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| Level 6- New Zealand Diploma in Software Development (2604) | | |
| Title | Assessment2 (Term3- Emerging Technologies) | |
| Internal Doc Version | 1.1 | |
| Last updated | 10 June 2023 | |
| Graduate Profile Outcome | **GPO 2-** Write and maintain programs using design patterns, data structures and algorithms to meet specifications.  **GPO 3-** Apply a range of software quality assurance techniques to verify correctness of systems.  **GPO 10-** Apply communication, information design, personal, and interpersonal skills, clearly and professionally to enhance working effectiveness, efficiency, and quality outcomes in an organisational environment. | |
| Learning Outcome | 2.1 | Coding – object oriented, procedural (1 credit) |
|  | 2.4 | Writing code following design patterns and software development standards (3 credits) |
|  | 2.6 | Optimisation concepts and techniques (5 credits) |
|  | 3.1 | Designing a variety of tests including unit and system tests, usability testing, user acceptance tests; incorporating a range of testing techniques e.g., white box, black box, boundary-value testing (2 credits) |
|  | 3.3 | Executing tests using manual and automated software testing, and documenting results (2 credits) |
|  | 3.4 | Debugging, which includes debugging utilities, managing bug reports and issue tracking. (1 credit) |
|  | 10.1 | Information representation design for multiple situations e.g., data visualisation; technical writing - help documents, user instructions, specifications; (1 credit) |
| Credits | 15 Credits | |
| Duration | Two days (4 hours each) | |
| Assessor Name | Arjinder Singh | |

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| Assessment Section | Marks  Possible |
| Part A- Task1 | 80 |
| PartB- Task2 | 70 |
| **Total** | **150** |
| Grade A+=95-100%, A=90-94%, A-=85-89%, B+=80-84%, B=70-79%, B-=60-69%, C+=55-59%, C=50-54%, D=Below 50% |  |
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| **Learner Declaration Statement**  *Only sign if you agree to the Learner Declaration Before assessment and After assessment sections below* | | | |
| Learner Name | Harrison Bennett | Learner Signature |  |

Learner Instructions and Declaration

**Declaration Statement**

I have read, understood, and agreed on the following (refer to student handbook):

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| Before the assessment |  |
| Techtorium Assessment Conditions and Guidelines | The responsibilities of the learner |
| The assessment environment is safe and accessible | The responsibilities of the assessor |
| The Learning Outcomes that will be assessed | Options for re-assessment |
| This assessment is my own original work, unless otherwise specified | Your completed assessment paper is the property of Techtorium and should not be removed from the premises at any time. |
| I have acknowledged all sources of information used in the writing of this assignment by using the recognized in-text APA referencing standard using the latest version. All unpublished sources of information have been acknowledged. | I have not copied either partially or in full any work from any other learner or former learner of Techtorium or any other tertiary institution. I promise not to share this project in part or whole with any other learner at Techtorium or outside this campus |
| I make this declaration in full knowledge and understanding that, should it be found false, Techtorium may take disciplinary action. | I understand that Techtorium may make use of systems such as Turnitin.com to verify the originality of my work. |
| [Academic Fraud](https://www.nzqa.govt.nz/assets/Providers-and-partners/NZQA-Effective-practice-guide.pdf) is a serious issue and will compromise your ability to study at Techtorium. If there is any doubt in your mind, then you should:   * State that you have copied and pasted work from another source * Use APA referencing * Include a weblink to the original source * Ask your Assessor for clarity | |
| After the assessment |  |
| 1. During the assessment it was clear what I was expected to do | 1. The feedback I received enabled me to find ways of reaching the standard (if it was not reached during the assessment) |
| 1. I was treated fairly | 1. The feedback I received met my needs and expectations |
| Learner feedback – *Before and After Assessment*:  *Please provide feedback so we can improve our Assessment Process:* | |

**Learner Instructions**

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| **Overview**   1. If you have any questions, you can ask your assessor before you start the assessment. 2. If you have any unforeseen circumstances which may affect your performance during the assessment. Please speak to your assessor before you start the assessment. 3. If you wish to query the Assessor marking, then follow the appeal process stated in the Student Handbook 4. This assessment is to be submitted as a soft copy which will be saved to a location specified by the Assessor at the time of the assessment. 5. If you are referring to external work, you must use the appropriate referencing style APA version 7 [reference link](https://guides.unitec.ac.nz/apareferencing/webpages) or equivalent hyperlinks. 6. If you are attaching any document, you must mention in the Proof of work that “document attached” with the specified name of the document. 7. The assessment will be completed in class during the scheduled time. 8. The product that you submit by the end of the allocated time for this assessment will be considered your last product for assessment. 9. You must complete this assessment on your own (individual work). 10. You are only allowed to use resources as prescribed by each task. 11. **This assessment will be conducted in 2 days (4 hours each). Part A will be released on day 1 and Part B will be released on day 2. Please note: Part B (Day 2) will not be available on day 1.**   **Technical Details**   1. Assessments will be given through Canvas and must be uploaded through Canvas. 2. Where applicable you must include clear screenshot evidence. Images must not be unreadable when zoomed in or out. 3. You must not modify any part of this document except the relevant sections in which you are expected to write or embed other documents.   **Success Criteria**   1. All work for this assessment must be original including any written work. See referencing section above if you have any doubts. 2. To pass Part A of this assessment:  * you must reach a minimum of a C grade (50%) for SR1.1, SR1.3 to SR1.6 * you must reach a minimum of a C grade (50%) for SR1.2  1. Your submission will be assessed through Turnitin.com to check the authenticity, **IF** any fraud/duplicate is detected, necessary actions will be taken.   **Learner Resources**  You will have access to the following resources for this assessment:   1. Assessment Coversheet (This document) 2. Declaration from Learner (This document) 3. Learner Instructions (This document) 4. Your own Device |

