C964: Computer Science Capstone Template

Task 2 parts A, B, C, and D

Part A: Project Proposal for Business Executives

Letter of Transmittal

Write a single-page cover letter to the organization's senior leadership. The letter should be concise and target a non-technical audience. Include the following:
- Problem summary.
- Recommendation for a solution centering around your application (called a *data product* in the task directions).
- Describe how the proposed solution benefits the organization.
- Provide an estimate of the total cost (this should match the total given in *Funding Requirements* of part A).
- Expertise and experience qualify you to develop the solution.
- Include all artifacts typical of a professional (business) letter, e.g., subject line, date, greeting, signature, etc.

Part A: Project Recommendation

Write a follow-up proposal to the letter of transmittal providing more details on how your project meets their organizational need(s). Again, the target audience is the same non-technical senior leadership from the *Letter of Transmittal*. Typically, this section is 2-3 pages; **write everything in the future tense.**

Problem Summary

- Summarize the project.
- Describe the setting and why the project is needed.
- Briefly describe how the project meets the business' (or organization's) needs.
- Describe what will be delivered and achieved.

Application Benefits

- Describe (in more detail than above) how the project meets the business's (or organization's) needs.
- Describe how the business (or organization) will benefit from implementing the proposed solution.

Application Description

- Provide technical details on how the application will solve the problem.

Data Description

- Identify the origin of the raw data.
- Describe the type (nominal, quantitative, etc.) and structure of data.
- Identify dependent and independent variables.
- Describe any anomalies (e.g., outliers) and limitations.

Objectives and Hypothesis

- Identify and describe desired outcomes of the project.
- If applicable, state a hypothesis.
- If applicable, state the desired prediction accuracy.

Methodology

- Identify the methodology used to develop and implement the project.
- Describe why the chosen methodology is appropriate for the project.
- Provide an outline of the project methodology describing each phase.

Funding Requirements

- Describe the project's funding requirements, including environment, personal, licensing, and tools.
- The funding amount should match the letter of transmittal.

Data Precautions

- Identify any sensitive or protected data.
- If applicable, review the general guidelines related to working with that data.
- If applicable, describe necessary precautions which will be taken.
- If either of the above is not applicable, explain why (public datasets, such as those from Kaggle.com, have no such restrictions).

Developer's Expertise

- Describe the developer's (you) qualifications, e.g., academic training, professional expertise, experience, etc. Using future qualifications, such as your WGU degree in Computer Science, is acceptable.
- Relate the listed qualifications to the needs of the project.

Part B: Project Proposal

The project proposal should target your client's technically savvy IT professional leadership. Use appropriate industry jargon and sufficient technical details to describe the proposed project and its resulting application. Remember, you're establishing the technical context for your project and what it will accomplish for the client. Typically, this section is 8 – 10 pages. **Write everything in the future tense.**

Problem Statement

- Describe the problem.

Client (or Customer) Summary

- Describe the client (or customers).
- Describe why your proposed *application* (a *data product* in the task directions) will resolve the problem successfully.

Existing System Analysis

- Describe (if any) what application(s) or tool(s) the client currently uses.
- Describe the shortcomings of this current technological environment, i.e., what your solution is needed.

Data

- This section should include (where applicable) descriptions of:
  - The raw data set.
  - How data will be collected, processed, and managed throughout the application development life cycle: design, development, maintenance, or others.
  - How data anomalies, e.g., outliers, incomplete data, etc., will be handled.

Project Methodology

- Describe an industry-standard methodology to be used to develop and (if applicable) deploy your application.
- Describe the planned development of your application in each phase of the methodology, e.g., analysis, design, etc.

Project Outcomes

- Provide descriptions of all deliverables. For example:
  - The finished application.
  - A user guide.

Implementation Plan

- Provide an outline of how the project will be implemented. This description might include:
  - General strategy.
  - Phases of the rollout.
  - Dependencies.
  - Details for testing and distribution.

Evaluation Plan

- Describe the verification method(s) to be used at each stage of development.

- Describe the validation method to be used upon completion of the project.

