

Assignment Solution

1. Assignment

The **Body Adiposity Index** (BAI) is a method of estimating the amount of **body** fat in humans. The BAI is calculated without using **body** weight, unlike the **body mass index** (BMI). Instead, it uses the size of the hips compared to the person's height.

Body adiposity index classification ranges for men and women, as outlined by Gallagher et al., are shown in the table below.

Body Adiposity Index Classifications for Women				
Age (years)	Underweight	Healthy	Overweight	Obese
20 - 39	Less than 21%	21% to 33%	Greater than 33%	Greater than 39%
40 - 59	Less than 23%	23% to 35%	Greater than 35%	Greater than 41%
60 - 79	Less than 25%	25% to 38%	Greater than 38%	Greater than 43%
Body Adiposity Index Classifications for Men				
Age (years)	Underweight	Healthy	Overweight	Obese
20 - 39	Less than 8%	8% to 21%	Greater than 21%	Greater than 26%
40 - 59	Less than 11%	11% to 23%	Greater than 23%	Greater than 29%
60 - 79	Less than 13%	13% to 25%	Greater than 25%	Greater than 31%

The following equation is used to calculate the body adiposity index:

$$\text{BAI} = (\text{HC} / (\text{HM})^{1.5}) - 18$$

Where:

BAI = Body Adiposity Index

HM = Height in Metres

HC = Hip Circumference in Centimetres

Colombo O, Villani S, Pinelli G, Trentani C, Baldi M, Tomarchio O, Tagliabue A. To treat or not to treat: comparison of different criteria used to determine whether weight loss is to be recommended. *Nutr J.* 2008 Jan 29;7:5.

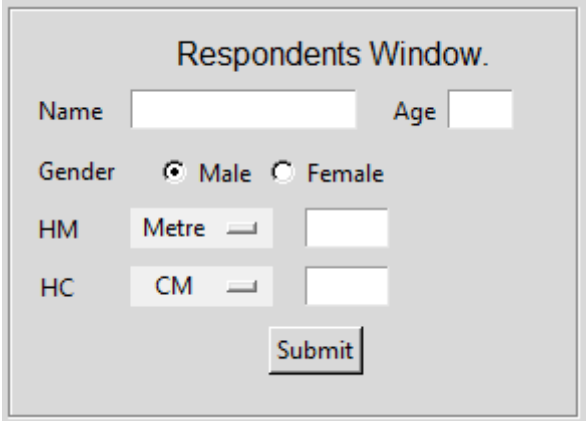
Gallagher D, Heymsfield SB, Heo M, Jebb SA, Murgatroyd PR, Sakamoto Y. Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. *Am J Clin Nutr.* 2000 Sep;72(3):694-701.

2. Decomposition, Planning and Design

Project is decomposed following sub-parts:

1. Respondents Window

This window provides facility to give inputs to the application of a respondent. This window contains entry section for Name, Gender, Age, HM and HC in different linear scales.

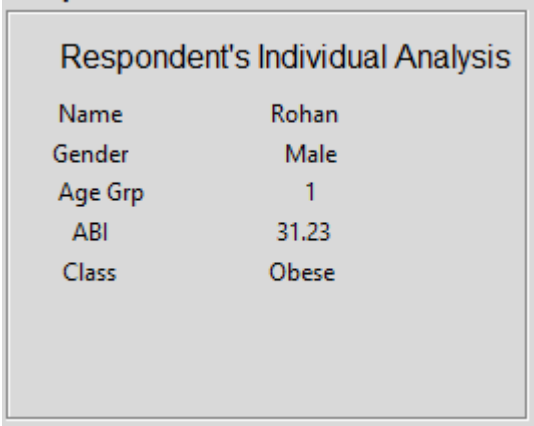


The 'Respondents Window' form contains the following fields and controls:

- Name:** A text input field.
- Age:** A text input field.
- Gender:** Radio buttons for 'Male' (selected) and 'Female'.
- HM:** A dropdown menu set to 'Metre' followed by a text input field.
- HC:** A dropdown menu set to 'CM' followed by a text input field.
- Submit:** A button at the bottom right.

2. Individual Respondents Analysis

This window will display processed data of individual at the time of input. There are three age group, 1 for 20-39, 2 for 40-59 and 3 for 60-79. After submitting the data of Rohan, output are shown.

