LES FACULTÉS
DE L'UNIVERSITÉ
CATHOLIQUE DE LILLE

Univariate Models Examples

OTHER TYPES OF REGRESSION

Baptiste Mokas

baptiste.mokas@gmail.com

weeki.io/dynamical-système

linktr.ee/baptistemokas

+33 7 69 08 54 19

KNOWLEDGE TREE

Part 1: Introduction to Univariate Statistical Tests

1.1 Definition and Significance

- Define univariate statistical tests
- Explain the importance of univariate analysis in research

1.2 Types of Data

- Categorical vs. continuous data
- Levels of measurement: nominal, ordinal, interval, and ratio

1.3 Assumptions of Univariate Tests

- Independence of observations
- Normality of data distribution
- Homogeneity of variances

Part 2: Tests for Continuous Data

2.1 One-Sample t-test

- Purpose and assuptions
- Steps to conduct the test
- Interpretation of results

2.2 Paired Samples t-test

- Differentiating between paired and independent samples
- Application and interpretation

2.3 One-way ANOVA

- Use and assumptions
- Post-hoc tests and their importance
- Interpreting the results

2.4 Non-parametric alternatives

- Wilcoxon Signed Rank Test
- Mann-Whitney U Test
- Kruskal-Wallis Test

Part 3: Tests for Categorical Data

3.1 Chi-Square Test of Independence

- Purpose and assumptions
- Steps to conduct the test
- Interpretation of results

3.2 Fisher's Exact Test

- When and why to use Fisher's test
- Application and interpretation

3.3 McNemar’s Test

- Comparing paired proportions
- Use-cases and interpretation

Part 4: Choosing the Right Test and Practical Application

4.1 Decision Trees and Flowcharts

- Criteria for selecting the appropriate test
- Visual aids in decision-making

4.2 Limitations and Pitfalls

- Common errors in applying univariate tests
- Importance of assumptions and their verification

4.3 Software and Tools for Analysis

- Introduction to software like SPSS, R, and Python.
- Demonstrating a sample analysis

4.4 Reporting Results

- Importance of clear communication
- APA guidelines for reporting statistics

KNOWLEDGE TREE

Statistical Learning

KEYWORDS (NEW)

Autres régressions
Régression logistique multinomiale
Régression logistique
Polynôme
Régression polynomiale
Modèle multiplicatif
Polynôme de degré p
Régression non linéaire
Régression par polynômes locaux
Régression Ridge / Lasso

ADD TO TREE

CHAPITRE 10 • MODÈLES À PLUSIEURS SOURCES D'ERREUR : MODÈLES MIXTES

10.1 Introduction
10.2 Modèles mixtes
10.3 Analyse de la variance multivariable
10.4 Exemples traités par logiciels informatiques

CHAPITRE 12 • PLANS RANDOMISÉS PAR UN GROUPE DE PERMUTATIONS : LA THÉORIE

12.1 Le modèle de la randomisation
12.2 Modèles mixtes stratifiables
12.3 Application aux plans d'expériences randomisés

CHAPITRE 13 • PLANS FRACTIONNAIRES

13.1 Introduction
13.2 Cadre général pour des facteurs à deux niveaux
13.3 Méthode des facteurs de base
13.4 Plan pour l'étude des effets principaux et des interactions doubles
13.5 Plan à s niveaux: la théorie
13.6 Exemples traités par logiciels informatiques

CHAPITRE 14 • SURFACES DE RÉPONSES ET PLANS ISOVARIANTS

14.1 Cadre de l'étude
14.2 Conditions d'isovariance
14.3 Plans composites centrés de Box et Wilson
14.4 Plans optimaux
14.5 Plans « space filling »
14.6 Exemples traités par logiciels informatiques

CHAPITRE 15 • ÉTUDES DE CAS TRAITÉS PAR LOGICIELS INFORMATIQUES

15.1 Étude de cas « Argus » : Analyse de la variance et de la covariance
15.2 Étude de cas « Béton »: sélection de modèles et analyse de la covariance
15.3 Etude de cas « Cola » : Plans d'expériences

