

MIS771 Descriptive Analytics and Visualisation

DEPARTMENT OF INFORMATION SYSTEMS AND BUSINESS ANALYTICS
DEAKIN BUSINESS SCHOOL
FACULTY OF BUSINESS AND LAW, DEAKIN UNIVERSITY



Assignment Two

Background

Assignment Two is an **individual** assignment. You need to analyse the given dataset and then interpret and draw conclusions from your analysis. You then need to convey your findings in a written report to an expert in Business Analytics.

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| Percentage of the final grade | 35% |
| The Due Date and Time | 8 pm Thursday 16th September 2021 |

Submission instructions

The assignment must be submitted by the due date electronically in CloudDeakin. When submitting electronically, you must check that you have submitted the work correctly by following the instructions provided in CloudDeakin. Please note that we will NOT accept any paper or email copies or part of the assignment submitted after the due date.

Information for students seeking an extension BEFORE the due date

If you wish to seek an extension for this assignment before the due date, you need to apply directly to the Unit Chair by completing the [Assignment and Online Test Extension Application Form](#) before Thursday 5 pm 16th September 2021. Please make sure you attach all supporting documentation and a draft of your assignment. The request for an extension needs to occur as soon as you become aware that you will have difficulty meeting the due date.

Please note: Unit Chairs can only grant extensions up to **two weeks** beyond the original due date. Therefore, if you require more than two weeks or have already been provided with an extension by the Unit Chair and require additional time, you must apply for Special Consideration via StudentConnect within three business days of the due date.

Conditions under which an extension will usually be considered include:

- **Medical** – to cover medical conditions of a severe nature, e.g. hospitalisation, severe injury or chronic illness.

Note: temporary minor ailments such as headaches, colds, and minor gastric upsets are not severe medical conditions and are unlikely to be accepted. However, severe cases of these may be considered.
- **Compassionate** – e.g. death of a close family member, significant family and relationship problems.
- **Hardship/Trauma** – e.g. sudden loss or gain of employment, severe disruption to domestic arrangements, a victim of crime.

Note: misreading the due date, assignment anxiety, or multiple assignments will not be accepted as grounds for consideration.

Information for students seeking an extension AFTER the due date

If the due date has passed, you require more than two weeks, or you have already been provided with an extension and require additional time, you must apply for Special Consideration via StudentConnect. Please be aware that applications are governed by University procedures and must be submitted within three business days of the due date or extension due date.

Please be aware that in most instances, the maximum amount of time that can be granted for an assignment extension is three weeks after the due date, as Unit Chairs are required to have all assignments submitted before results/feedback can be released back to students.

Penalties for late submission

The following marking penalties will apply if you submit an assessment task after the due date without an approved extension:

- 5% will be deducted from available marks for each day, or part thereof, up to five days.
- Work submitted more than five days after the due date will not be marked; you will receive 0% for the task.

Note: 'Day' means calendar day.

The Unit Chair may refuse to accept a late submission where it is unreasonable or impracticable to assess the task after the due date.

Additional information: For advice regarding academic misconduct, special consideration, extensions, and assessment feedback, please refer to the document "Rights and responsibilities as a student" in the "Unit Guide and Information" folder under the "Resources" section in the MIS771 CloudDeakin site.

Assurance of Learning

This assignment assesses the following Graduate Learning Outcomes and related Unit Learning Outcomes:

| Graduate Learning Outcome (GLO) | Unit Learning Outcome (ULO) |
|--|--|
| GLO1: Discipline-specific knowledge and capabilities - appropriate to the level of study related to a discipline or profession. | ULO 1: Apply quantitative reasoning skills to solve complex problems. |
| GLO2: Communication - using oral, written and interpersonal communication to inform, motivate and effect change | ULO 2: Plan, monitor, and evaluate own learning as a data analyst. |
| GLO5: Problem Solving - creating solutions to authentic (real world and ill-defined) problems. | ULO 3: Deduce clear and unambiguous solutions in a form that they useful for decision making and research purposes and for communication to the wider public. |
| GLO6: Self-Management - working and learning independently, and taking responsibility for personal actions | |

Feedback before submission

You can seek assistance from the teaching staff to ascertain whether the assignment conforms to submission guidelines.

Feedback after submission

An overall mark, together with feedback, will be released via CloudDeakin, **usually within 15 working days**. You are expected to refer and compare your answers to the feedback to understand any areas of improvement.

The Case Study

The B-Craft is a South Australian micro-brewery company with fifteen years of experience in brewing ale. Although its operations are limited to Adelaide and regional South Australia, the company has been financially successful.

B-Craft beer is sold directly to their customers (pubs, bars, restaurants and bottleshops) or indirectly through an external distribution network.



Despite their successful operations and solid financial turnovers in the last two years, B-Craft is forecasting a shift in business climate within the next five years. Now more than ever, B-Craft management feels the need to ensure a strong relationship with its customer base. In addition, they are planning to put in place a formal procedure to forecast their beer production. The formal forecasting would help B-Craft with production planning.