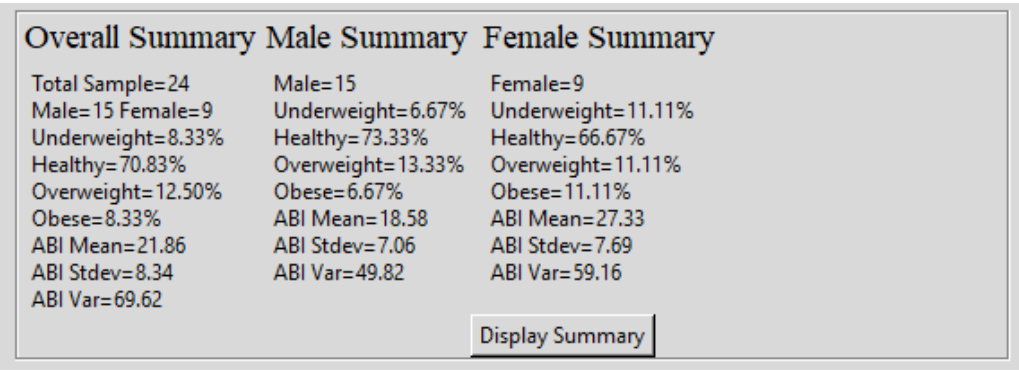


The 'Respondent's Individual Analysis' form displays the following data for Rohan:

Name	Rohan
Gender	Male
Age Grp	1
ABI	31.23
Class	Obese

3. Over Summary Window

This section contains the analysis of the stored data. Any time "Display Summary" button is clicked, statistics of the latest updated data will be displayed. It contain three part, 1- Overall Summary of data, 2-Male Respondents Summary, and 3-Female Respondents Summary.



The 'Over Summary Window' form displays the following statistics:

Overall Summary	Male Summary	Female Summary
Total Sample=24	Male=15	Female=9
Male=15 Female=9	Underweight=6.67%	Underweight=11.11%
Underweight=8.33%	Healthy=73.33%	Healthy=66.67%
Healthy=70.83%	Overweight=13.33%	Overweight=11.11%
Overweight=12.50%	Obese=6.67%	Obese=11.11%
Obese=8.33%	ABI Mean=18.58	ABI Mean=27.33
ABI Mean=21.86	ABI Stdev=7.06	ABI Stdev=7.69
ABI Stdev=8.34	ABI Var=49.82	ABI Var=59.16
ABI Var=69.62		

Display Summary

4. Input Validation

This section validates each entry and data which is to be submitted. Data is submitted only when all data entries are valid. For each invalid entries alert message are shown.

The screenshot shows the ABI Analyzer application window. The 'Respondents Window' has fields for Name, Age, Gender (Male/Female), HM (Metre), and HC (CM). The 'Respondent's Individual Analysis' section shows fields for Name, Gender, Age Grp, ABI, and Class. An 'Overall Summary' section displays statistics for the sample. A 'Name Error' dialog box is open, displaying a red 'X' icon and the message 'Name Field Cannot be Empty!'. The dialog has an 'OK' button.

The screenshot shows the ABI Analyzer application window. The 'Respondents Window' has fields for Name, Age, Gender (Male/Female), HM (Metre), and HC (CM). The 'Respondent's Individual Analysis' section shows fields for Name, Gender, Age Grp, ABI, and Class. An 'Overall Summary' section displays statistics for the sample. An 'Age Error' dialog box is open, displaying a red 'X' icon and the message 'Age cannot be more than 79 years and less than 20!'. The dialog has an 'OK' button.

The screenshot shows the ABI Analyzer application window. The 'Respondents Window' has fields for Name, Age, Gender (Male/Female), HM (Metre), and HC (CM). The 'Respondent's Individual Analysis' section shows fields for Name, Gender, Age Grp, ABI, and Class. An 'Overall Summary' section displays statistics for the sample. An 'HC Error' dialog box is open, displaying a red 'X' icon and the message 'Please enter an Valid HC Value'. The dialog has an 'OK' button. A 'Close' button is also visible on the dialog.

ABI Analyzer

Welcome to ABI Analyzer.

Respondents Window.

