جامعة الحسين التقنية
Al Hussein Technical University

ASSIGNEMNT BRIEF

HTU Course No: 10204210 **HTU Course Name:** F/618/7415	**BTEC Unit No:** Data Analytics **BTEC Unit Name:** Data Analytics

Assignment Brief Number: 1

Version: 2

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Assessment Brief

Student Name/ID Number/Section	
HTU Course Number and Title	**10204210 – Data Analytics**
BTEC Course Number and Title	**Unit 8 [F/618/7415–Data Analytics]**
Academic Year	Spring 2022-2023
Assignment Author	Dr. Raneem Qaddoura
Unit Tutor	Dr. Raneem Qaddoura Bassam Kasasbeh
Assignment Title	Data Analytics using Python
Assignment Ref No.	1
Issue Date	09/05/2023
Formative Assessment Dates:	12/03/2023 to 01/06/2023
Submission Date	18/06/2023
IV Name & Date	Eng. Aisha Al Sadi - 06/05/2023

Submission Format

The assignment submission should be through the university's eLearning system within the deadline specified above using the following link: https://elearning.htu.edu.jo.

Submission of the assignment is expected to be as follows:

1. Four certificates from DataCamp in pdf format (Part 1).
2. Python Google Colab / Jupiter notebook (ipynb) with all results displayed within the notebook for the descriptive and predictive analytics part of your work (Part 2).
3. Python Jupiter notebook (ipynb) with all results displayed within the notebook for the prescriptive analytics part of your work (Part 3).
4. A report in .docx format (Part 4).
    a) You must effectively use headings, bullet points, and subsections as appropriate. Your research should be referenced using the Harvard referencing system.
    b) Use 12pt font size using the times new roman font family.
5. Declaration Form filled out and signed correctly.

Note: DO NOT compress (zip) any file.

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Unit Learning Outcomes

LO1: Discuss the theoretical foundation of data analytics that determine decision making processes in management or business environments.

LO2: Apply a range of descriptive analytic techniques to convert data into actionable insight using a range of statistical techniques.

LO3: Investigate a range of predictive analytic techniques to discover new knowledge for forecasting future events.

LO4: Demonstrate prescriptive analytic methods for finding the best course of action for a situation.

Assignment Brief and Guidance

You have been hired as a new data analyst at a start-up company that studies and improves stock exchanges. One of the essential factors the company is exploring is the stock price. Your first task is to analyze a stock dataset attached to the assignment and predict the peak (highest point) and the trough (lowest point) stock price value. Your second task is to show how to minimize a trader's spending on the stock.

To fulfill the assigned tasks, you must finish the following parts:

Part 1: Demonstrate an ability to use a popular programming language or tool used in the data analytics industry by completing the following courses from DataCamp:

1. Introduction to Python
2. Intermediate Python
3. Introduction to NumPy
4. Data Manipulation with Pandas

Part 2: Write a code using Google Colab / Jupiter file to include the following items:

1. Apply Python programming language to demonstrate the **descriptive** analytics techniques by applying the following:
   a. Analyze at least three features by using appropriate measures and visualization charts.
   b. Using a contingency table find an association between at least two features.
2. Apply Python programming language to demonstrate these **predictive** analytic techniques by applying the following:
   a. Apply a feature selection technique to find the best features that help the model achieve the best stock price prediction.
   b. Predict the “high” label (peak stock price) and “low” label (trough stock price) using different techniques.
   c. Compare the results of the different techniques using appropriate evaluation measures.
   d. Visualize the results using proper charts to show the quality of the different predictive models.

Part 3: Write a code using Jupiter file to demonstrate these **prescriptive** analytic techniques using a Python programming language technique by applying the following:

1. Based on the following table, determine the optimal stock quantity for each bank so that traders can minimize the amount they spend on the stock.

