Zhang Xiaoyu - Project Portfolio

PROJECT: SugarMummy

Overview

SugarMummy is a desktop application used to help type-II diabetics develop healthier lifestyle. The user interacts with it using a Command Line Interface, and its GUI is created with JavaFx. It is written in Java and has about 30 kLOC.

Summary of contributions

- **Major Feature**: added **recmf command**
  - What it does: Recommends a list of medically suggested foods to type II diabetics.
  - Justification: This feature is crucial to diabetic patients since their health states are closely related to food consumptions.
  - Highlights: This feature benefits the extension of more accurate and personalized food recommendations since the food model with nutrition values that can be calculated and analyzed. Besides, it is also useful for future commands that relate to diet records and analysis.
- **Minor enhancement**:
  - added a `recmfmix` command as a concise version of `recmf` command
  - added `addfood` and `deletef` commands that allows the user to change the food database
  - added `resetf` command that allows the user to clear any modifications on the food database
- **Code contributed**: [View RepoSense]
- **Other contributions**:
  - Project management:
    - Set up the organization and repo
    - Transferred user cases to GitHub project
    - Categorized issue tags
    - Managed releases `v1.2.1`, `v1.3.2`, `v1.3.3`, `1.3.6` (4 releases) on GitHub
  - Enhancements to existing features:
    - Helped construct the display pane switch between commands: #64
    - Constructed a generic Storage class for storage reading and writing: #65
  - Documentation:
    - Designed the background for the application: #22
    - Added application logo: #105

        - Updated the initial User Guide, and detailed the food recommendation feature: #20, #110, #214
        - Updated `Readme` and application background: #22
        - Helped finalize the Developer Guide, and detailed the food recommendation feature: #85, #185, #214, #218
    - Community:
        - Reported bugs and suggestions for other teams in the class: 1, 2, 3

Contributions to the User Guide

Food Recommendation

General Note

1. If a command requires no user-input arguments, all the additional inputs after this command string will be ignored, and the command will be executed as usual.
2. If a command requires any parameters, the input order is flexible. Duplicate parameters are also allowed, **but only the last occurrence will be considered**.

Recommending food: `recmf`

Recommends medically suggested foods for type II diabetes patients. The user can specify flags and food names` as two kinds of filters, as well as one type of sorting order:

- **Flags:** specifies the wanted food types in the form of following flags:

-nsv: non-starchy vegetable, such as *Broccoli*	**-sv: starchy vegetable**, such as *Potato*
-f: fruit, such as *Cherry*	**-p: protein**, such as *Lean Lamb*
-s: snack, such *Fig Roll*	**-m: meal**, such as *Spanish Omelet*

Note:
1. Flags are case-insensitive and duplicates are allowed, but they will be recognized only when placed before any prefix.
2. If no flag is specified, it is equivalent to specifying all flags. Namely, foods of all types will be shown.

- **Food Names:** matches foods that contain **one of** given food names in the form of `fn/[FOOD_NAME]⋯`

Note:
1. Matching is case-insensitive but is full-word matching. For example, "chicken" does not match "ch".
2. If no food name specified after `fn/`, it is equivalent to matching all foods.

- **Sorting Order**: determines the presentation order of food cards in **one** of the two forms: `+sort/SORT_ORDER_TYPE` and `-sort/SORT_ORDER_TYPE`
  - `+` indicates in ascending order and `-` descending
  - `SORT_ORDER_TYPE` is required and can be one of the following six:
    `fn`: food name; `ft`: food type; `ca`: calorie; `gi`: glycemic index; `su`: sugar; `fa`: fat

> **NOTE:**
> 1. `+sort/SOT` and `-sort/SOT` cannot be both present even though they may have different `SOT`(`SORT_ORDER_TYPE`).
> 2. Specially, for `ft`, the ascending order is predefined as: nsv, sv, f, p, s, m.

Format: `recmf [-nsv] [-sv] [-f] [-p] [-s] [-m] [fn/FOOD_NAME…][±sort/SORT_ORDER_TYPE]`

Examples: `recmf -p -f`, `recmf fn/chicken rice`, `recmf -p -m -f fn/chicken`, `recmf -p -nsv +sort/gi`

Recommending food combination: `recmfmix`

Recommends one food from each type. A summary card will be appended at the end.

> **Note:**
> 1. Food types with no available food data will not be shown. If there is no food data at all, the summary card will not be shown as well.
> 2. The summary data is formatted as integers. For Calorie, Sugar, and Fat, the sums of recommended foods are calculated. For GI (glycemic index) value, the average is calculated.
> 3. For more information about GI, please refer to this link.

