

MVLU COLLEGE

PRACTICAL 11 OUTPUT:

The image displays two screenshots of the RStudio interface, showing the execution of R code and the resulting environment variables.

Top Screenshot:

- Console:** Shows the execution of the following code:

```
> library(tidyverse)
Error in head(fertility_pivot) : object 'fertility_pivot' not found

In addition: warning message:
package 'tidyverse' was built under R version 4.1.3

> print("ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 11")
[1] "ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 11"

> df <- read_csv("C:/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/MLR2.csv") %>%
+ mutate(RowID = row_number())

> print("---- 1. original data ----")
[1] "---- 1. original data ----"
> head(df)
  1..Year PerFemEmploy FertilityRate Ratio_MaletoFemale PerFemEmployers
1 1995 24.30 3.71 28.33 0.1
2 1996 24.57 3.59 28.72 0.1
3 1997 24.82 3.48 29.18 0.1
4 1998 25.11 3.37 29.67 0.1
5 1999 25.38 3.27 30.17 0.1
6 2000 25.63 3.17 30.66 0.1
  Agriculture Industry Services wage.Salaried ContrFamWorkers OwnAccount
1 84.79 7.66 7.56 18.03 66.80 15.07
2 82.28 7.46 10.27 18.38 66.39 15.14
3 81.19 7.57 11.24 18.74 65.95 15.21
4 80.28 7.77 11.95 19.11 65.53 15.26
5 79.52 8.12 12.36 19.50 65.01 15.39
6 78.78 8.65 12.57 19.90 64.53 15.47
  vulnerable RowID
1 81.87 1
2 81.52 2
3 81.16 3
4 80.79 4
5 80.40 5
6 80.00 6

> long_df <- df %>%
```
- Environment:** Shows the following variables in the Global Environment:
 - df: 25 obs. of 13 variables
 - employees_q1: 3 obs. of 3 variables
 - employees_q2: 3 obs. of 3 variables
 - high_income: 521 obs. of 17 variables
 - high_tech_by_...: 621 obs. of 17 variables
 - low_tuition: 326 obs. of 17 variables
 - MLR2: 25 obs. of 12 variables
 - my_data: 1000 obs. of 17 variables
 - new_staff: 2 obs. of 3 variables
 - performance_c...: 3 obs. of 4 variables

Bottom Screenshot:

- Console:** Shows the execution of the following code:

```
> long_df <- df %>%
+ pivot_longer(
+   cols = c(Year, RowID),
+   names_to = "Metric",
+   values_to = "Value"
+ )

Error in pivot_longer(, cols = c(Year, RowID), names_to = "Metric", :
could not find function "pivot_longer"

> print("---- 2. Long Format ----")
[1] "---- 2. Long Format ----"
> head(long_df, 12)

Error in head(long_df, 12) : object 'long_df' not found

> wide_df <- long_df %>%
+ pivot_wider(
+   names_from = Metric,
+   values_from = Value
+ )

Error in pivot_wider(, names_from = Metric, values_from = Value) :
could not find function "pivot_wider"

> print("---- 3. Wide Format (Restored) ----")
[1] "---- 3. Wide Format (Restored) ----"
> head(wide_df)

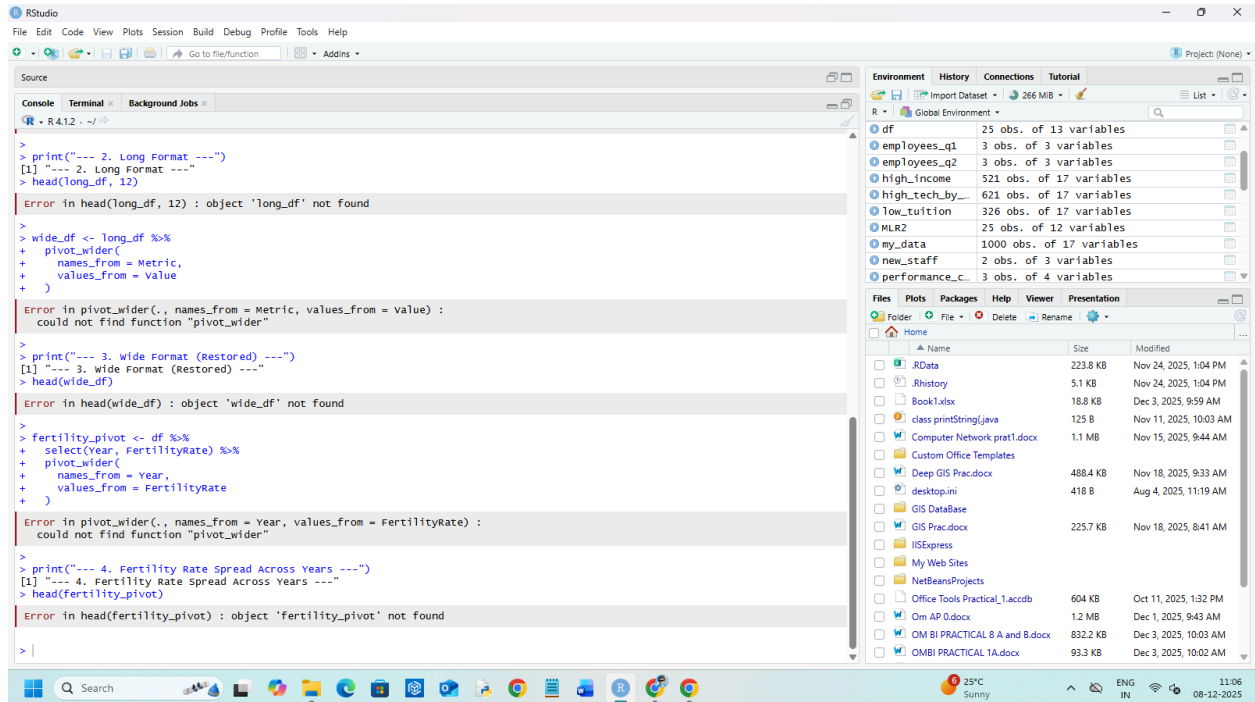
Error in head(wide_df) : object 'wide_df' not found

> fertility_pivot <- df %>%
+ select(Year, FertilityRate) %>%
+ pivot_wider(
+   names_from = Year,
+   values_from = FertilityRate
+ )

Error in pivot_wider(, names_from = Year, values_from = FertilityRate) :
could not find function "pivot_wider"
```
- Environment:** Shows the same variables as the top screenshot.

