HSUHK 45th Anniversary -
HSU x eClass Computing Cup

智能餐單助手設計比賽

*** Overview 概要 ***

Design and implement an Android mobile app that creates personalized meal plans for users. The app will display calorie information for a specific list of foods and include a Smart Diet Planner feature. This app allows users to input their weight, height, gender, physical activity level, and food preferences. Based on this information, the planner will recommend a meal plan that meets all user requirements, aiming to maximize user satisfaction with their meal choices. While the use of large language models (LLMs) may be incorporated in the development of the planner, it is not a requirement.

*** Data of Foods 食物數據 ***

The Calorie data for the list of foods is provided in the pdf file[1] and should be pre-loaded into the APP. Contestants may also include food information other than that in the file; however, they must demonstrate that such information is reliable and not simply generated by artificial intelligence. Furthermore, the APP will aim to maximize user's preference for the generated meal plan. To simplify the problem, we assume that users can input their preferences for certain foods on a scale from 0 to 6, where 0 indicates they do not like the food at all and 6 indicates a strong preference. For foods without specified preferences, a default value of 3 will be applied.

[1] https://www.chp.gov.hk/files/pdf/exn_nutp_058b.pdf

*** Smart Diet Planner 智能餐單助手 ***

The APP contains a Smart Diet Planner function that allows the user to input his/her weight, height, gender, physical activity level, which will be recorded and taken into consideration every time it provides meal plan recommendations. Users can also input their preferences for certain foods using a score from 0 to 6.

There are three meals in a day: Breakfast, Lunch, and Dinner. Once the user has entered their preferences, the app will create a meal plan for the three meals based on these requirements and conditions. We have some basic assumptions and requirements (Harris-Benedict Equation):

1. The calories required for male per day: [66.5 + 13.75*weight(kg) + 5*height(cm) - 6.75*age] * physical activity level
   The calories required for female per day: [655 + 9.56*weight(kg) + 1.85*height(cm) - 4.68*age] *physical activity level
   The physical activity level varies from 1.2-1.9. For a person who sits in the office the whole day, the physical activity level is 1.2.
2. The calories from Breakfast should be roughly 25%*calories of whole day.
3. The calories from Lunch should be roughly 35%*calories of whole day.
4. The calories from dinner should be roughly 40%* calories of whole day.
5. A food item cannot have more than two portions in a single meal.

*** Examples 例子 ***

For example, for a man: 70 kg, 175 cm, 30 years old, Physical level=1.2 (Daily Calories = 2042Cal based on the formula). The preference for some of the foods is listed in Table 2.

Table 2

No.	Food name	Preference
4	Plain congee	2
10	Spaghetti (cooked)	2
13	Braised pork blade shoulder (lean)	4
18	Cod (Atlantic, dry heat)	2
23	Ground pork (cooked)	2
29	Roasted chicken breast (without skin)	1
31	Roasted duck (without skin)	1
32	Roasted goose (with skin)	4
38	Boiled cabbage	2
41	Boiled sweet corn	5
49	Dragon fruit	4
56	Fried flat noodles with sliced beef	4
57	Fried noodles with soy sauce	1
58	Fried rice (Yangzhou style)	6
68	Steamed rice with stewed eggplant and shredded salty fish	4
75	Curry puff	2
85	Raisin bun	6
88	Barbecued pork puff pastry	6
93	Spring roll	6
94	Steamed barbecued pork bun	4
100	Steamed fresh prawn dumpling (Ha-gau)	5
109	Curry fish ball	4
120	Cream soup with puff pastry	5
123	Red bean dessert/ sweet soup	4
124	Sesame dessert/ sweet soup	1
138	Red bean icy drink	4

140	Sour plum drink	5
148	Peanut oil	2
149	Sesame seed dressing	5
150	Ginger puree	6

Notice that the preference of remaining items is set to 3 as default.

The following menu is the possible answer 1:

Breakfast: No.41*2+No.85

(409Cal < 2042*25%=510.5; Preference (average) = 5.33)

Lunch: No.88*2+No.93*2+No.100*2

(660Cal < 2042*35%=714.7; Preference (average) = 5.67)

Dinner: No.58

(965Cal > 2042*40%=816.8; Preference (average) = 6)

The total preference (sum): 16

The following menu is the possible answer 2:

Breakfast: No.85+No.88+No.93

(491Cal < 2042*25%=510.5; Preference (average) = 6)

Lunch: No.13+ No.120

(643Cal < 2042*35%=714.7; Preference (average) = 4.5)

Dinner: No.56

(910Cal > 2042*40%=816.8; Preference (average) = 4)

The total preference (sum): 14.5

*** Scoring Criteria 評分準則 ***

Works submitted by each team will be scored according to the following criteria:

1. Functional Assessment (30 marks)

Programs will be evaluated based on their performance across multiple test cases. Evaluation criteria include:

   i. Is the total calorie count of the proposed menu accurate?
   ii. Do the proposed breakfast, lunch, and dinner align with the calorie distribution ratios?
   iii. Are the calorie counts for the foods in the proposed menu accurate?
   iv. Are the foods in the proposed menu included in the list?
   v. Is there any variation in the combinations of each meal in the proposed menu?

2. Human-Centred Design (15 marks)

"Assistants" should follow human-centred design principles and aim to provide users with a pleasant experience. This means that the "assistant" should be able to meet the users' actual needs, featuring a clear, simple, and user-friendly interface. The information provided should be practical, and expressions should facilitate real operational needs. Additionally, the Assistant should run smoothly and without errors. Evaluation criteria include:

   i. Preference optimization of the proposed menu
   ii. Response speed of the assistant
   iii. Interface design

3. Resource Budget (15 marks)

Considering the budget and resources used by the "Assistant," including but not limited to the hardware and resources used, smaller is better. Evaluation criteria include:

   i. Hardware costs
   ii. Compatibility of hardware with the model

Environmental requirements and dependencies

*** Deliverable 提交作品 ***

*** Initial Round **

Please submit the following items via the competition page:

1. A documentation of no more than 15 pages, with font size 12 and line spacing 1.5. The document must describe the design concept of the work, including but not limited to:
    a. Overall design concept
    b. Methods used in planning the meal plan
    c. Hardware used and detailed specifications
    d. Operation procedure of the “Assistant”
    e. Screenshots of the “Assistant” (if available)
2. A functional Android mobile application (including user interface), formatted as an APK file

The judging panel will select the top five participating teams to advance to the finals.

*** Finals ***

The five teams with the highest scores in the second round of selection can advance to the finals. They need to bring the devices to the finals venue for on-site testing, demonstration, and reporting.

The judging panel will select a champion, first runner-up, and second runner-up, as well as two outstanding teams.