Format: `recmfmix`

Example: `recmfmix`

Adding new food items : `addfood`

Adds a new food item for future recommendations. The following six fields are required:

- food name: `fn/FOOD_NAME`
  Food name should only contain alphabets, numbers, and whitespace. It should be less than 30 characters for display quality and readability.
- food type: `ft/FOOD_TYPE`
  Food types should be exactly one of the following: nsv(non-starchy vegetable), sv(starchy vegetable), f(fruit), p(protein), s(snack), or m(meal).
- calorie (cal): `ca/CALORIE`
  Calorie should be less than 700(cal) per serving.
- gi: `gi/GI`
  Glycemic Index should be less than 70 per serving.
- sugar (g): `su/SUGAR`
  Sugar should be less than 25(g) per serving.

- fat (g): `fa/FAT`
  Fat should be less than 35(g) per serving.

> **Note:**
> 1. No duplicate food names are allowed.
> 2. All nutrition values should be non-negative numbers and contain no more than four decimals. Incomplete decimals, such as ".5" and "1.", can be accepted as "0.5" and "1" respectively. However, decimal point by it alone will not be accepted.
> 3. Ideally, the input values are normalized as per serving for more practical value comparisons and calculations.

Format: `addfood fn/FOOD_NAME ft/FOOD_TYPE ca/CALORIE gi/GI su/SUGAR fa/FAT`

Example: `addfood fn/Cucumber ft/nsv ca/15 gi/15 su/1.7 fa/0`

Deleting an existing food: `deletef`

Deletes a food that matches the specified food name.

> **Note:** FOOD_NAME matching is case-insensitive, but is strict matching for every single character, including white spaces between words. It is also full matching. For example, "Rice with Chicken" does not match with "Chicken".

Format: `deletef fn/FOOD_NAME`

Example: `deletef fn/Mushroom`

Resetting food data: `resetf`

Clears all modifications, adding and deleting, on the food list. The food data will be reset to sample food data.

Format: `resetf`

Example: `resetf`

Recovering food data: *recoverf* `[coming in v2.0]`

Recovers the food data after resetting all the foods. The recovered data is based on the food list state just before the **latest recmf command**. This would be useful if the user wrongly enter `resetf` command, or another user want to temporarily use the same jar file on the same PC.

Editing a food: *editf* `[coming in v2.0]`

Edits the available food fields, such as food name and GI value, of an existing food. The restrictions on field value are the same as the restrictions declared in `addfood` commands. This would provide more flexibility to the user to manipulate food data, instead of directly deleting a food.

Recording and analyzing diets `[coming in v2.0]`

Records the user's diets on specified dates and provides daily, weekly, and monthly summaries about nutrition intakes. This would allow the user to have an overview of his food consumption statistics. Bases on such statistics, the user can get more specific and personalized suggestions to balance the his nutrition intake.

Contributions to the Developer Guide

Food Recommendation Feature

The food recommendation mechanism is based on the manipulation of `UniqueFoodList`, via the implementation of the following operations:

- **Showing food recommendations as cards** filtered by `Flags` and / or `Food Names`.
- **Sorting the food list** according to `SortOrderType`.
- **Showing combined recommendations** from each food type with an additional *Summary* card.
- **Adding foods** and **Deleting foods**
- **Resetting food database** which clears modifications on the food list done by the user

These operations are respectively exposed in the `Model` interface as `updateFilteredFoodList()`, `sortFoodList()`, `getMixedFoodList()`, `addFood()`, `deleteFood()`, `setFoods()`.

Data Structure Overview

The main data structures used to support food recommendation are listed as follows.

1. Food Model

It encapsulates `FoodName`, `FoodType`, and four `NutritionValues` and has the following usages:

- Fields are visualized in `FoodCards`, which collectively compose the `FoodFlowPane`.
- Fields are `Comparable` to support `sortFoodList()` function.
- `NutritionValues` are used by `FoodCalculator` to obtain summary statistics.

