University of Ferrara

DEPARTMENT OF ECONOMICS & MANAGEMENT

STATISTICS FOR ECONOMICS AND BUSINESS

Second level degree

"Economics Management and Policies for Global Challenges"

Curriculum:

Small and medium enterprises (SMEs) in International Markets

96 hours, 12 credits

Prof. STEFANO BONNINI, Email address: stefano.bonnini@unife.it

Prof. VALENTINA MINI, Email address: valentina.mini@unife.it

Teaching materials

Lecture notes

Material provided by the Professors, available at

www.unife.it/economia/lm.economics/lectures/statistics-for-economics-business

Suggested Textbooks:

Mardia K.V., Kent J.T., Bibby J.M.
«Multivariate Analysis»
Academic Press, London
Edited in 2000 or later

Anderson T.W.
«An introduction to Multivariate Statistical Analysis»
Wiley
Edited in 2003 or later

1. **An *introduction to multivariate statistical analysis**

By: Anderson, Theodore Wilbur. Hoboken : Wiley. [2003]. XX, 721 p. 24 cm. Language: English, Database: BiblioFE

Argomenti: ANALISI MULTIVARIATA

BiblioFe Esporta in Mendeley, Endnote ecc.

Libro

Luogo	N° collocazione	Stato
Economia	TL 519. 535 ANDETWint	Documento per sola consultazione interna

3. **Multivariate analysis**

By: Mardia, Kantilal Varichand. London \etc.! : Academic press. 1979. XV, 521 p. 23 cm. Language: English, Database: BiblioFE

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Libro

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Università degli Studi di Ferrara

Economics Management and Policies for Global Challenges

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A.A.2018/2019

- Statistics for economics and business
- Materiale didattico 2018/2019
- Statistic for economic and business

Statistics for economics and business

Topics and calendar (part 1)

LEZIONE	Day	Time	Duration	SUBJECT
1	23,11,2018	**14**	4	Overview and introduction (course and software) Matrix Algebra: theory and practice
2	5,12,2018	**14**	2	Linear Regression: theory
3	7,12,2018	**14**	4	Linear Regression: Theory and application
4	14,12,2018	**14**	4	Multiple regression model
5	21,12,2018	**14**	4	Discussion and interpretation of Multiple regression analysis
6	20,2,2019	**16**	2	Introduction to the Factor Analysis
7	22,2,2019	**8**	4	Factor Analysis: discussion and interpretation
8	27,2,2019	**16**	2	Introduction to the PCA
9	1,3,2019	**8**	4	PCA: discussion and interpretation
10	06,03,2019	**16**	2	Introduction to the Cluster Analysis
11	8,3,2019	**8**	4	Cluster Analysis: discussion and interpretation
12	20,3,2019	**16**	2	Composite Indicators: approach and techniques
13	22,3,2019	**8**	4	Ppractical application
14	27,3,2019	**16**	2	Practical application and exercises
15	29,03,2018	**8**	4	Exam simulation
			48	

Lectures' structure

Four main parts:

-Theory
-Examples / Case studies
-Practice
-Workout using R (lab)

→Additional reading will be suggested

→For the workout you may use a personal database (please, before to install it ask to the professor)

Final exam

- Written test:

STRUCTURE: Multiple choice questions (1 hour)

CONTENTS:

- Theoretical questions
- Applied problems

FINAL MARK:

a) **For each question you'll get:**

+2 for each Right answer

-1 for each Wrong answer

0 points for each Missing answer

Final MARK = calculated as the sum of your scores

b) **Practical assignment** based on a given dataset, challenging economics' or business' problems (you'll get max +3 points on the final mark, that must be greater than or equal to **18!!!!**

Before to submit the practical assignment you must achieve at least the passing mark within the written test!)

INTRODUCTION TO THE DATABASES

Passito

A marketing survey on the demand of the wine «Passito» has been performed.

A sample of n=386 people has been interviewed. The questionnaire includes several questions about their preferences and behaviors related to drinking wine.

