Food Nutrition Analyser

Food Nutrition Analyser is a Python script designed to perform comparative analysis of food's nutritional content utilizing the nutritional information from the <u>FoodData Central database</u> curated by the United States Department of Agriculture (USDA).

FUNCTIONALITIES

The program includes a script for data transformation which allows any dataset from the FoodData Central database to be used for the analysis, provided it is in a JSON format. The comparative nutrient analysis can be performed in two ways. The 'Rank Foods' option ranks all selected foods based on their nutritional content of selected nutrients (Figure 1). The 'Compare Nutrients' option produces a table which summarises the nutritional content of selected foods as percentages of Recommended Daily Allowance (RDA) of selected nutrients per 100 grams of food (Figure 2).

food_name	food_category	kcal/100g	g of Magnesium, Mg/100g	% of Magnesium, Mg RDA/100g	mg of Zinc, Zn/100g	% of Zinc, Zn RDA/100g
Seeds, cottonseed meal, partially defatted (glandless)	Nut and Seed Products	367	0.76	190	12.3	112
Seeds, cottonseed flour, partially defatted (glandless)	Nut and Seed Products	359	0.721	180	11.7	106
Seeds, cottonseed flour, low fat (glandless)	Nut and Seed Products	332	0.716	179	11.6	105
Seeds, sesame flour, partially defatted	Nut and Seed Products	382	0.362	91	10.7	97
Seeds, hemp seed, hulled	Nut and Seed Products	553	0.7	175	9.9	90
Seeds, watermelon seed kernels, dried	Nut and Seed Products	557	0.515	129	10.2	93
Seeds, sesame flour, high-fat	Nut and Seed Products	526	0.361	90	10.7	97
Seeds, pumpkin and squash seed kernels, dried	Nut and Seed Products	559	0.592	148	7.81	71
Seeds, sesame butter, tahini, from unroasted kernels (non-chemically removed seed coat)	Nut and Seed Products	607	0.353	88	10.4	95
Seeds, pumpkin and squash seed kernels, roasted, with salt added	Nut and Seed Products	574	0.55	138	7.64	69
Seeds, pumpkin and squash seed kernels, roasted, without salt	Nut and Seed Products	574	0.55	138	7.64	69
Seeds, sesame butter, paste	Nut and Seed Products	586	0.362	91	7.29	66
Seeds, sesame seed kernels, toasted, without salt added (decorticated)	Nut and Seed Products	567	0.346	87	10.2	93
Seeds, cottonseed kernels, roasted (glandless)	Nut and Seed Products	506	0.44	110	6	55
Seeds, sesame meal, partially defatted	Nut and Seed Products	567	0.346	87	10.2	93
Seeds, sesame seed kernels, toasted, with salt added (decorticated)	Nut and Seed Products	567	0.346	87	10.2	93
Seeds, sesame seeds, whole, dried	Nut and Seed Products	573	0.351	88	7.75	70
Seeds, sesame seeds, whole, roasted and toasted	Nut and Seed Products	565	0.356	89	7.16	65
Seeds, sesame flour, low-fat	Nut and Seed Products	333	0.338	84	10	91
Seeds, sesame seed kernels, dried (decorticated)	Nut and Seed Products	631	0.345	86	6.73	61
Seeds, pumpkin and squash seeds, whole, roasted, with salt added	Nut and Seed Products	446	0.262	66	10.3	94
Seeds, pumpkin and squash seeds, whole, roasted, without salt	Nut and Seed Products	446	0.262	66	10.3	94
Seeds, safflower seed kernels, dried	Nut and Seed Products	517	0.353	88	5.05	46
Nuts, cashew nuts, raw	Nut and Seed Products	553	0.292	73	5.78	53
Seeds, safflower seed meal, partially defatted	Nut and Seed Products	342	0.35	87	5.01	46
Seeds, sunflower seed flour, partially defatted	Nut and Seed Products	326	0.346	87	4.95	45
Seeds, flaxseed	Nut and Seed Products	534	0.392	98	4.34	39
Seeds, sunflower seed kernels, dried	Nut and Seed Products	584	0.325	81	5	45

Figure 1. An example output of the 'Rank Foods' program. Ranking foods from the 'Nut and Seed Products' category based on their magnesium and zinc content (RDA values for a 25-year-old male).