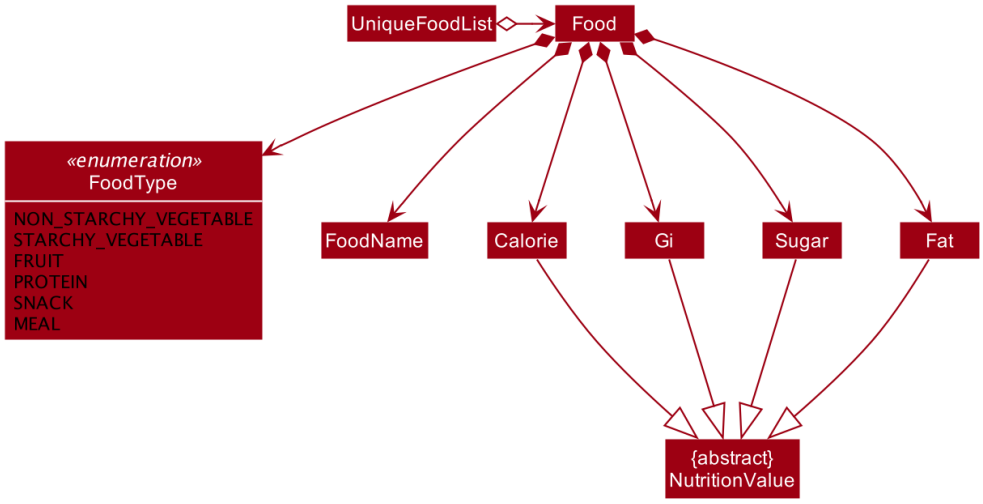
API: Food.java

2. UniqueFoodList

It holds the collection of foods, and it exposes necessary methods in `ModelManager`. Internally, it holds an `ObservableList` available for modifications, such as adding foods. It also implements `getMixedFoodList()` method for `recmfmix` command via randomly selecting foods from its `internalUnmodifiableList`.

API: UniqueFoodList.java

The following class diagram summaries how these two main components interact.



3. Predicates

Both `Predicates`, `FoodNameContainsKeywordsPredicate` and `FoodTypeIsWantedPredicate` hold desired conditions as `Collections`, such as `List` and `Set`. They literate through the whole food list to select foods that matches any of given conditions. If the conditions are empty, the `test()` result is always set to be true.

API: FoodNameContainsKeywordsPredicate.java; FoodTypeIsWantedPredicate.java

Implementation of *recmf* and *recmfmix* command

`recmf` command

`RecmFoodCommandParser` parses user inputs to standard parameters for the customised presentation of food recommendations, detailing in the following three ways:

1. Specifying flags

`Flags` specify food types that are intended to be shown. This design is similar to using options in Unix commands. Available `Flags` depend on available `FoodTypes`, as they will be eventually translated to a `HashSet` of `FoodTypes` and supplied to FoodTypeIsWantedPredicate.

NOTE	If no flag is specified, `RecmFoodCommandParser#getWantedFoodTypes(flagsStr)` just returns an empty `HashSet`.

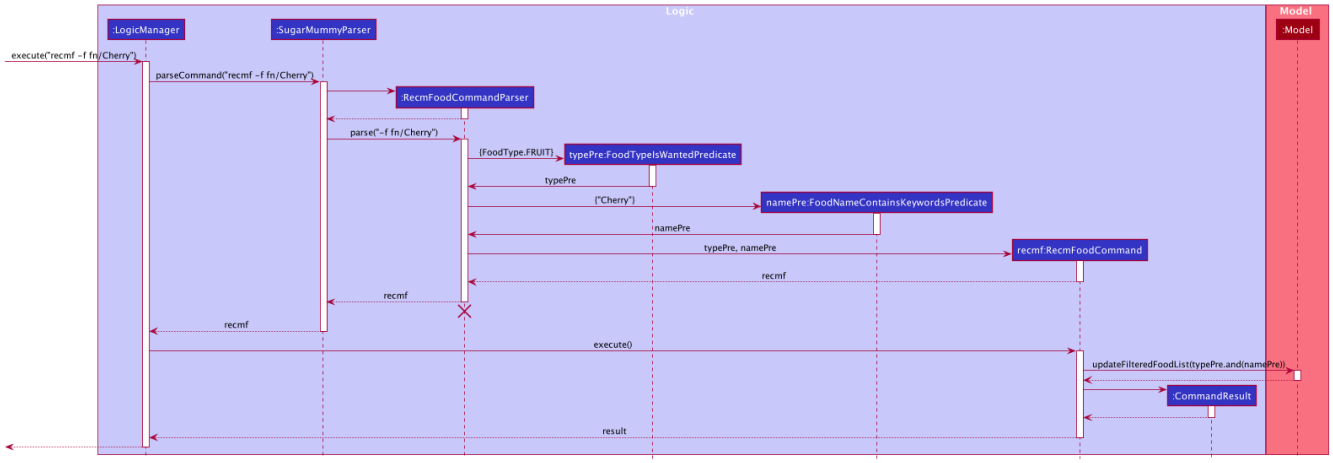
API: Flag.java; {repoURL}{generalPath}/model/recmf/FoodType.java[FoodType.java]

2. Filtering food names

It is similar to but simpler than the implementation of specifying flags. A `List` of food name strings will be supplied to FoodNameContainsKeywordsPredicate.