Bank Name	Index	Sat 7/5/2022	Sun 8/5/2022	Mon 9/5/2022	Tue 10/5/2022	Wed 11/5/2022	Thu 12/5/2022
Index		1	2	3	4	5	6
ARBK	1	1.33	5.59	1.6	0.47	0.33	0.58
HBTF	2	0.5	0.47	0.83	1.14	1.23	1.19
AHLI	3	0.1	1.18	1	1.36	0.5	0.45

Use the following equation in the objective function:
$1.33 * Q_{11} + 5.59 * Q_{12} + 1.6 * Q_{13} + 0.47* Q_{14} + 0.33 * Q_{15} + 0.58 * Q_{16} + 0.5 * Q_{21} + 0.47 * Q_{22} + 0.83 * Q_{23} + 1.14 * Q_{24} + 1.23 * Q_{25} + 1.19 * Q_{26} + 0.1* Q_{31} + 1.18 * Q_{32} + 1 * Q_{33} + 1.36 * Q_{34} + 0.5 * Q_{35} + 0.45 * Q_{36}$
where each quantity is limited to 5 stocks and total quantity is not less than 10 stocks.

2. Compare the results of the different techniques.

Part 4: Prepare a report demonstrating how you analyzed the data and generated the predictive model, then show the insights you have reached. Your report should include the following sections:

1. Identify data analytic activities, techniques, and tools.
2. Investigate the three types of data analytic methods and their use in industry.
3. Investigate **descriptive** analytic techniques and explain with appropriate examples from the **descriptive** analytics code you implemented. Then, show how these **descriptive** analytic techniques contribute to decision-making.
4. Identify **predictive** analytic techniques and describe these techniques with examples from the **predictive** analytics code you implemented. Then, compare a range of **predictive** analytical techniques for forecasting purposes.
5. Analyze **prescriptive** analytic techniques with appropriate examples.
6. Describe how **prescriptive** analytic techniques are used to find the best course of action.
7. Evaluate the importance of data analytical techniques to the decision-making process by evaluating the **descriptive** analysis results you have achieved through the code you implemented.
8. Evaluate how **predictive** analytic techniques can be used for forecasting purposes by evaluating the **predictive** analysis results you have achieved through the code you implemented.
9. Show how your implementation finds the best course of action that minimizes the trader's spending when applying Python programming language to demonstrate the **prescriptive** analytic techniques.

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<table>
<tr><th colspan="3">Learning Outcomes and Assessment Criteria</th></tr>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td colspan="2">LO1 Discuss the theoretical foundation of data analytics that determine decision-making processes in management or business environments</td><td rowspan="4">D1 Evaluate the importance of data analytical techniques to the decision-making process.</td></tr>
<tr><td>P1 Identify data analytic activities, techniques, and tools.

P2 Demonstrate an ability to use a popular programming language or tool used in the data analytics industry.</td><td>M1 Investigate the three types of data analytic methods and their use in industry.</td></tr>
<tr><td colspan="2">LO2 Apply a range of descriptive analytic techniques to convert data into actionable insight using a range of statistical techniques</td></tr>
<tr><td>P3 Investigate descriptive analytic techniques and explain with appropriate examples.

P4 Apply an appropriate tool or programming language to demonstrate these descriptive analytics techniques.</td><td>M2 Show how these descriptive analytic techniques contribute to decision-making.</td></tr>
<tr><td colspan="2">LO3 Investigate a range of predictive analytic techniques to discover new knowledge for forecasting future events</td><td rowspan="2">D2 Evaluate how predictive analytic techniques can be used for forecasting purposes.</td></tr>
<tr><td>P5 Identify predictive analytic techniques and describe these techniques with examples.

P6 Apply an appropriate tool or programming language to demonstrate these predictive analytic techniques.</td><td>M3 Compare a range of predictive analytical techniques for forecasting purposes.</td></tr>
<tr><td colspan="2">LO4 Demonstrate prescriptive analytic methods for finding the best course of action for a situation</td><td rowspan="2">D3 Apply an appropriate programming language or tool to demonstrate how these prescriptive analytic techniques are used to find the best course of action in a situation</td></tr>
<tr><td>P7 Analyse prescriptive analytic techniques with appropriate examples.

P8 Demonstrate these techniques using an appropriate programming language or tool.</td><td>M4 Describe how these prescriptive analytic techniques are used to find the best course of action in a situation.</td></tr>
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