		Fiber, total dietary	Niacin	Vitamin C, total ascorbic acid
3	Seaweed, Canadian Cultivated EMI-TSUNOMATA, dry	131%	23%	32%
4	Seaweed, Canadian Cultivated EMI-TSUNOMATA, rehydrated	16%	3%	4%
5	Potatoes, hash brown, refrigerated, unprepared	6%	11%	5%
6	Potatoes, hash brown, refrigerated, prepared, pan-fried in canola oil	13%	20%	3%
7	Sweet Potatoes, french fried, frozen as packaged, salt added in processing	20%	4%	8%
8	Tomato and vegetable juice, low sodium	3%	5%	31%
9	Hearts of palm, raw	5%	6%	9%
10	Yeast extract spread	23%	800%	0%
11	Sweet Potatoes, french fried, crosscut, frozen, unprepared	12%		5%
12	Sweet Potato puffs, frozen, unprepared	7%		2%
13	Turnip greens, canned, no salt added	5%	2%	17%
14	Alfalfa seeds, sprouted, raw	7%	3%	9%
15	Artichokes, (globe or french), cooked, boiled, drained, without salt	20%	7%	8%
16	Artichokes, (globe or french), frozen, unprepared	14%	5%	6%
17	Artichokes, (globe or french), frozen, cooked, boiled, drained, without salt	16%	6%	6%
18	Asparagus, raw	8%	6%	6%
19	Asparagus, cooked, boiled, drained	7%	7%	9%
20	Balsam-pear (bitter gourd), leafy tips, cooked, boiled, drained, without salt	7%	6%	62%
21	Balsam-pear (bitter gourd), pods, raw	10%	2%	93%
22	Balsam-pear (bitter gourd), pods, cooked, boiled, drained, without salt	7%	2%	37%
23	Lima beans, immature seeds, raw	18%	9%	26%
24	Corn, sweet, yellow, canned, drained solids, rinsed with tap water	6%	5%	2%
25	Corn, sweet, yellow, frozen, kernels cut off cob, unprepared (Includes foods for USDA's Food Distribution Program)	8%	11%	7%
26	Corn, sweet, yellow, frozen, kernels cut off cob, boiled, drained, without salt	9%	8%	4%
27	Corn, sweet, yellow, frozen, kernels on cob, unprepared	10%	10%	8%
28	Corn, sweet, yellow, frozen, kernels on cob, cooked, boiled, drained, without salt	10%	9%	5%
29	Cowpeas (blackeyes), immature seeds, cooked, boiled, drained, without salt	18%	9%	2%
30	Cowpeas (blackeyes), immature seeds, frozen, unprepared	18%	5%	4%

Figure 2. An example output of the 'Compare Foods' program. Comparing foods from the 'Vegetables and Vegetable Products' category based on their content of fibre, niacin and vitamin C expressed as percentages of daily RDA per 100 grams of food (RDA values for a 25-year-old male).

HOW TO USE

A demo version of the program can be run on Replit. Instead of creating a CSV or Excel file, demo version displays the results on the screen. The full program can be downloaded here. To run the program:

- Choose between 'Rank Foods' and 'Compare Foods' options (Figure 3A);
- Select the foods, food categories, and nutrients of interest (Figure 3B);
- Provide additional information (Figure 3C):
  - 'Rank Foods' program accepts an 'additional argument' which can be used apply a filter on food records based on a word or phrase, if desired;
  - 'Rank Foods' program can rank foods by nutrients per 100 grams or nutrients per 1 kcal of food;
  - RDA values are adjusted based on gender and age;
- Run the program and explore the results.

Figure 3. The user interface of the Food Nutrition Analyser.

FOOD RANKING

The 'Rank Foods' program ranks foods using the following algorithm:

- For each selected nutrient, all selected foods are sorted from the highest to the lowest based on their nutritional content for that particular nutrient;
- The foods are then given a rank with the highest number being assigned to the food with the highest content of a particular nutrient;
- Once ranks for all selected nutrients are determined, the average rank is calculated for each food;
- Foods are then sorted based on their average rank.

Important considerations:

- Only food records that contain information on all selected nutrients are used for the analysis. Consequently, higher number of selected nutrients means a higher chance of more foods being excluded from the analysis.
- All nutrients are assigned equal importance and equally contribute to the final result.