The following sequence diagram shows the how `recmf` command with flag and food name as the

filters works.



NOTE	The sorting related (refer to the following section) parts, such `FoodComparator`, are omitted in this diagram.

3. Sorting

It is implemented via supplying a `FoodComparator` to `model#sortFoodList()` method.
`FoodComparator` wraps A `Comparator` to handle the main logic, such as reversing the `FoodComparator` via `Comparator#reversed()`. An inner enum class `SortOrderType` holds all the comparable food fields for sorting.

NOTE	The private `FoodComparator` constructor that directly takes in `Comparator` is for internal usage of getting reversed `FoodComparator`. Outside instantiation is done by supplying `SortOrderType` strings.

API: `FoodComparator.java`

`recmfmix` command

`UniqueFoodList#getMixedFoodList()` generates a temporary `ObservableList` from the existing food data. This list will eventually be supplied to `FoodFlowPane` via `Model` and then `Logic`.

- Food Summary Card: It is essentially treated as `Food` with *Summary* as food name and *meal* as food type. The total / average nutrition values are calculated by `FoodCalculator`.

NOTE	This command has to override the `Command#isToCreateNewPane()` and return `true`, since it must refresh the display pane each time by randomly getting new foods, rather than getting the existing display pane from `typeToPaneMap` (refer to `MainDisplayPane.java`).

API: `FoodCalculator.java`

Implementation of other supplementary commands

The following three commands can be used modify the food database.

`addfood` and `deletef` commands

`AddFoodCommandParser` and `DeleteFoodCommandParser` are used for parsing these two commands respectively. Parameter validation is done by `RecmFoodParserUtil`.

API: `RecmFoodParserUtil.java`

`resetf` command

It is implemented by setting the internal list of `UniqueFoodList` to be the sample food data in `SampleFoodDataUtil`.