Name: Age:

Gender: ☒ Male ☐ Female

HM:

HC:

Respondent's Individual Analysis

Name

Gender

Age Grp

ABI

Class

Overall Summary Male

Total Sample=24
Male=15 Female=9
Underweight=8.33%
Healthy=70.83%
Overweight=12.50%
Obese=8.33%

Overall Summary Female

Total Sample=9
Male=15 Female=9
Underweight=13.33%
Healthy=77.78%
Overweight=6.67%
Obese=11.11%

ABI Mean=18.58
ABI Mean=27.33

Age Error

Please enter a Valid Age Value!

ABI Analyzer

Welcome to ABI Analyzer.

Respondents Window.

Name: Age:

Gender: ☒ Male ☐ Female

HM:

HC:

Respondent's Individual Analysis

Name

Gender

Age Grp

ABI

Class

Overall Summary Male

Total Sample=24
Male=15 Female=9
Underweight=8.33%
Healthy=70.83%
Overweight=12.50%
Obese=8.33%

Overall Summary Female

Total Sample=9
Male=15 Female=9
Underweight=13.33%
Healthy=77.78%
Overweight=6.67%
Obese=11.11%

ABI Mean=18.58
ABI Mean=27.33

HM Error

Please enter an Valid HM Value!

5. Data Storage and Updation

Every time respondent submit individual data it is stored in runtime environment and when window is going close, before that all the data gets updated in “ABI_Respondant_Data.json” file which is stored in same directory.

Complete Data

ABI_Respondant_Data - Dictionary (24 elements)

Key	Type	Size	Value
0	dict	8	{'Name': 'Mahendra', 'Gender': 'Male', 'Age': 29.0, 'AgeGroup': 1, 'HM': 1. ...
1	dict	8	{'Name': 'VK', 'Gender': 'Male', 'Age': 38.0, 'AgeGroup': 1, 'HM': 1.7, 'HC ...
10	dict	8	{'Name': 'jss', 'Gender': 'Female', 'Age': 24.0, 'AgeGroup': 1, 'HM': 1.7, ...
11	dict	8	{'Name': 'MJG', 'Gender': 'Female', 'Age': 47.0, 'AgeGroup': 2, 'HM': 1.7, ...
12	dict	8	{'Name': 'Rohan', 'Gender': 'Male', 'Age': 25.0, 'AgeGroup': 1, 'HM': 1.55, ...
13	dict	8	{'Name': 'Rohan', 'Gender': 'Male', 'Age': 21.0, 'AgeGroup': 1, 'HM': 1.55, ...
14	dict	8	{'Name': 'Lambu', 'Gender': 'Male', 'Age': 28.0, 'AgeGroup': 1, 'HM': 1.879 ...
15	dict	8	{'Name': 'Lambu2', 'Gender': 'Male', 'Age': 28.0, 'AgeGroup': 1, 'HM': 1.87 ...
16	dict	8	{'Name': 'Lambu3', 'Gender': 'Male', 'Age': 28.0, 'AgeGroup': 1, 'HM': 1.87 ...
17	dict	8	{'Name': 'pooja', 'Gender': 'Female', 'Age': 38.0, 'AgeGroup': 1, 'HM': 1.5 ...
18	dict	8	{'Name': 'Rkh', 'Gender': 'Female', 'Age': 40.0, 'AgeGroup': 2, 'HM': 1.600 ...
19	dict	8	{'Name': 'kk', 'Gender': 'Male', 'Age': 30.0, 'AgeGroup': 1, 'HM': 1.727199 ...
2	dict	8	{'Name': 'JOJO', 'Gender': 'Female', 'Age': 26.0, 'AgeGroup': 1, 'HM': 1.72 ...
20	dict	8	{'Name': 'jhon', 'Gender': 'Male', 'Age': 23.0, 'AgeGroup': 1, 'HM': 1.8034 ...
21	dict	8	{'Name': 'jhony', 'Gender': 'Male', 'Age': 24.0, 'AgeGroup': 1, 'HM': 1.854 ...
22	dict	8	{'Name': 'Radha', 'Gender': 'Female', 'Age': 22.0, 'AgeGroup': 1, 'HM': 1.5 ...
23	dict	8	{'Name': 'Radhai', 'Gender': 'Female', 'Age': 22.0, 'AgeGroup': 1, 'HM': 1. ...
3	dict	8	{'Name': 'Anu', 'Gender': 'Female', 'Age': 23.0, 'AgeGroup': 1, 'HM': 1.56, ...
4	dict	8	{'Name': 'SS', 'Gender': 'Male', 'Age': 27.0, 'AgeGroup': 1, 'HM': 1.6256, ...
5	dict	8	{'Name': 'sk', 'Gender': 'Male', 'Age': 32.0, 'AgeGroup': 1, 'HM': 1.600199 ...
6	dict	8	{'Name': 'MK', 'Gender': 'Male', 'Age': 29.0, 'AgeGroup': 1, 'HM': 1.8034, ...
7	dict	8	{'Name': 'MKg', 'Gender': 'Male', 'Age': 28.0, 'AgeGroup': 1, 'HM': 1.8034, ...
8	dict	8	{'Name': 'MK shau', 'Gender': 'Male', 'Age': 25.0, 'AgeGroup': 1, 'HM': 1.8 ...
9	dict	8	{'Name': 'js', 'Gender': 'Female', 'Age': 24.0, 'AgeGroup': 1, 'HM': 1.7, ' ...