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The screenshot shows the RStudio interface. The console displays the following code and errors:

```
> print("--- 2. Long Format ---")
[1] "--- 2. Long Format ---"
> head(long_df, 12)
Error in head(long_df, 12) : object 'long_df' not found

> wide_df <- long_df %>%
+   pivot_wider(
+     names_from = Metric,
+     values_from = value
+   )
Error in pivot_wider(., names_from = Metric, values_from = value) :
could not find function "pivot_wider"

> print("--- 3. Wide Format (Restored) ---")
[1] "--- 3. Wide Format (Restored) ---"
> head(wide_df)
Error in head(wide_df) : object 'wide_df' not found

> fertility_pivot <- df %>%
+   select(year, FertilityRate) %>%
+   pivot_wider(
+     names_from = Year,
+     values_from = FertilityRate
+   )
Error in pivot_wider(., names_from = Year, values_from = FertilityRate) :
could not find function "pivot_wider"

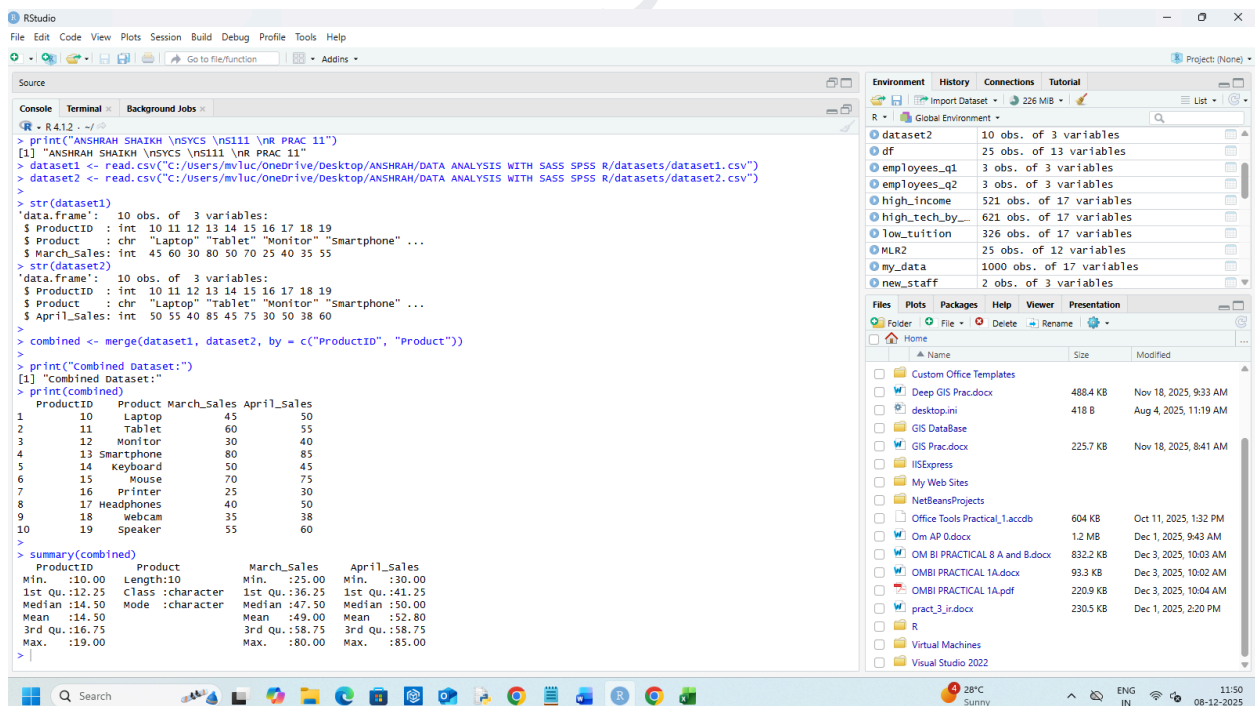
> print("--- 4. Fertility Rate Spread Across Years ---")
[1] "--- 4. Fertility Rate Spread Across Years ---"
> head(fertility_pivot)
Error in head(fertility_pivot) : object 'fertility_pivot' not found

> |
```