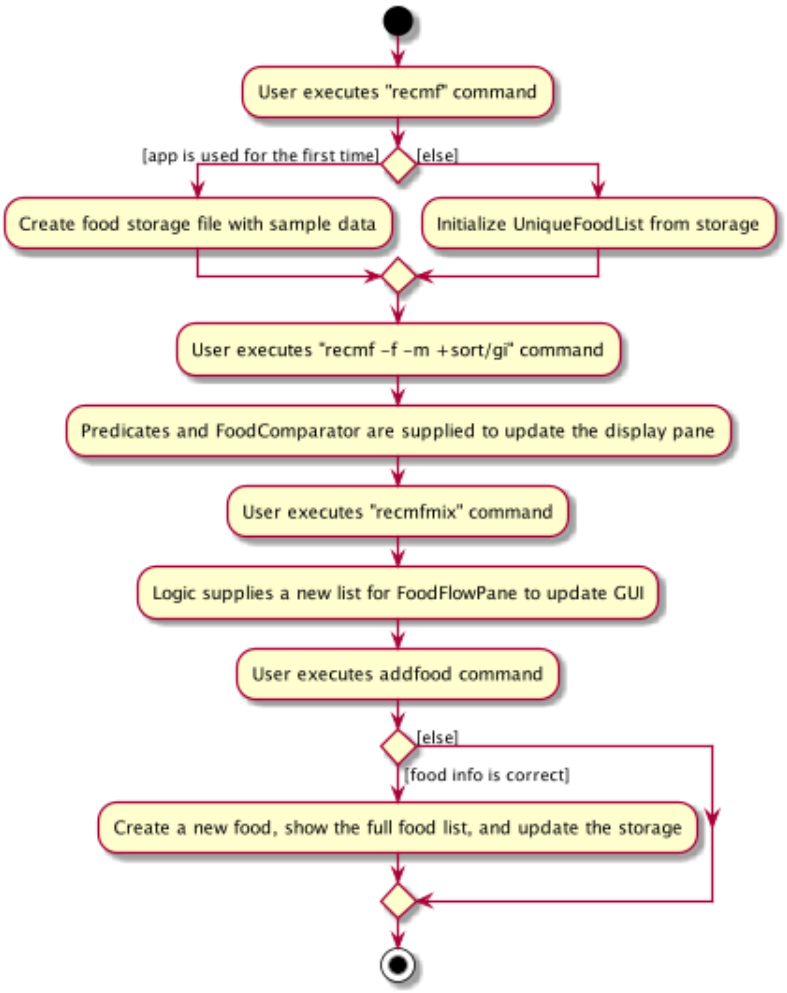
API: `SampleFoodDataUtil.java`

Example Usage Scenario and Summary

Given below is an example usage scenario and how the food recommendation mechanism behaves at each step.

1. The user launches the application and enter `recmf`.
    a. If it is the first time entering a command, a `foodlist.json` storage file will be created with sample food data. Otherwise, data is loaded from the existing storage file.
    b. `FoodFlowPane` obtains food list information from `Logic` and displays food cards to the user.
2. The user executes `recmf -f -m +sort/gi` command.
    a. `FoodTypeIsWantedPredicate` is set to select foods of *fruit* and *meal* types. `FoodComparator` is set to sort foods in ascending order based on their GI values.
    b. `Model` updates the `filteredFoodList` with this predicate and sorts the list with this comparator.
    c. `FoodFlowPane` notices the such updates from `Listener` and refreshes the GUI.
3. The user executes `recmfmix` command.
    a. `Logic` gets a list of foods from UniqueFoodList#getMixedFoodList(), which contains a Summary food calculated by `FoodCalculator`.
    b. `FoodFlowPane` updates its content with this new list.
4. The user executes `addfood fn/Cucumber ft/nsv ca/15 gi/15 su/1.7 fa/0`.
    a. The display switches to show the full list which also contains this newly added food.
    b. The storage file updates accordingly.

The following activity diagram summarizes the above steps.



Design Considerations

Aspect: Data Structure of the Food Collection

- **Alternative 1 (current choice):** Use a `List` to store all the foods
  - Pros: The logic can be easily understood.
  - Cons: Operations on foods, such as filtering and adding, need to iterating through the whole list.
- **Alternative 2:** Use a `Map` that categorizes foods based on their food types
  - Pros: Impoves efficiency of filtering by flags by simply `get()`. Besides, maintaining the order after adding a new food only requires to sort foods of the same type. It can improve efficiency especially when the database is large.
  - Cons: There is no `FilteredMap` class supported by JavaFX. Extra work is needed to apply `Predicate` on the Map.

Aspect: The presentation (UI) of food recommendations

- **Alternative 1 (current choice):** Show the user a pane of cards. Different types are indicated by the different colors.
  - Pros: Easy to implement. Cheerful colors may make reading more pleasant.
  - Cons: The size of food cards cannot be customized. If the window size is relatively small, the

user may need to repeatedly scroll up and down to locate certain foods.

- **Alternative 2:** Use several horizontal `ListViews` to hold different food type.
  - Pros: The content can be more organized and the user does not need to specify the food types for filtering. Besides, the food cards can be customized for each `ListView`, such as omitting GI and Sugar for proteins since they are usually zero.
  - Cons: The operations targeting at the whole list need to be applied separately for each food list.

Aspect: Inputting New Food Data

- **Alternative 1 (current choice):** Require inputs for all fields (e.g. calorie, gi...).
  - It prevents some foods from permanently having empty fields, which may result in inaccurate sorting and summaries.
  - Cons: There is no way to add new foods with currently unavailable fields.
- **Alternative 2:** Use a separate list to hold foods with incomplete inputs.
  - Pros: This makes user inputs more flexible.
  - Cons: Extra work is needed to apply changes on two lists and transfer data from one list to the other.

Future Developments [Proposed Features]

- Recovering data after resetting `[coming in v2.0]`
  This may be implemented by using a separate file to store the food data before executing `resetf` command. This file will be updated with the current food list before the `resetf` command is executed.
- Editing Foods `[coming in v2.0]`
  This can be adapted from exiting `edit` command from `AddressBook3`. However, since foods are identified by names instead of indexes, may consider using a `Map` that maps food names to food objects.
- Recording and Analyzing diets `[coming in v2.0]`
  This can be adapted from existing `Record` model for daily, weekly, and monthly data summaries. The suggestions can be made via (1)calculating ideal nutrition value intake based the user's BMI value, and (2) comparing the ideal intake amounts with the user's actual intake amounts.