# Part A

# Scenario

You are a financial analyst working for a leading financial institution that offers a range of banking and investment services. The company is planning to launch a new wealth management service, and as part of this initiative, they want to develop a predictive model to estimate the net worth of potential clients. This will help the institution tailor their services and investment recommendations to individual clients' financial situations.

Your company has gathered data from existing clients who have provided various pieces of information about their personal and financial profiles. The dataset includes the following attributes:

1. Client Name
2. Client Email
3. Profession
4. Education
5. Country
6. Gender
7. Age
8. Income
9. Credit Card Debt
10. Healthcare Cost
11. Inherited Amount
12. Stocks
13. Bonds
14. Mutual Funds
15. ETFs (Exchange-Traded Funds)
16. REITs (Real Estate Investment Trusts)
17. Net Worth (Target Variable)

Your task as a financial analyst is to build a predictive model that can estimate a potential client's net worth based on these attributes. Accurate net worth estimates are essential for providing tailored financial advice and investment strategies.

## Requirements

You must attempt the following tasks:

* You must train minimum 7 models which must include ‘Linear Regression’ and ‘Ridge Regression’ to identify the optimized model for the above given dataset and select the optimized model to make the predictions.
* You must write code using object oriented and procedural programming approaches.
* You must write code using the appropriate design pattern.

[Note: All the required dataset and templates are available along with the assessment component]

# Task 1:

**Outcome Mapping:**

**2.1 - Coding – object oriented, procedural (1 credit)**

**2.4 - Writing code following design patterns and software development standards (2 credits)**

**2.6 - Optimisation concepts and techniques (5 credits)**

## Solution Requirements

**The following solution requirements will be calculated toward your final grade for this term. You MUST attempt all the SRs.**

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| SR# | Solution Requirement | Details | Max Marks |
| SR1.0 | GitHub link  Push your code to the repository, add “techtoriumtrainer” as a collaborator. | Provide a link of the repository | 1 |
| Attach link here.    <https://github.com/BarryHennett/Term-3-AI.git>  (Has all of terms work. In the “tests” folder you will find the assessments python file named “AI\_Assessment”, the readme will be updated at a later date according to the sharepoint tasks.) | | |  |
| SR1.1 | Visualise the data to identify the relationship between different variables to select the relevant features for input and output.  Write a method to plot the relationships between different variables of the dataset. | Provide a screenshot of the code and graph. | 6 |
| Proof of work | | |  |
| SR1.2 | Train minimum 7 models which must include the ‘linear regression’ and ‘ridge regression’ to identify the optimised model to make predictions using given dataset.  Write a code using:   * object oriented and procedural approach. * Design patterns * Code must follow the series of steps to train the model and predict the outcome. | Provide screenshots of the complete code which must include all the steps required to train the models. | 45 |
| Proof of work | | |  |
| SR1.3 | Write a code to evaluate and plot the performances of various models for the given dataset and identify the optimized model for predictions. You must follow either object oriented or procedural approach to write the code. | Provide a screenshot of the code and bar chart. | 12 |
| Proof of work | | |  |
| SR1.4 | Write a code to retrain the model for complete dataset and save the optimized model. You must follow either object oriented or procedural approach to write the code. | Provide a screenshot of the code which must focus on retrain the model for the complete dataset then save it. | 6 |
| Proof of work | | |  |
| SR1.5 | Predict the output with the selected optimized model using given input. You must follow either object oriented or procedural approach to write the code. | Provide a screenshot of the code which must include the input values and output after prediction. | 6 |
| Proof of work    Same code as Screen Shot Below:  def New\_Data\_Prediction(loaded\_model, sc, sc1):      TestOX1 = sc.transform(np.array([[52,35069.41886,1851.979839,31978.9799,4897.702477,16393.51771,46929.38914,23370.35779,18246.00139]]))      pred\_value = loaded\_model.predict(TestOX1)      print(pred\_value) | | |  |
| SR1.6 | Main machine learning workflow | Provide a screenshot of the Main part of the code | 4 |
| Proof of work | | |  |

# ------------------------------------------------------------------------------------------- End of Part A---------------------------------------------------------------------------------------