Save and Close Close

Individual Data

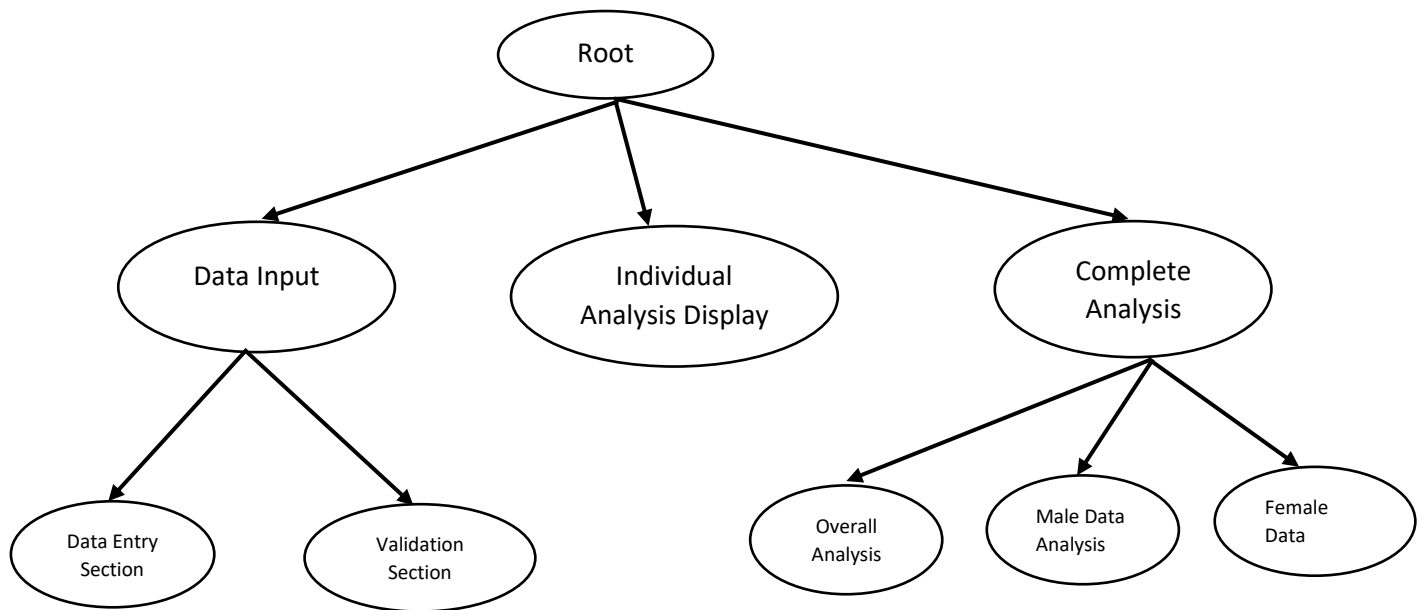
13 - Dictionary (8 elements)

Key	Type	Size	Value
ABI	float	1	31.229571771443474
Age	float	1	21.0
AgeGroup	int	1	1
Class	str	1	Obese
Gender	str	1	Male
HC	float	1	95.0
HM	float	1	1.55
Name	str	1	Rohan

