are described clearly, but not biased from PS.	Aim and objectives are de-scribed in broad terms only. ROs outlined but lacking in clarity or focus.
Scope and Significance of the Project/Research	10	The significance and scope of the research is clearly described. The research is strongly justified and supported by reliable references.	The significance and scope of the research is clear, but there is a lack of strong support by reliable references.	The significance and scope of the research is moderately clear, by weak support from references.	The significance and scope of the study is described, but it is not clear or supported by any reference.
Project/Research Methodology	15	Creative and highly appropriate methodology is clearly articulated and justified.	Methodology is explained and appropriate for the project.	An appropriate methodology is broadly outlined, but details are not always clear	The methodology is either not appropriate for the project or is poorly articulated suggesting deficits in understanding.

Project/Research Plan	5	Excellent planning and evaluation of the requirements for the successful delivery of the project.	Correct planning and evaluation of the requirements for the successful delivery of the project.	Planning and evaluation of the requirements are provided, but some omissions in task, deliverables, or resources.	Insufficient planning and/or evaluation of the requirements for the successful delivery of the project.
Citations and References	5	There is full, accurate, and professional citations of very recent sources and reliable references with correct format.	Citations are mostly done, and references are up to date, but there are some outdated and non-reliable sources, suitable format.	References and citations are acceptable, but lack of high quality and professional sources, acceptable format with some mistakes.	Inadequate citations of sources, outdated and unreliable references, poor format with many mistakes.
Presentation	10	The presentation was excellent, with a clear structure and included all the necessary parts and contents with details. Time management, and English presentation were excellent.	The presentation had a clear structure and included most of the required sections, but some details were not presented. Time management and English presentation needed to be improved.	The presentation had a moderately clear structure and included the required contents, but details of contents are not provided. Time management and English presentation were satisfactory.	The presentation was weak in terms of structure, contents, and details. Time management and English presentation were weak.
Slides	10	The presentation used excellent slides, in terms of layout, content, consistency of formatting, order of information, title page, page numbers, references, etc.	The presentation used good slides, in terms of content, but some features of a professional slides are not provided, or inconsistencies in terms of layout or formatting.	Slides were satisfactory, but slides are not prepared in a good manner in terms of content/Inconsistency of layout and formatting	Slides were poor and most of feature to show a satisfactory presentation were not included in slides/ poor layout and formatting
Questions and Answers	10	The student was able to correctly interpret the questions and answer accordingly and very confidently. Responses to questions were at the correct depth, and in an appropriate language given the audience. A deep knowledge and understanding of the subject area was demonstrated.	The student was able to correctly interpret the questions and answer accordingly. Responses to most of questions were at the correct depth, and in an appropriate language given the audience. A knowledge and understanding of the subject area was mostly demonstrated.	The student was able to correctly interpret some questions and answer accordingly. Responses to questions were mainly at the correct depth, and in an appropriate language given the audience. Knowledge of the subject area was satisfactory.	The student was not able to interpret many questions correctly, and responses were not I correct depth and appropriate to the question. A low level of knowledge and understanding of topic is demonstrated by the student.