Dataset variables:

Label	Description	Coding
ID	Personal ID of the interviewed	Increasing integer number
AgeClass	Age of the person	Age (years)
AGE_CLASS	Age class of the person	1-6
SEX	Sex of the person	M or F
PROV	Province where the interviewed lives	Province code
LIKE_WINE	How much do you like drinking wine?	Integrer number from 1 to 7
FREQ_HOME	How often do you drink wine at home with meals?	Integrer number from 1 to 5
FREQ_BAR	How often do you drink wine in bars/pubs?	Integrer number from 1 to 5
FREQ_REST	How often do you drink wine at restaurants with meals?	Integrer number from 1 to 5
KNOW_PAS	Do you know the wine Passito?	Integrer number from 1 to 7
FREQ_PAS	How often do you drink Passito?	Integrer number from 1 to 5
FREQ_P_HOL	How often do you drink Passito on holidays and celebrations?	Integrer number from 1 to 5
FREQ_P_ALO	How often do you drink Passito when you are alone?	Integrer number from 1 to 5
FREQ_P_MEA	How often do you drink Passito at the end of meals?	Integrer number from 1 to 5
FREQ_P_OFF	How often do you drink Passito offered by someone?	Integrer number from 1 to 5
HOW_MUCH	How much wine do you drink in one year?	Integrer number from 1 to 4
LIKE_PAS	How much do you like drinking Passito?	Integrer number from 1 to 7
LIKE_AROMA	How much do you like aroma and smell of Passito?	Integrer number from 1 to 7
LIKE_SWEET	How much do you like the sweetness of Passito?	Integrer number from 1 to 7
LIKE_ALCOHOL	How much do you like the alcohol content of Passito?	Integrer number from 1 to 7
LIKE_TASTE	How much do you like the intensity of taste of Passito?	Integrer number from 1 to 7
PRICE	How much could you pay for one bottle of Passito? (0.5 litre)	Integrer number from 1 to 5

Heating Habits

Official data by Food and Agricultural Organization (FAO) about per capita food consumption by type of food.

The set of 126 countries with a population greater than 3 milions of people have been considered.

Dataset variables:

- Alcoholic Beverages
- Cereals
- Fruits
- Starchy Roots
- Sugar
- Veg Oils
- Animal Fats
- Meat
- Eggs
- Fish
- Veg_pulses
- Milk
- Population

Hotel

A customer satisfaction survey where four hotels have been evaluated by 40 customers (10 for each hotel) with respect to k=3 variables: cleanliness, courtesy and price.

The data consist of rates from 0 (minimum satisfaction) to 100 (maximum satisfaction).

Dataset variables:

Name	***Type***
Hotel	Categorical
Cleanliness	Numeric
Courtesy	Numeric
Price	Numeric

Students

Let us consider an example of teaching evaluation of k=3 university programs (undergraduate degree in Economics) evaluated by n=20 students with a rate from 0 to 100.

Dataset variables:

Statistics
Mathematics
Econometrics

Mall

A customer satisfaction survey about a a recently opened shopping center.

A sample of n=29 customers was asked to evaluate k=5 different aspects of the shopping center, such as the environmental temperature, the brightness, the presence of sales assistents, the range of products, the background music volume.

