

MA4830 – Realtime Software for Mechatronic Systems
Minor Assignment

13 January 2024

Introduction:

The body mass index (BMI) is a value derived from the mass(kg) and height(m) of an individual. The BMI is defined as the body mass divided by the square of the body height and is expressed in units of kg/m².

$$BMI \left(\frac{kg}{m^2} \right) = \frac{Mass(kg)}{Height^2(m^2)}$$

The BMI attempts to quantify the amount of tissue mass, muscle, fat, and bone, in an individual, and then categorise that person as underweight, normal weight, overweight, or obese based on that value. BMI is a measurement of a person's leanness based on their height and weight, and is intended to quantify tissue mass. It is widely used as a general indicator of whether a person has a healthy body weight for their height.

These ranges of BMI vary based on factors such as ethnicity.

The recommended BMI values are:

- Asians: Low (<18.5), Normal (18.5 – 23.0), Overweight (23.0 – 27.5) Obese (>27.5)
- Non-Asian: Low (<18.5), Normal (18.5 – 24.9), Overweight (24.9 – 29.9) Obese (>29.9)

There are different classifications for Asians and non-Asians. With Asians the ideal BMI is lower than non-Asians.

Minor Assignment :

Produce a C Language Program to:

- Compute the users BMI and to provide a preliminary assessment of the person's health risk.
- Analyse and classify the user's ideal BMI (Low, Normal, Overweight, Obese)
- Recommended "mass" reduction required to take the user's assessment to a "normal" state.

Your program should accept the necessary input parameters and compute the necessary indicators.

- Accept inputs using function the C language scanf() function and/or as command line arguments.
- Check for invalid data and provide user assistance
 - Exclude excessive weight, height and other non valid inputs.
- Compute BMI value and provide weight change recommendations
- Arrange your output into a readable table showing data entered by the user, BMI value and lifestyle recommendations.

Elaboration of Requirements

- Real-time check of data input
 - Check range of input values for improbable inputs and any additional data required (if required)
 - Assume adult users with plausible weight and height ranges.
 - Help & suggestion in identification of input error.
- Software robustness
 - Stable operation and avoidance of infinite loop or programming “hanging”
- Pleasant format of output results.

Administration Details:

- **Report Content:**
 - Explanation of what the program achieves
 - Its limitations and novelty (if any)
 - Highlight notable attributes
 - Simple flow chart explaining the various sub-tasks of the program
 - Example run and user manual
 - Print out the sample runs, under different conditions,
 - highlighting the input and output parameters.
- **Report Format:** Typically, <5 pages of report comprising of the following:
 - Short description on how to solve BMI equations
 - Flow chart and program listing (with comments)
 - Screen shot of screen output
- **Composition of Group**
 - 3 to 4 members per group. (typ.)

Grading Scheme

- Meets basic requirements (40%)
 - Full consideration of program requirements
- Accurate flow chart (15%)
- Program listing (25%)
- Program completeness and usability (20%)
 - Structure, comments and modularity
 - Overall presentation
 - Robustness and ease-of-use.
- This assignment comprises 10% of total course marks.

Dateline: 15 March 2024 (Friday following recess week)

Please note that this is a programming assignment and not intended to provide medical and/or lifestyle consultations.