B-Craft approached BEAUTIFUL-DATA (a market research company) and asked them to conduct a large-scale survey of their customers to better understand the characteristics of B-Craft's customers and their repurchase intention.

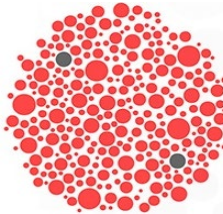
Data

Subsequently, BEAUTIFUL-DATA contacted B-Craft's customers and encouraged them to participate in an online survey. B-Craft's customers rated the company on nine attributes using a 1 – 10 scale in the survey. They also indicated the likelihood of recommending B-Craft to others. The survey data was supplemented by information such as loyalty duration, type, region, and distribution channel in B-Craft's database.

A complete listing of variables, their definitions, and an explanation of their coding is provided in the [A2T22021.xlsx](#) file.

Your Role at BEAUTIFUL-DATA

You are a modeller at BEAUTIFUL-DATA. The team leader (Todd Nash, with a PhD in Data Science and a Master Degree in Digital Marketing) has asked you to lead the modelling component for the **B-Craft** project. You need to review and complete the modelling activities as per the document below. The minutes of the team meeting is below.

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|---|------------------------------|---|----------|-----------|------------------------------|
|  BEAUTIFUL DATA | | BEAUTIFUL-DATA Level 12, 727 Collins St, Docklands VIC 3008 Phone: (+61 3 212 66 000) info@beautiful-data.com.au | | Reference | PH-103 B-Craft Project |
| | | | | Revised | 19 th August 2021 |
| | | | | Level | Expert Analysis |
| Meeting Chair | | Todd Nash | | | |
| Date | 19 th August 2021 | Time | 10:00 am | Location | Zoom Conference |
| Topic | | B-Craft Project – Analytics Details | | | |
| Meeting Purpose: | | Specifying and allocating Data Analytics Tasks | | | |
| Discussion items: | | <ul style="list-style-type: none">• Model <u>Quantity Ordered</u>.• Model <u>the likelihood of recommending B-Craft to others</u>.• Forecast the <u>Pale Ale production volumes</u> for the upcoming four quarters.• Produce a <u>technical report</u>. | | | |
| Detailed Action Items | Who: Modeller | What: <ol style="list-style-type: none">1. The ability to meet project deadlines is a highly sought-after skill at ANALYTICS7. Report how you plan to deliver the outputs on or before the set date of this project.2. Build a multiple regression model to estimate the order quantity.3. Todd has performed a separate regression analysis and found that the perception of beer quality is a significant predictor of the quantity ordered. In line with his findings, prior research shows that the strength of this relationship may vary according to brand image. That is, customers tend to associate the brand image with product quality. Therefore, Todd believes that the relationship between quality and quantity ordered should be stronger for those with a more favourable perception of a brand. Model the interaction between these variables to test Todd's assumption and comment whether there is sufficient evidence to conclude that the interaction term is statistically significant in the model. | | | |

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| | <p>4. Finalise Todd's logistic regression model to predict the likelihood of recommending B-Craft to others:</p> <p>4.1. Todd has completed the initial analysis for this task. He has narrowed down the key predictors to Distribution Channel, Quality, Brand Image and Shipping Speed. Your task is to continue his work and develop a predictive model to ascertain the likelihood of recommending B-Craft to others.</p> <p>4.2. Todd is specifically interested in understanding the probability of customers who meet the following criteria to recommend B-Craft to others.</p> <p>Those who,</p> <ol style="list-style-type: none"> Feel neutral (i.e. score of 5 on the relevant scale) towards B-Craft's speed of delivery; With varying levels of perception towards product quality (i.e., scores from 1 to 10) and brand image (scores of 1=negative, 5=neutral, and 10=positive); And across two market segments: those who purchase directly; and those who purchase through a sales representative. <p>Todd believes that the quality of the product and brand image define B-Craft's success in being recommended. Therefore, it is essential for B-Craft to know whether effort and money should be put in improving perceptions of product quality and brand image to increase the probability of being recommended. Accordingly, your job is to visualise the predicted probability of being recommended to others by customers with the attributes described above.</p> <p>5. Develop a time-series model to forecast B-Craft production volumes of pale ale for the next four fiscal quarters.</p> <p>6. Produce a written technical report detailing all aspects of your analysis.</p> <p>Your report should be as detailed as possible and should describe all critical outputs of your analysis. The results of the analysis should drive the recommendations to B-Craft management.</p> |
| Next meeting | Friday 17 th September 10 am |

Appendix- A: Explanatory Notes

To accomplish allocated tasks, you need to examine and analyse the dataset thoroughly. Below are some guidelines to follow:

Task 1. – Assignment planning and execution

The purpose of this practical task is to help you keep track of your progress with the project and complete it on time. To report how you plan your project and turn the plan into action, you must complete the tables provided in dot points as clearly as possible. Remember, effective planning, execution, and completing given tasks on time are essential professional development skills.