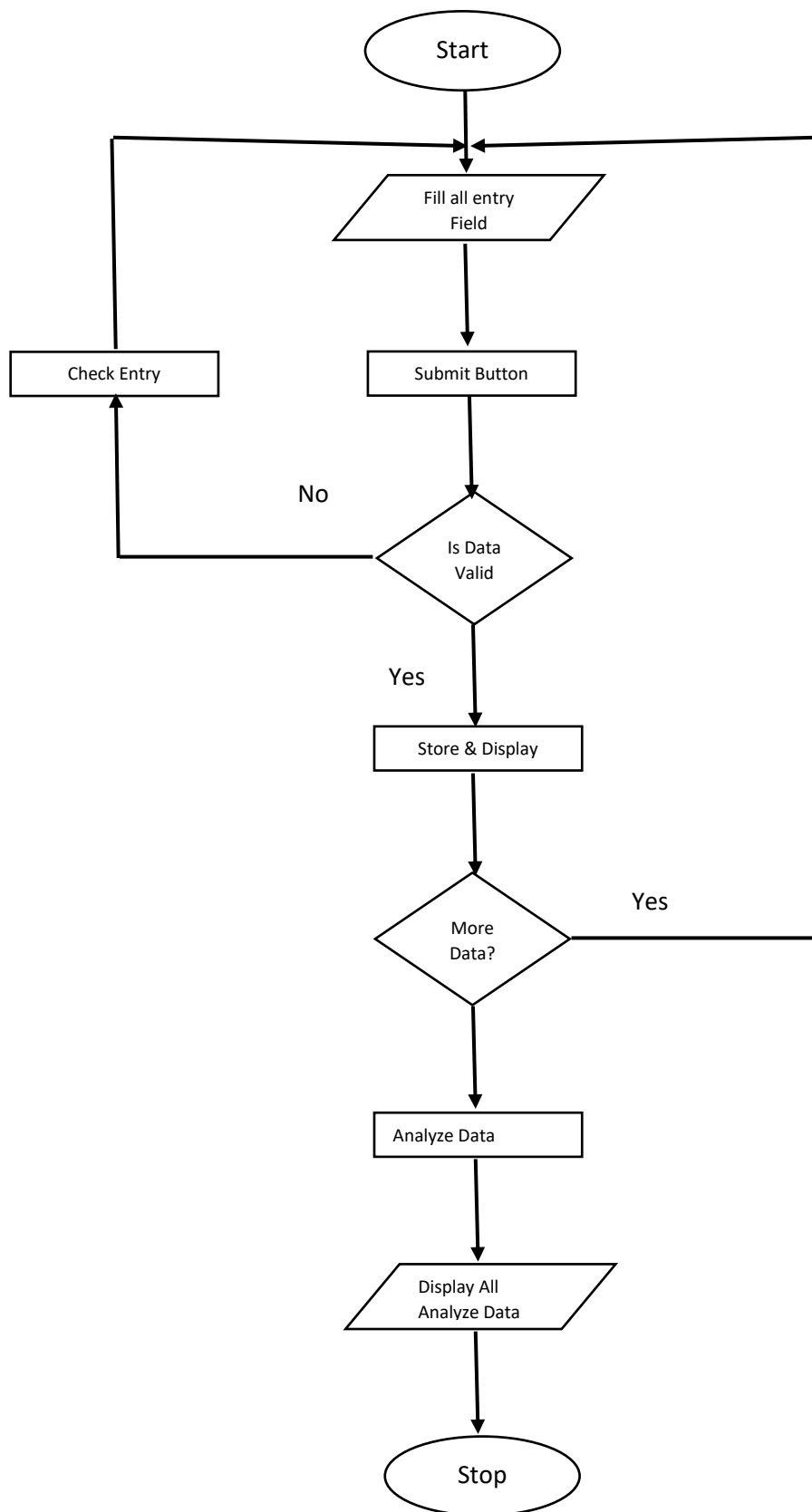
Save and Close Close

6. Error Checking

7. Hierarchical Structure of Project.



1. Flowchart



3. Implementation
4. Testing and Analysis
5. Review
6. Demonstration

Test Sample

Mahendra Gupta Age=39 HM=1.803 HC=93.96

Jyoti Gupta Age=26 HM=1.72 HC=99.08