Resources and Costs

- Itemize hardware and software costs.
- Itemize estimated labor time and costs.
- Itemize estimated environment costs of the application, e.g., deployment, hosting, maintenance, etc.

Timeline and Milestones

- Provide a projected timeline, including start dates and end dates for each milestone (a table is acceptable).

Part C: Application

Part C is your submitted application. The document only needs to include a list of any submitted files or links.

Your submitted *application* (called a data product in the task directions) must include the following features:
- Three visualizations (three different images). Static images are permissible.
- A *Descriptive method* = anything that describes the data.
    - Images can double count as your visualization and descriptive method.
    - Ex. mean, median, bar plot, scatterplot, k-means clustering, etc.
- A *Non-descriptive method* = is anything that infers from the data, i.e., makes predictions or prescriptions.
    - Ex. classification models, regression, image recognition, etc. This is typically where machine learning is applied.
- Applying "machine learning" in the non-descriptive OR descriptive method (most data analysis algorithms are acceptable -including regression).
- An interactive "dashboard."
    - The application must be usable for solving the proposed problem. Any method enabling the user to interact is acceptable, including the command line. A GUI is *not* required.
- A "user-friendly" interface.
    - Following the "user guide" of part D, the evaluator can successfully run your application as described on their machine.
- Security appropriate to your application's need.

Part D: Post-implementation Report

Create a post-implementation as outlined below. Provide sufficient detail so that a reader knowledgeable in computer science but unfamiliar with your project can understand what you have accomplished. Use of examples and visualizations (including screenshots) beyond the three required is highly recommended. **Write everything in the past tense.**

A Business (or Organization) Vision

- Describe the problem.
- Describe how your application solves the problem.
- Describe how the user can use your application to solve the problem.
  - Though not required, an example demonstrating how a user will apply the product is helpful for evaluators.

Datasets

- Describe the raw and processed data.
- Provide an example (or examples) of the raw and processed data (if applicable).
- Provide access to any datasets used.
- Describe how the data's security (storage and maintenance) suits the needs of your project.

Data Product Code

- Review the functionality of the code used to perform the analysis and develop your application.
  - Processing raw data (if not applicable, explain why).
  - Descriptive methods(s) and visualizations.
  - Non-descriptive method(s)
- For the non-descriptive portion, describe the following:
  - The analytic methods
  - Why these methods are appropriate for the project
  - How they were developed, e.g., trained and tested.
- Where applicable, discuss how the data analysis supported the choosing and improving your descriptive and non-descriptive methods.
- Through direct submission or shared links, evaluators should be given access to all sources necessary for the development of your project.

Objective (or Hypothesis) Verification

- Describe the project's objective (or hypothesis).
- Discuss if and why the objective (or hypothesis) was met (or not met).

Effective Visualization and Reporting

- Describe how the descriptive method(s) and visualizations supported your non-descriptive method(s) development process. Items discussed should include:
  - Data exploration.
  - Data analysis.
  - Data summary.
  - Analysis application of three visualizations (include examples of all three).

Accuracy Analysis

- Provide a description including objective metrics assessing the accuracy of your non-descriptive method.

        o   If not applicable, describe how future developments of the project could measure accuracy.
- Include an example demonstrating the non-descriptive method and discuss the accuracy.

Application Testing

- Describe how the application was tested.
- Explain how the testing results were used to improve the application. If no modification was necessary, explain why.

Application Files

- Provide a hierarchical list of files and libraries required to execute (or access) your application through a Windows 10 machine.
- Describe the organization of files in the submission.

User Guide

- Include an enumerated (steps 1, 2, 3, etc.) guide to execute and use your application.
  - Include instructions for downloading and installing any necessary software or libraries.
  - Your application will be considered "user-friendly" if the evaluator successfully executes and uses your application on a Windows 10 machine following your instructions.
- Though not required, an example demonstrating how a user will apply the product is helpful for evaluators.

Summation of Learning Experience

- Describe how your previous experience (academic or professional) readied you for this project.
- Describe any additional learning or resources needed to complete this project.
- Describe how this experience contributed to your concept of lifelong learning.