Note: Dot point writing requires you to use 'point form', not complete sentences.

Task 2. – Model building

You should follow an appropriate model building process. You should include all steps of the model building activities (**especially all relevant pre and post model diagnostics**) in your analysis. You can have as many Excel worksheets (tabs) as you require to demonstrate different iterations of your regression model (i.e., 2.2.a., 2.2.b., 2.2.c. etc.). If you make any reasonable/realistic assumption about the parameters, please note them next to the analysis.

Your **technical report** should clearly explain why the model might have undergone several iterations. Also, you must provide a detailed interpretation of ALL elements of the **final** model/regression output.

Task 3. – Interaction effect

To accomplish this task, you need to develop a **new** regression model using **ONLY** the factors discussed in the team meeting (Item 3). If you make any reasonable/realistic assumptions about the parameters, please note them next to the analysis.

Your **technical report** should clearly explain the role of each variable included in the model and use visualisation to illustrate the interaction effect. Make sure you interpret all relevant outputs in detail and provide managerial recommendations based on the results of your analysis.

Task 4.1 – Model building

You should follow an appropriate model building process. You should include all steps of the model building activities (**especially all relevant pre and post model diagnostics**) in your analysis. You can have as many Excel worksheets (tabs) as you require to demonstrate different iterations of your regression model (i.e., 4.1, 4.1.a). If you make any reasonable/realistic assumptions about the parameters, please note them next to the analysis.

You are required to discuss all details of your predictive model/logistics regression output.

Task 4.2. – Visualising and interpreting predicted probabilities

Your **technical report** must include the predicted probability visualisation and the practical recommendations. These recommendations should broadly answer the following question:

*"How a change in perceptions of **quality** (scores from 1 to 10) and **brand image** (scores of 1, 5, and 10) may affect the predicted probability of recommending B-Craft by two customer segments (i.e. those purchasing directly, and those purchasing through sales representative)."*

Task 5. – Forecasting Production

Past quarterly beer production numbers are in the Excel file. Your job is to develop a suitable model to forecast Quarterly production volumes for **the next four quarters**.

In your **technical report**, you must explain the reason for selecting the forecasting method to forecast future beer production. The report also must include a detailed interpretation of the **final** model (e.g. a practical interpretation of the time-series model...etc.)

Task 6. – Technical report

Your **technical report** must be as comprehensive as possible. ALL aspects of your analysis and final outputs must be described/interpreted in detail.

Remember, your audience are experts in analytics and expect **a very high standard of work** from your report. High standards mean **quality content** (demonstrated attention to details) as well as an **aesthetically appealing report**.

Note: The use of technical terms is encouraged and expected in this assignment.

Your report should include an **introduction** as well as a **conclusion**. The introduction begins with the purpose(s) of the analysis and concludes by explaining the report's structure (i.e., subsequent sections). The conclusion should highlight the essential findings and explain the main limitations. There is no requirement for a table of content or an executive summary.

Appendix-B: Submission Guidelines

The assignment consists of **three** documents:

- *Planning and execution tables*
- *Analysis*
- *Technical Report*

1) Assignment Planning and Execution Tables

The planning and execution details should be submitted in the appropriate tables provided. The tables should be in dot points. Before filling in the tables, students are strongly encouraged to watch the pre-recorded workshop called 'How to plan an assignment and turn the plan into action?' by a Language and Learning Adviser.

Note: Give the assignment planning and execution file the following name

A2_Planning_YourStudentID.docx

2) Analysis

The analysis should be submitted in the appropriate worksheets in the Excel file. Each step in the model buildings should be included in a separate tab (e.g. 2.1.a., 2.1.b., ...; and 3.2.a. 3.2.b., ...). Add more worksheets if necessary.

Before submitting your analysis, make sure it is logically organised, and any incorrect or unnecessary output has been removed. Marks will be deducted for poor presentation or disorganised/incorrect results. Your worksheets should follow the order in which tasks are allocated in the minutes of the team meeting document.

Note: Give the Excel file the following name **A2_YourStudentID.xlsx** (use a short file name while you are doing the analysis).

3) Technical Report

Your technical report consists of four sections: **Introduction**, **Main Body**, **Conclusion**, and **Appendices**. The report should be approximately 2,500 words.

Use proper headings (i.e., 2., 2.1., 2.2., ...) and titles in the main body of the report. Use sub-headings where necessary.

Visualisations / statistical output allowed in the report are:

1. Interaction effect plots
2. Predicted probability plots.

All other visualisations should ideally be in the **Appendices** (appendices are not included in the word count).

Make sure these outputs are **visually appealing**, have **consistent formatting style** and **proper titles** (title, axes titles etc.), and are **numbered correctly**. Where necessary, refer to these outputs in the main body of the report.

Note: Give the report the following name **A2_YourStudentID.docx**.