Analytical Skills for Business (WS 2025/26)

Business Administration (M. A.)

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This document holds the course material for the Analytical Skills for Business course in the Master of Business Administration program. It discusses version control systems such as Git and GitHub for efficient team collaboration, offers an overview of no-code and low-code tools for data analytics including Tableau, Power BI, QlikView, makeML, PyCaret, RapidMiner, and KNIME, and introduces key programming languages such as R, Python, and SQL alongside essential programming concepts like syntax, libraries, variables, functions, objects, conditions, and loops. In addition, it covers working with modern development environments, including Unix-like systems, containers, APIs, Jupyter, and RStudio, and sets expectations for project submissions and evaluation.

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Hypothesis testing is a fundamental statistical method used to make inferences about population parameters based on sample data [@Illowsky2018]. It provides a systematic framework for evaluating claims about populations using sample evidence, enabling data-driven decision making in business contexts.

3.3.1 Core Concepts

A statistical hypothesis test involves formulating two competing hypotheses:

- **Null hypothesis (H)**: The status quo or default position, typically representing no effect or no difference
- **Alternative hypothesis (H or H)**: The research hypothesis representing the effect or difference we seek to detect

The process involves calculating a test statistic from sample data and comparing it to a critical value or determining a p-value to make decisions about rejecting or failing to reject the null hypothesis [@GeeksforGeeks2024].

3.3.2 Key Components

Test Statistics: Standardized measures that quantify how far sample data deviates from what would be expected under the null hypothesis.

Significance Level ( ): The probability threshold for rejecting the null hypothesis, commonly set at 0.05 (5%).

P-value: The probability of observing test results at least as extreme as those obtained, assuming the null hypothesis is true.

Critical Region: The range of values for which the null hypothesis is rejected.

3.3.3 Types of Errors

- **Type I Error ( )**: Rejecting a true null hypothesis (false positive)
- **Type II Error ( )**: Failing to reject a false null hypothesis (false negative)
- **Statistical Power (1-)**: The probability of correctly rejecting a false null hypothesis

3.3.4 Reference Materials

For comprehensive coverage of hypothesis testing concepts, methodologies, and applications, consult:

- **Theoretical Foundation**: Introductory Statistics provides detailed explanations of hypothesis testing principles and procedures [@Illowsky2018]
- **Visual Guide**: Hypothesis Testing Overview offers a visual representation of key concepts
- **Detailed Methodology**: Hypothesis Testing Documentation contains comprehensive methodological information
- **Online Resource**: Additional perspectives on hypothesis testing applications can be found in the GeeksforGeeks guide [@GeeksforGeeks2024]

Understanding hypothesis testing is essential for making informed business decisions based on data analysis, forming the foundation for advanced statistical inference and predictive analytics in business contexts.

3.4 Confidence intervals, p-values, and statistical tests

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in the programming language R, translating theoretical knowledge into practical applications.

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5 Literature

All references for this course.

5.1 Essential Readings

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5.2 Further Readings

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