The Environment pane on the right shows the following objects:

Object	Size	Modified
df	25 obs. of 13 variables	
employees_q1	3 obs. of 3 variables	
employees_q2	3 obs. of 3 variables	
high_income	521 obs. of 17 variables	
high_tech_by...	621 obs. of 17 variables	
low_tuition	326 obs. of 17 variables	
MLR2	25 obs. of 12 variables	
my_data	1000 obs. of 17 variables	
new_staff	2 obs. of 3 variables	
performance_c...	3 obs. of 4 variables	

PRACTICAL 12 OUTPUT:



The screenshot shows the RStudio interface. The console displays the following code and output:

```
> print("ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 11")
[1] "ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 11"
> dataset1 <- read.csv("C:/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/dataset1.csv")
> dataset2 <- read.csv("C:/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/dataset2.csv")
>
> str(dataset1)
'data.frame':   10 obs. of  3 variables:
 $ ProductID: int  10 11 12 13 14 15 16 17 18 19
 $ Product  : chr  "Laptop" "Tablet" "Monitor" "Smartphone" ...
 $ March_Sales: int  45 60 30 80 50 70 25 40 35 55
> str(dataset2)
'data.frame':   10 obs. of  3 variables:
 $ ProductID: int  10 11 12 13 14 15 16 17 18 19
 $ Product  : chr  "Laptop" "Tablet" "Monitor" "Smartphone" ...
 $ April_Sales: int  50 55 40 85 45 75 30 50 38 60
>
> combined <- merge(dataset1, dataset2, by = c("ProductID", "Product"))
> print("Combined Dataset:")
[1] "Combined Dataset:"
> print(combined)
  ProductID Product March_Sales April_Sales
1         10   Laptop         45          50
2         11   Tablet         60          55
3         12   Monitor         30          40
4         13 Smartphone         80          85
5         14   Keyboard         50          45
6         15    Mouse         70          75
7         16   Printer         25          30
8         17 Headphones         40          50
9         18   Webcam         35          38
10        19   Speaker         55          60
>
> summary(combined)
  ProductID Product March_Sales April_Sales
Min.   :10.00  Length:10    Min.   :25.00  Min.   :30.00
1st Qu.:12.25   Class :character 1st Qu.:36.25 1st Qu.:41.25
Median :14.50   Mode  :character  Median :47.50 Median :50.00
Mean   :14.50                      Mean   :49.00 Mean   :52.80
3rd Qu.:16.75                      3rd Qu.:58.75 3rd Qu.:58.75
Max.   :19.00                      Max.   :80.00 Max.   :85.00
> |
```

The Environment pane on the right shows the following objects:

Object	Size	Modified
dataset2	10 obs. of 3 variables	
df	25 obs. of 13 variables	
employees_q1	3 obs. of 3 variables	
employees_q2	3 obs. of 3 variables	
high_income	521 obs. of 17 variables	
high_tech_by...	621 obs. of 17 variables	
low_tuition	326 obs. of 17 variables	
MLR2	25 obs. of 12 variables	
my_data	1000 obs. of 17 variables	
new_staff	2 obs. of 3 variables	

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PRACTICAL 13 OUTPUT:

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help

Source
Console Terminal Background Jobs
R - R4.12.2 - ~/R
> library(dplyr)
> print("ANSHRAH SHAIKH \NSYCS \NS111 \NR PRAC 13")
[1] "ANSHRAH SHAIKH \NSYCS \NS111 \NR PRAC 13"
>
> orders_df <- read.csv("/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SAS SPSS R/datasets/dataset3.csv")
>
> print("--- 1. Original dataset ---")
[1] "--- 1. Original dataset ---"
> print(orders_df)
  orderID Customer Product
1      101      Raj  Laptop
2      102      Bebo   Phone
3      102      Bebo   Phone
4      103    Charlie Tablet
5      104    Dinesh Monitor
6      101      Raj  Laptop
7      104    Dinesh Mouse
8      105    Alice keyboard
9      106      Bob   Mouse
10     107    Charlie Tablet
11     108      Bebo   Phone
12     108      Bebo   Phone
>
> duplicates_report <- orders_df %>%
+   group_by(orderID, customer, Product) %>%
+   count() %>%
+   filter(n > 1)
>
> print("--- 2. Identification Report (Rows that are duplicated) ---")
[1] "--- 2. Identification Report (Rows that are duplicated) ---"
> print(duplicates_report)
# A tibble: 3 x 4
# Groups:   orderID, customer, Product [3]
  orderID customer Product     n
  <int> <chr>    <chr>    <int>
1     101 Raj      Laptop     2
2     102 Bebo     Phone     2
3     108 Bebo     Phone     2
>
> clean_exact <- orders_df %>%
+   distinct()
>
> print("--- 3. Removed Exact Duplicates (distinct) ---")
```

Environment History Connections Tutorial

R - Global Environment

- orders_df 12 obs. of 3 variables
- performance_c 3 obs. of 4 variables
- senior_or_ent 254 obs. of 17 variables
- student_spend 1000 obs. of 18 variables
- students_mult 1000 obs. of 17 variables
- students_sort 1000 obs. of 17 variables
- students_sort 1000 obs. of 17 variables
- tech_nb 265 obs. of 17 variables
- text_data 20 obs. of 10 variables
- unique_custom 6 obs. of 3 variables

Files Plots Packages Help Viewer Presentation

Folder Home File Delete Rename

Name	Size	Modified
Custom Office Templates		
Deep GIS Prac.docx	488.4 KB	Nov 18, 2025, 9:33 AM
desktop.ini	418 B	Aug 4, 2025, 11:19 AM
GIS DataBase		
GIS Prac.docx	225.7 KB	Nov 18, 2025, 8:41 AM
ISExpress		
My Web Sites		
NetBeansProjects		
Office Tools Practical_1.docx	604 KB	Oct 11, 2025, 1:32 PM
Om AP 0.docx	1.2 MB	Dec 1, 2025, 9:43 AM
OM BI PRACTICAL 8 A and B.docx	832.2 KB	Dec 3, 2025, 10:03 AM
OMBI PRACTICAL 1A.docx	93.3 KB	Dec 3, 2025, 10:02 AM
OMBI PRACTICAL 1A.pdf	220.9 KB	Dec 3, 2025, 10:04 AM
pract_3_pr.docx	230.5 KB	Dec 1, 2025, 2:20 PM
R		
Virtual Machines		
Visual Studio 2022		

28°C Sunny ENG IN 12:00 08-12-2025

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help

Source
Console Terminal Background Jobs
R - R4.12.2 - ~/R
> print("--- 2. Identification Report (Rows that are duplicated) ---")
[1] "--- 2. Identification Report (Rows that are duplicated) ---"
> print(duplicates_report)
# A tibble: 3 x 4
# Groups:   orderID, customer, Product [3]
  orderID customer Product     n
  <int> <chr>    <chr>    <int>
1     101 Raj      Laptop     2
2     102 Bebo     Phone     2
3     108 Bebo     Phone     2
>
> clean_exact <- orders_df %>%
+   distinct()
>
> print("--- 3. Removed Exact Duplicates (distinct) ---")
[1] "--- 3. Removed Exact Duplicates (distinct) ---"
> print(clean_exact)
  orderID Customer Product
1      101      Raj  Laptop
2      102      Bebo   Phone
3      103    Charlie Tablet
4      104    Dinesh Monitor
5      104    Dinesh Mouse
6      105    Alice keyboard
7      106      Bob   Mouse
8      107    Charlie Tablet
9      108      Bebo   Phone
>
> unique_customers <- orders_df %>%
+   distinct(customer, .keep_all = TRUE)
>
> print("--- 4. Unique Customers only (Partial Duplicates removed) ---")
[1] "--- 4. Unique Customers only (Partial Duplicates removed) ---"
> print(unique_customers)
  orderID Customer Product
1      101      Raj  Laptop
2      102      Bebo   Phone
3      103    Charlie Tablet
4      104    Dinesh Monitor
5      105    Alice keyboard
6      106      Bob   Mouse
> |
```