KEYWORDS

- Univariate Statistical Tests
- Statistical Analysis
- Research
- Types of Data
- Categorical Data
- Continuous Data
- Levels of Measurement
- Assumptions
- Independence of Observations
- Normality of Data Distribution
- Homogeneity of Variances
- One-Sample t-test
- Paired Samples t-test
- One-way ANOVA
- Post-hoc Tests
- Non-parametric Tests
- Wilcoxon Signed Rank Test
- Mann-Whitney U Test
- Kruskal-Wallis Test
- Chi-Square Test of Independence
- Fisher's Exact Test
- McNemar's Test
- Choosing the Right Test
- Decision Trees
- Data Analysis Software
- SPSS
- R
- Python
- Reporting Results
- APA Guidelines

Use Case with python

Use Case: Choosing the Right Univariate Statistical Test for Healthcare Research

In the context of the course on "Univariate Statistical Tests," which covers topics related to univariate analysis, various types of tests for continuous and categorical data, and choosing the right test, let's explore a use case related to healthcare research. We will focus on selecting the appropriate univariate statistical test for analyzing healthcare data.

Description:

In this use case, we will assume the role of a healthcare researcher who wants to analyze data related to the effectiveness of two different treatments for a specific medical condition. We have collected data from patients, and our goal is to determine whether there is a significant difference in treatment outcomes between the two groups.

Key Components:

Univariate Statistical Tests for Continuous Data: We will consider using the one-sample t-test, paired samples t-test, and one-way ANOVA to analyze continuous data, such as changes in patients' blood pressure after treatment.

Univariate Statistical Tests for Categorical Data: We will explore the chi-square test of independence, Fisher's exact test, and McNemar's test to analyze categorical data, such as the presence or absence of side effects in patients.

Decision Trees and Flowcharts: We will create a decision tree or flowchart to guide us in selecting the appropriate statistical test based on the nature of the data and research questions.

Healthcare Research Scenario:

Suppose we have conducted a study to compare the effectiveness of two different treatments (Treatment A and Treatment B) for hypertension. We collected data from 100 patients who were randomly assigned to one of the two treatments. Here's how we can apply univariate statistical tests to analyze this healthcare data:

Python Code Example (Choosing the Right Test for Healthcare Research):

```python
import numpy as np
import pandas as pd
from scipy import stats
from sklearn.tree import DecisionTreeClassifier, export_text

# Load healthcare data
data = pd.read_csv('healthcare_data.csv')

# Define variables for analysis
treatment_a = data[data['Treatment'] == 'Treatment A']
treatment_b = data[data['Treatment'] == 'Treatment B']

continuous_variable = 'Change_in_Blood_Pressure'
categorical_variable = 'Side_Effects'

# Create a decision tree for test selection
X = data[['Treatment', 'Change_in_Blood_Pressure', 'Side_Effects']]
y = data['Outcome']  # Outcome variable indicating treatment success

# Fit a decision tree classifier
decision_tree = DecisionTreeClassifier()
decision_tree.fit(X, y)

# Visualize the decision tree rules
tree_rules = export_text(decision_tree, feature_names=list(X.columns))
print(tree_rules)

# Based on the decision tree rules, select the appropriate test
# Perform the chosen univariate statistical test and report results
# (e.g., t-test for Change_in_Blood_Pressure, chi-square test for Side_Effects)

```

In this code, we load healthcare data, create a decision tree to guide test selection, and use the decision tree's rules to choose the appropriate univariate statistical test. We then perform the selected test to analyze the data and report the results.

This use case demonstrates how to leverage univariate statistical tests and decision trees to make informed decisions in healthcare research, ensuring that the right statistical analysis is applied to answer specific research questions.

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TEXTE DE DESCRIPTION DU COURS

Explore the fundamental principles of "Univariate Statistical Tests" in this comprehensive course designed to provide you with a robust understanding of key concepts, practical applications, and the significance of statistical analysis in research.

In the initial section, "Introduction to Univariate Statistical Tests," you will define univariate statistical tests and grasp their critical role in research. Understanding the importance of univariate analysis in research is essential for drawing meaningful conclusions from data. Moving forward, you'll explore the diverse "Types of Data" encountered in research, distinguishing between categorical and continuous data. You'll delve into the levels of measurement, encompassing nominal, ordinal, interval, and ratio data, which are essential considerations when choosing appropriate statistical tests.

