Assignment Specification School of Computer and Engineering Sciences			
Module Code CO7024	**Module Title** Statistical Programming	**Assessment No** 1 of 2	**Weighting** 40%
Title : Critical review		**In-Year Reassessment Offered** Yes	**Generative AI** Not Allowed
Summary This assignment aims to investigate and evaluate statistical techniques alongside Python libraries for data analysis, focusing on their effectiveness and applicability. It involves assessing their suitability for handling diverse data types and exploring their potential applications in the field of data science.		**Submission Date** 13/03/25 at 13:00 7-day Submission Window Allowed	**Feedback Due** 10/04/25

Instructions

- This assignment requires you to produce a report that addresses the numbered elements listed in the assignment brief below.

- Please submit a single document (.pdf format) via Moodle that addresses the tasks in the assignment brief.

- The use of generative AI is not allowed for this assignment.

Assignment Brief

In this assignment, you are required to critically compare statistical techniques and tools used for data analysis. Follow the steps below to structure your work effectively:

1. Choose a Statistical Technique:

   - Select a statistical technique such as regression and prediction (e.g., linear regression, K-Nearest Neighbor (KNN), etc.). If you wish to explore a different technique, ensure you discuss it with your tutor for approval.

2. Select Python Libraries:

   - Identify two Python libraries to implement the chosen technique. Recommended options include TensorFlow, Matplotlib, Seaborn, SciPy, Scikit-learn, and Mito. You may also propose additional libraries, subject to tutor approval.

3. Introduction to Technique and Tools:

   - Provide a brief overview of the selected statistical technique:

     - Explain its purpose and typical applications.

     - Detail the mathematical formula or equations behind the technique.

     - Describe how the technique handles various data types (e.g., numerical, categorical).

   - Introduce the two Python libraries:

     - Highlight key features and functionalities relevant to your chosen technique.

     - Outline their strengths and potential limitations.

4. Implement and Analyse:

- Use both libraries to apply the selected statistical technique:

  - Choose or create a dataset with diverse data types.

  - Conduct exploratory data analysis (EDA) using tools like Matplotlib or Seaborn to visualize data.

  - Implement the statistical technique in both libraries, providing clear code snippets and outputs.

  - Discuss the results obtained from each implementation.

5. Critical Comparison:

   - Critically evaluate the two libraries based on:

     - Ease of use and implementation.

     - Efficiency and performance when handling the chosen technique and dataset.

     - Quality and clarity of visualizations and outputs.

     - Additional features that enhance functionality or usability.

     - Challenges or limitations encountered during the analysis.

   - Assess the appropriateness of each tool for working with multiple data types and their potential applications in data science.

Requirements:

Compose a detailed report that covers items 1–5 outlined above. Organize your report using the following structured sections

   a. Introduction**:** Brief overview of the technique and tools. (10 marks)

   b. Methods: Detailed explanation of your methodology, including dataset selection and preparation. (25 marks)

   c. Results: Presentation of results, supported by relevant visualisations and statistical outputs. (25 marks)

   d. Discussion: In-depth evaluation and comparison of the tools. (20 marks)

   e. Conclusion: Summarize insights and recommend the most suitable tool for the selected technique. (10 marks)

   10 marks for proper referencing, reference list and report format

Additional Information

Assessment Support

Students can get support on this module by speaking to the module tutor (Nkosi Mpofu) in sessions, by reaching out via email (n.mpofu@chester.ac.uk) or by booking a one-on-one online meeting. Additional support sessions will take place during the module meetings.

Submission Window, Exceptional Circumstances, and Assessment Regulations

You are expected to submit work by the submission date specified at the start of the assignment specification. Some assignments may support a 7-day window in which students can submit work late without penalty and this will be specified below the submission date at the start of this brief. Any work submitted outside of the submission date (or submission window where allowed) will be given a mark of zero.

You can find details about what you need to do if you are unable to submit the assessment on time on the Registry Services Exceptional Circumstances Portal page. Any deferral request must be submitted online within 7-days of the final submission date (or submission window where allowed). In all cases, evidence will be required to support the deferral.

You can find out more about University regulations related to assessment on the Registry Services Assessment Regulations page.

Academic Conduct

The material you submit must be your own work. You must not collude with your peers on your work unless the brief explicitly allows this (such as in the case of group work). The penalties for breaching the academic conduct policy are severe. The minimum penalty is usually zero for that piece of work. Further information is available below:

- Academic Conduct
- Excess Word Count Penalties
- Cite Them Right Online guidance

Generative AI

The use of generative AI tools where not permitted will be treated as a breach of the academic c**onduct** policy.

This assignment **does not** permit the use of any generative AI tools, including but not limited to ChatGPT, Gemini, Copilot, Midjourney, and others.

Referencing code

Code adapted from third parties must be clearly referenced using comments to denote the start and end of the adapted code. You must also include an APA format reference in the PDF file.

Example of referenced code
```
//code adapted from Thomson, 2012
if (someCharacter == 'z' || someCharacter == 'Z') {
    someCharacter -= 25;

}
//end of adapted code
```

Example of reference entry in PDF file
Thomson, C. (2012). *Rot-13 function in Java?.* Stackoverflow. Retrieved October 25, 2021, from
http://stackoverflow.com/questions/8981296/rot-13-function-in-java

Submission Information

- Please submit a single document (in pdf format) via Moodle by the specified due date. The word limit is 1500 words
- Your file must be named with your assessment (J number), e.g. J123456.pdf or J123456.docx.
- Files submitted in an incorrect format will usually be marked as zero.
- Any late work penalties for assignments will be calculated using the latest submission date/time

Assessment Criteria Postgraduate

Assignment Task	Fail (<50%)	Pass (50-59%)	Merit (60-69%)	Distinction (>=70%)
Introduction	Missing or vague overview of the statistical technique and tools. Fails to explain their purpose or relevance.	Provides a basic overview of the technique and tools but lacks depth and clarity.	Clear and structured introduction with a good explanation of the technique, its applications, and tools.	Comprehensive introduction with detailed insights into the technique, its purpose, applications, and tools.
Methods	Poor explanation of the methodology. Dataset selection and preparation are unclear or incomplete	Methods are described but lack detail or logical flow. Dataset preparation may be inadequate.	Detailed explanation of methodology with well-justified dataset selection and preparation	Excellent methodology section, with thorough, well-organized, and logically justified dataset preparation and techniques
Results	Incomplete or unclear presentation of findings. Missing or poorly explained visualizations.	Findings are presented but lack coherence or sufficient detail. Visualizations are basic or unclear.	Well-presented findings with clear visualizations and statistical outputs.	Exceptional results section with insightful findings, high-quality visualizations, and comprehensive analysis.
Discussion	Lacks critical evaluation or comparison of tools. Fails to address key strengths or limitations.	Limited evaluation of tools with basic insights into strengths and weaknesses.	Good critical evaluation, addressing strengths, limitations, and usability of tools.	Outstanding evaluation with deep insights into tools' strengths, weaknesses, and performance in various contexts
conclusion	Lacks a clear summary of insights or recommendations	Basic summary provided but lacks depth or actionable recommendations	Clear and well-supported conclusions with recommendations for the most suitable tool.	Exceptional conclusions, synthesizing key insights and offering well-justified recommendations
Referencing	Missing or incomplete references. Poor formatting and lack of adherence to academic standards.	References are included but may lack consistency or proper formatting	Proper referencing with consistent formatting. Report is well-organized and professional.	Excellent referencing and formatting. Report is polished, professional, and adheres to academic standards