Environment History Connections Tutorial

R - Global Environment

- orders_df 12 obs. of 3 variables
- performance_c 3 obs. of 4 variables
- senior_or_ent 254 obs. of 17 variables
- student_spend 1000 obs. of 18 variables
- students_mult 1000 obs. of 17 variables
- students_sort 1000 obs. of 17 variables
- students_sort 1000 obs. of 17 variables
- tech_nb 265 obs. of 17 variables
- text_data 20 obs. of 10 variables
- unique_custom 6 obs. of 3 variables

Files Plots Packages Help Viewer Presentation

Folder Home File Delete Rename

Name	Size	Modified
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GIS DataBase		
GIS Prac.docx	225.7 KB	Nov 18, 2025, 8:41 AM
ISExpress		
My Web Sites		
NetBeansProjects		
Office Tools Practical_1.docx	604 KB	Oct 11, 2025, 1:32 PM
Om AP 0.docx	1.2 MB	Dec 1, 2025, 9:43 AM
OM BI PRACTICAL 8 A and B.docx	832.2 KB	Dec 3, 2025, 10:03 AM
OMBI PRACTICAL 1A.docx	93.3 KB	Dec 3, 2025, 10:02 AM
OMBI PRACTICAL 1A.pdf	220.9 KB	Dec 3, 2025, 10:04 AM
pract_3_pr.docx	230.5 KB	Dec 1, 2025, 2:20 PM
R		
Virtual Machines		
Visual Studio 2022		

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PRACTICAL 14 OUTPUT:

The image displays two screenshots of the RStudio interface, showing the execution of R code for data manipulation and time extraction.

Top Screenshot:

- Console:** Shows the execution of the following code:

```
> R - R 4.1.2 - ~/
> dates_dataset <- read.csv("C:/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/dates_dataset.csv")
> View(dates_dataset)
> library(lubridate)

Attaching package: 'lubridate'

The following objects are masked from 'package:base':
    date, intersect, setdiff, union

Warning message:
package 'lubridate' was built under R version 4.1.3
> library(dplyr)
> print("ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 13")
[1] "ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 13"
> dates_df <- read.csv("C:/Users/mvlu/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/dates_dataset.csv")
> print("--- 1. Original dataset ---")
[1] "--- 1. Original dataset ---"
> print(dates_df)
  Event_ID Date_String
1         1 15-01-2023
2         2 31-10-2023
3         3 29-02-2024
4         4 25-12-2024
5         5 10-03-2025
> processed_data <- dates_df %>%
+   mutate(
+     Actual_Date = ymd(Date_String),
+     Year_Num    = year(Actual_Date),
+     Month_Num   = month(Actual_Date),
+     Month_Name  = month(Actual_Date, label = TRUE),
+     Day_Num     = day(Actual_Date),
+     Weekday_Num = wday(Actual_Date),
+     Weekday_Name = wday(Actual_Date, label = TRUE, abbr=FALSE),
+     Quarter     = quarter(Actual_Date),
+     Day_of_Year = yday(Actual_Date)
+   )
```
- Environment:** Lists the loaded packages: employees_q2 (3 obs. of 3 variables), high_income (521 obs. of 17 variables), high_tech_by_ (621 obs. of 17 variables), low_tuition (326 obs. of 17 variables), MLR2 (25 obs. of 12 variables), my_data (1000 obs. of 17 variables), new_staff (2 obs. of 3 variables), orders_df (12 obs. of 3 variables), performance_c_ (3 obs. of 4 variables), and processed_data (5 obs. of 11 variables).

Bottom Screenshot:

- Console:** Shows the execution of the following code:

```
> print("--- 2. Data with Extracted Date Components ---")
[1] "--- 2. Data with Extracted Date Components ---"
> print(processed_data)
  Event_ID Date_String Actual_Date Year_Num Month_Num Month_Name Day_Num
1         1 15-01-2023      <NA>      NA      NA      <NA>      NA
2         2 31-10-2023      <NA>      NA      NA      <NA>      NA
3         3 29-02-2024      <NA>      NA      NA      <NA>      NA
4         4 25-12-2024      <NA>      NA      NA      <NA>      NA
5         5 10-03-2025      <NA>      NA      NA      <NA>      NA
  Weekday_Num Weekday_Name Quarter Day_of_Year
1           NA      <NA>      NA      NA
2           NA      <NA>      NA      NA
3           NA      <NA>      NA      NA
4           NA      <NA>      NA      NA
5           NA      <NA>      NA      NA
> current_time <- now()
> print("--- 3. Current Time Extraction ---")
[1] "--- 3. Current Time Extraction ---"
> print(paste("Current Year:", year(current_time)))
[1] "Current Year: 2025"
> print(paste("Current Month:", month(current_time)))
[1] "Current Month: 12"
> print(paste("Current Day:", day(current_time)))
[1] "Current Day: 8"
> print(paste("Current Hour:", hour(current_time)))
[1] "Current Hour: 12"
> print(paste("Current Minute:", minute(current_time)))
[1] "Current Minute: 8"
> print(paste("Current Second:", second(current_time)))
[1] "Current Second: 22.2163400650024"
> # =====
> |
```
- Environment:** Lists the loaded packages: employees_q2 (3 obs. of 3 variables), high_income (521 obs. of 17 variables), high_tech_by_ (621 obs. of 17 variables), low_tuition (326 obs. of 17 variables), MLR2 (25 obs. of 12 variables), my_data (1000 obs. of 17 variables), new_staff (2 obs. of 3 variables), orders_df (12 obs. of 3 variables), performance_c_ (3 obs. of 4 variables), and processed_data (5 obs. of 11 variables).

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PRACTICAL 15 OUTPUT:

The image displays two screenshots of the RStudio interface, showing the execution of R code and the resulting data analysis output.

Top Screenshot:

- Console:** Shows the execution of the following code:

```
R> R 4.1.2 - ~/>  
> print("ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 13")  
[1] "ANSHRAH SHAIKH \nSYCS \nS111 \nR PRAC 13"  
> mlr2_df <- read.csv("C:/Users/mvluc/OneDrive/Desktop/ANSHRAH/DATA ANALYSIS WITH SASS SPSS R/datasets/MLR2.csv")  
>  
> print("--- 1. Original MLR2 dataset ---")  
[1] "--- 1. Original MLR2 dataset ---"  
> print(head(mlr2_df))  
  1..Year  PerFemEmploy  FertilityRate  Ratio_MaletoFemale  PerFemEmployers  
1  1995      24.30          3.71          28.33          0.1  
2  1996      24.57          3.59          28.72          0.1  
3  1997      24.82          3.48          29.18          0.1  
4  1998      25.11          3.37          29.67          0.1  
5  1999      25.38          3.27          30.17          0.1  
6  2000      25.63          3.17          30.66          0.1  
Agriculture  Industry  Services  wage.Salaried  ContrFamworkers  OwnAccount  
1  84.79      7.66      7.56      18.03          66.80      15.07  
2  82.28      7.46      10.27     18.38          66.39      15.14  
3  81.19      7.57      11.24     18.74          65.95      15.21  
4  80.28      7.77      11.95     19.11          65.53      15.26  
5  79.52      8.12      12.36     19.50          65.01      15.39  
6  78.78      8.65      12.57     19.90          64.53      15.47  
vulnerable  
1  81.87  
2  81.52  
3  81.16  
4  80.79  
5  80.40  
6  80.00  
> print("--- 2. OUTPUT of str() ---")  
[1] "--- 2. OUTPUT of str() ---"  
> str(mlr2_df)  
'data.frame': 25 obs. of 12 variables:  
 $ 1..Year : fct 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 ...  
 $ PerFemEmploy : num 24.3 24.6 24.8 25.1 25.4 ...  
 $ FertilityRate : chr "3.71" "3.59" "3.48" "3.37" ...  
 $ Ratio_MaletoFemale: num 28.3 28.7 29.2 29.7 30.2 ...  
 $ PerFemEmployers : num 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 ...  
 $ Agriculture : num 84.8 82.3 81.2 80.3 79.5 ...  
 $ Industry : num 7.66 7.46 7.57 7.77 8.12 ...  
 $ Services : num 7.56 10.27 11.24 11.95 12.36 ...  
 $ wage.Salaried : num 18 18.4 18.7 19.1 19.5 ...  
 $ ContrFamworkers : num 66.8 66.4 66 65.5 65 ...  
 $ OwnAccount : num 15.1 15.1 15.2 15.3 15.4 ...  
 $ vulnerable : num 81.9 81.5 81.2 80.8 80.4 ...
```
- Environment:** Shows the loaded datasets: `low_tuition` (326 obs. of 17 variables), `MLR2` (25 obs. of 12 variables), `mlr2_df` (25 obs. of 12 variables), `my_data` (1000 obs. of 17 variables), `new_staff` (2 obs. of 3 variables), `orders_df` (12 obs. of 3 variables), `performance_c` (3 obs. of 4 variables), `processed_data` (5 obs. of 11 variables), `senior_or_ent` (254 obs. of 17 variables), and `student_spend` (1000 obs. of 18 variables).