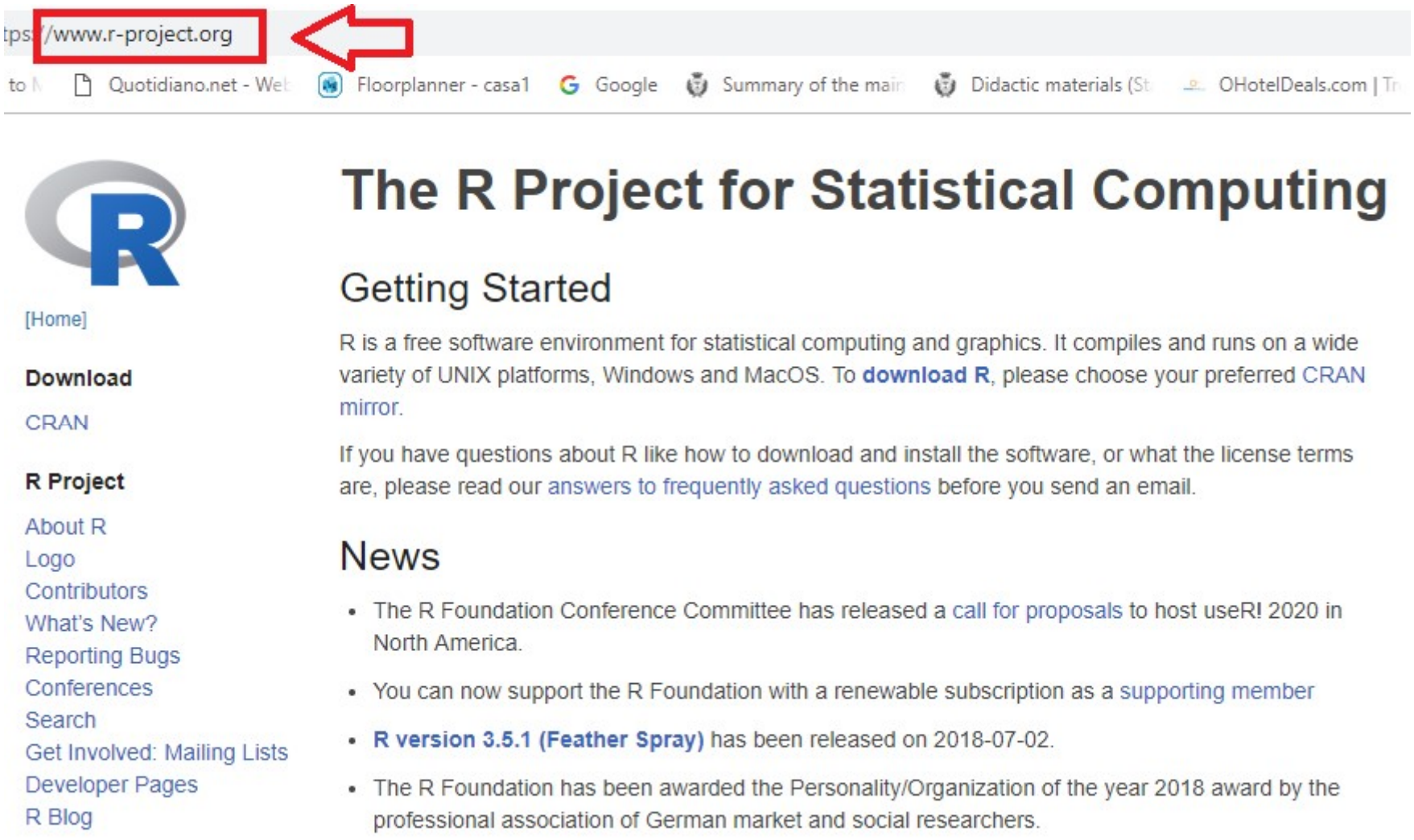
Evaluations are expressed on a scale from -100 («too little») to +100 («too much»), where 0 corresponds to «just right».

Dataset variables:

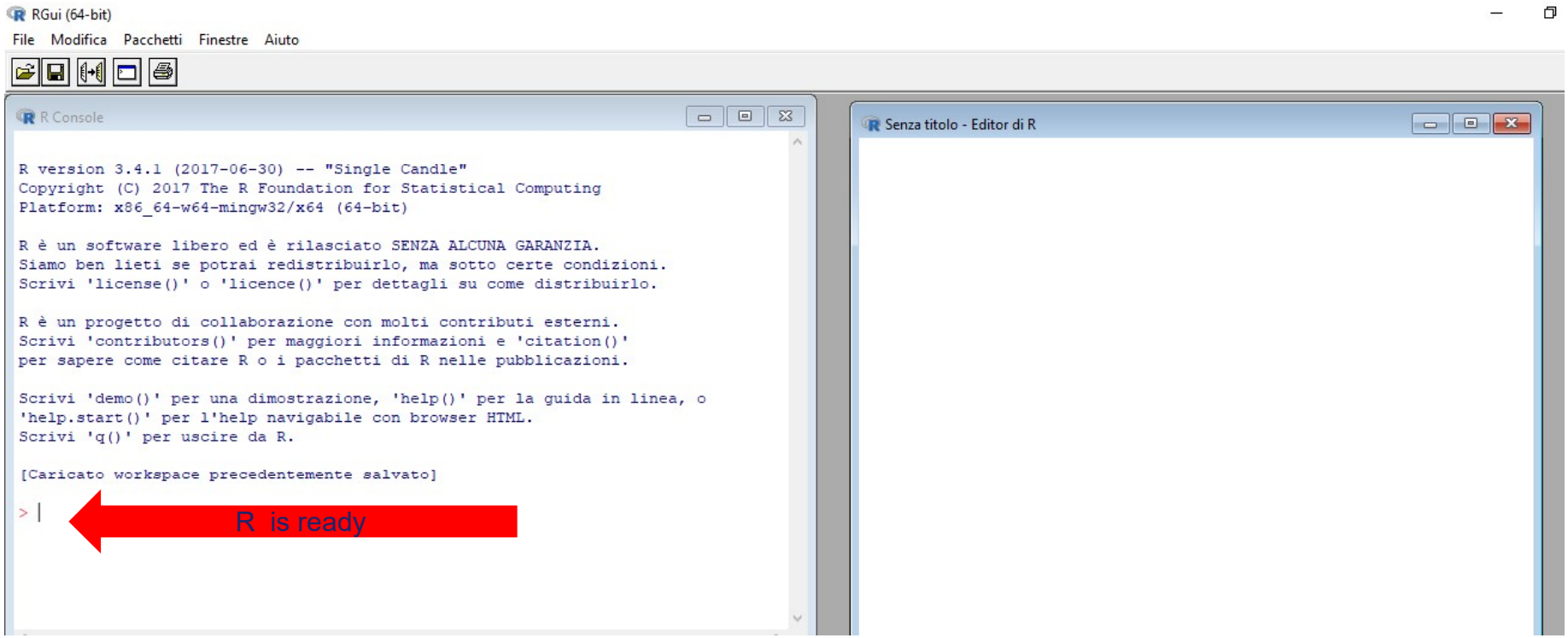
Temp_Level
Brightness
Salesman
Product_assortmant
Music_volume

INTRODUCTION TO THE SOFTWARE R

The main website



Opening R your PC appears like this:



Console: commands and results

Editor (write and save your commands)

The output of your R code is shown in the console in the left corner

Opening R your PC appears like this:

R makes use of the # sign to add comments, so that you and others can understand what the R code is about.
Just like Twitter! Comments are not run as R code, so they will not influence your result.

For example:

Calculate 3 + 4 → is a comment.

OPEN R FROM YOUR PC:

1) Using the console write the following comment: INTRODUCTION TO THE SOFTWARE
2) Calculate 3+6 and insert a comment explaining the calculation
3) Calculate 3*3 and insert a comment explaining the calculation
4) Calculate 3/3 and insert a comment explaining the calculation
5) Calculate 6-3 and insert a comment explaining the calculation
6) Calculate (3+3)*2 and insert a comment explaining the calculation
7) Calculate 3^2 and insert a comment explaining the calculation

First workout using R :

SOME BASIC RULES:

-R is key sensitive (be careful !!! Capital and small letters are different!)

- R communicate to you his status:
  The symbol > means “ready to start”
  The symbol [1] means “result”
  Error means you must have make a mistake
  # indicates a following comment
  If you don’t close your command, R will waits for it

  (ex. Write 3+4- and tape return key … please observe the the result)

-How to save your work:
  -Editor: extension **.txt**
  -Database in excel that you will use in R: extension **.csv**

First workout using R : EXERCISES

2 operations separated from semicolon ";"

Ex: 3+5*(3.5/15)+5-(2/6*4); 3+2

Operation using square root values:

10+(7-2)*4-8/2+sqrt(9)

Assign a value to a variable (you may use = or direct arrow →)
x=6 # R registers the assignment
x and tape return key # R visualizes the content of the object x

Create a series of values (or vector):

v= c(9,5,4)
v

LAST EXERCISE introduces the next topic: MATRIX ALGEBRA