The course proceeds with an exploration of the "Assumptions of Univariate Tests." You'll delve into the critical assumptions underpinning statistical tests, including the independence of observations, normality of data distribution, and homogeneity of variances. Understanding these assumptions is crucial as they guide the selection and interpretation of statistical tests.

In "Tests for Continuous Data," you'll navigate through a variety of essential statistical tests. You'll start with the "One-Sample t-test," understanding its purpose, assumptions, and the step-by-step process to conduct the test. Interpretation of results will equip you with the skills to draw meaningful insights from your analysis. Next, you'll explore the "Paired Samples t-test" and differentiate between scenarios requiring paired or independent samples analysis. You'll delve into the application and interpretation of this test.

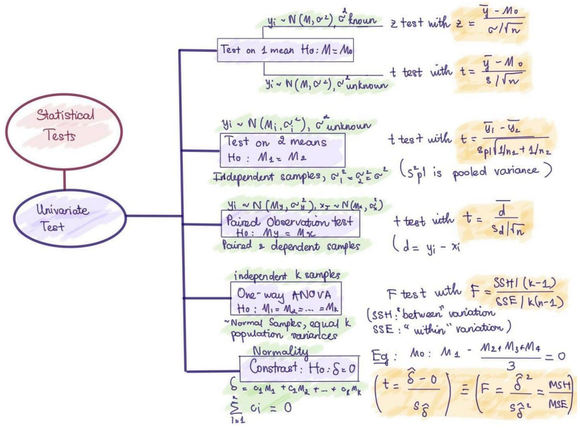
"One-way ANOVA" takes center stage as you learn about its utility and assumptions. You'll also uncover the importance of post-hoc tests in ANOVA and how to interpret the results effectively. In addition, you'll explore non-parametric alternatives such as the "Wilcoxon Signed Rank Test," "Mann-Whitney U Test," and "Kruskal-Wallis Test," expanding your analytical toolkit to address scenarios where parametric assumptions are not met.

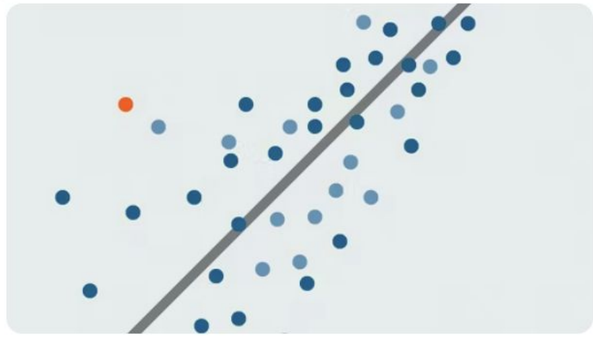
Transitioning to "Tests for Categorical Data," you'll delve into categorical data analysis. The "Chi-Square Test of Independence" will be a focal point, including its purpose, assumptions, and the step-by-step procedure to conduct the test. You'll gain the ability to interpret results and assess relationships between categorical variables. Additionally, you'll explore "Fisher's Exact Test," understanding when and why it is employed and how to interpret the outcomes. "McNemar's Test" will be introduced, focusing on comparing paired proportions, use-cases, and interpretation.

In "Choosing the Right Test and Practical Application," you'll develop the skills to make informed decisions in selecting appropriate statistical tests. Decision trees and flowcharts will serve as visual aids in your decision-making process. You'll also gain insights into the limitations and pitfalls commonly encountered when applying univariate tests, emphasizing the importance of assumptions and their verification. Furthermore, you'll be introduced to software and tools like SPSS, R, and Python, and witness a sample analysis to reinforce your understanding. Finally, you'll explore the significance of reporting results clearly and adhere to APA guidelines for reporting statistics, ensuring effective communication of your findings.

By the end of this course, you'll be equipped with a robust foundation in univariate statistical tests, enabling you to conduct rigorous data analysis, make informed decisions in research, and effectively communicate your findings.

DESIGN DE LA CARD





Author: Baptiste Mokas, Weeki

Course Name: Simple Linear Regression

#StatisticalAnalysis
#ResearchMethods
#DataInterpretation

Duke University

Linear Regression and Modeling

Compétences que vous acquerrez: Probability & Statistics, Regression, Business Analysis, Data Analysis, General Statistics, Statistical Analysis,…

★ **4.8** (1.7k avis)

Débutant · Course · 1 à 4 semaines