Bottom Screenshot:

- Console:** Shows the execution of the following code:

```
R> R 4.1.2 - ~/>  
> print("--- 2. OUTPUT of str() ---")  
[1] "--- 2. OUTPUT of str() ---"  
> str(mlr2_df)  
'data.frame': 25 obs. of 12 variables:  
 $ 1..Year : fct 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 ...  
 $ PerFemEmploy : num 24.3 24.6 24.8 25.1 25.4 ...  
 $ FertilityRate : chr "3.71" "3.59" "3.48" "3.37" ...  
 $ Ratio_MaletoFemale: num 28.3 28.7 29.2 29.7 30.2 ...  
 $ PerFemEmployers : num 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 ...  
 $ Agriculture : num 84.8 82.3 81.2 80.3 79.5 ...  
 $ Industry : num 7.66 7.46 7.57 7.77 8.12 ...  
 $ Services : num 7.56 10.27 11.24 11.95 12.36 ...  
 $ wage.Salaried : num 18 18.4 18.7 19.1 19.5 ...  
 $ ContrFamworkers : num 66.8 66.4 66 65.5 65 ...  
 $ OwnAccount : num 15.1 15.1 15.2 15.3 15.4 ...  
 $ vulnerable : num 81.9 81.5 81.2 80.8 80.4 ...  
> print("--- 3. OUTPUT of summary() ---")  
[1] "--- 3. OUTPUT of summary() ---"  
> summary(mlr2_df)  
  1..Year  PerFemEmploy  FertilityRate  Ratio_MaletoFemale  
Min. :1995 Min. :24.30 Length:25 Min. :28.33  
1st Qu.:2001 1st Qu.:25.78 Class :character 1st Qu.:31.02  
Median :2007 Median :26.56 Mode :character Median :33.50  
Mean :2007 Mean :27.68 Mean :34.95  
3rd Qu.:2013 3rd Qu.:28.99 3rd Qu.:38.49  
Max. :2019 Max. :33.82 Max. :44.50  
PerFemEmployers  Agriculture  Industry  Services  
Min. :0.0900 Min. :59.03 Min. : 7.46 Min. : 7.56  
1st Qu.:0.1000 1st Qu.:64.73 1st Qu.: 9.01 1st Qu.:13.55  
Median :0.1200 Median :67.52 Median :12.62 Median :19.87  
Mean :0.1964 Mean :70.27 Mean :12.02 Mean :17.71  
3rd Qu.:0.1600 3rd Qu.:77.44 3rd Qu.:14.42 3rd Qu.:20.86  
Max. :0.6600 Max. :84.79 Max. :16.78 Max. :24.27  
wage.Salaried  ContrFamworkers  OwnAccount  vulnerable  
Min. :16.56 Min. :27.99 Min. :15.07 Min. :66.73  
1st Qu.:19.11 1st Qu.:52.41 1st Qu.:15.52 1st Qu.:77.11  
Median :20.81 Median :61.29 Median :17.48 Median :79.09  
Mean :21.97 Mean :55.87 Mean :21.97 Mean :77.84  
3rd Qu.:22.78 3rd Qu.:64.07 3rd Qu.:26.47 3rd Qu.:80.79  
Max. :32.61 Max. :66.80 Max. :38.74 Max. :83.27
```
- Environment:** Shows the loaded datasets: `low_tuition` (326 obs. of 17 variables), `MLR2` (25 obs. of 12 variables), `mlr2_df` (25 obs. of 12 variables), `my_data` (1000 obs. of 17 variables), `new_staff` (2 obs. of 3 variables), `orders_df` (12 obs. of 3 variables), `performance_c` (3 obs. of 4 variables), `processed_data` (5 obs. of 11 variables), `senior_or_ent` (254 obs. of 17 variables), and `student_spend` (1000 obs. of 18 variables).

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The image displays two screenshots of the RStudio environment. The top screenshot shows the R console with the following code and output:

```
> mlr2_df$Year <- as.factor(mlr2_df$Year)
Error in '$<-data.frame'("tmp", Year, value = integer(0)) :
replacement has 0 rows, data has 25
> print("---- 4. OUTPUT OF summary() [Year as Factor] ----")
[1] "---- 4. OUTPUT OF summary() [Year as Factor] ----"
> summary(mlr2_df)
 1..Year   PerFemEmploy   FertilityRate   Ratio_MaletoFemale
Min.   :1995   Min.   :24.30   Length:25   Min.   :28.33
1st Qu.:2001   1st Qu.:25.78   Class :character   1st Qu.:31.02
Median :2007   Median :26.56   Mode  :character   Median :33.50
Mean    :2007   Mean    :27.68               Mean    :34.95
3rd Qu.:2013   3rd Qu.:28.99               3rd Qu.:38.49
Max.    :2019   Max.    :33.82               Max.    :44.50
PerFemEmployers Agriculture Industry Services
Min.   :0.0900   Min.   :59.03   Min.   :7.46   Min.   :7.56
1st Qu.:0.1000   1st Qu.:64.73   1st Qu.:9.01   1st Qu.:13.55
Median :0.1200   Median :67.52   Median :12.62   Median :19.87
Mean    :0.1964   Mean    :70.27   Mean    :12.02   Mean    :17.71
3rd Qu.:0.1600   3rd Qu.:77.44   3rd Qu.:14.42   3rd Qu.:20.86
Max.    :0.6600   Max.    :84.79   Max.    :16.78   Max.    :24.27
wage.Salaried ContrFamworkers OwnAccount Vulnerable
Min.   :16.56   Min.   :27.99   Min.   :15.07   Min.   :66.73
1st Qu.:19.11   1st Qu.:52.41   1st Qu.:15.52   1st Qu.:77.11
Median :20.81   Median :61.29   Median :17.48   Median :79.09
Mean    :21.97   Mean    :55.87   Mean    :21.97   Mean    :77.84
3rd Qu.:22.78   3rd Qu.:64.07   3rd Qu.:26.47   3rd Qu.:80.79
Max.    :32.61   Max.    :66.80   Max.    :38.74   Max.    :83.27
> avg_fertility <- mean(mlr2_df$FertilityRate, na.rm = TRUE)
Warning message:
In mean.default(mlr2_df$FertilityRate, na.rm = TRUE) :
argument is not numeric or logical: returning NA
```

The bottom screenshot shows the same RStudio environment with additional code and output:

```
> print("---- 4. OUTPUT OF summary() [Year as Factor] ----")
[1] "---- 4. OUTPUT OF summary() [Year as Factor] ----"
> summary(mlr2_df)
 1..Year   PerFemEmploy   FertilityRate   Ratio_MaletoFemale
Min.   :1995   Min.   :24.30   Length:25   Min.   :28.33
1st Qu.:2001   1st Qu.:25.78   Class :character   1st Qu.:31.02
Median :2007   Median :26.56   Mode  :character   Median :33.50
Mean    :2007   Mean    :27.68               Mean    :34.95
3rd Qu.:2013   3rd Qu.:28.99               3rd Qu.:38.49
Max.    :2019   Max.    :33.82               Max.    :44.50
PerFemEmployers Agriculture Industry Services
Min.   :0.0900   Min.   :59.03   Min.   :7.46   Min.   :7.56
1st Qu.:0.1000   1st Qu.:64.73   1st Qu.:9.01   1st Qu.:13.55
Median :0.1200   Median :67.52   Median :12.62   Median :19.87
Mean    :0.1964   Mean    :70.27   Mean    :12.02   Mean    :17.71
3rd Qu.:0.1600   3rd Qu.:77.44   3rd Qu.:14.42   3rd Qu.:20.86
Max.    :0.6600   Max.    :84.79   Max.    :16.78   Max.    :24.27
wage.Salaried ContrFamworkers OwnAccount Vulnerable
Min.   :16.56   Min.   :27.99   Min.   :15.07   Min.   :66.73
1st Qu.:19.11   1st Qu.:52.41   1st Qu.:15.52   1st Qu.:77.11
Median :20.81   Median :61.29   Median :17.48   Median :79.09
Mean    :21.97   Mean    :55.87   Mean    :21.97   Mean    :77.84
3rd Qu.:22.78   3rd Qu.:64.07   3rd Qu.:26.47   3rd Qu.:80.79
Max.    :32.61   Max.    :66.80   Max.    :38.74   Max.    :83.27
> avg_fertility <- mean(mlr2_df$FertilityRate, na.rm = TRUE)
Warning message:
In mean.default(mlr2_df$FertilityRate, na.rm = TRUE) :
argument is not numeric or logical: returning NA
> max_fem_employ <- max(mlr2_df$PerFemEmploy, na.rm = TRUE)
> print(paste("Average Fertility Rate:", avg_fertility))
[1] "Average Fertility Rate: NA"
> print(paste("Maximum Percentage of Female Employment:", max_fem_employ))
[1] "Maximum Percentage of Female Employment: 33.82"
>
```

Both screenshots show the RStudio interface with the Environment pane on the right, displaying the loaded data frames and their dimensions. The bottom screenshot also shows the Files pane with a list of files in the Home directory.

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