

Team 8: NutriFive

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Motivation

- Students away from home - limited time for cooking – important to balance practicality and nutrition
- Junk food – accessible but detrimental to health [1]
- No current solution incorporates **ALL**:
 - Time constraint for each meal
 - Include/Exclude specific ingredients
 - Maximizing nutritional value

Data

- Dataset downloaded from Kaggle [2]
- **201,578** recipes after cleaning
- 7 nutritional parameters per recipe: calories, fat PDV, sugar PDV, sodium PDV, protein PDV, saturated fat PDV, carbohydrates PDV (PDV = % daily value)
- Target nutrition per day (N) as per [3]

Approach

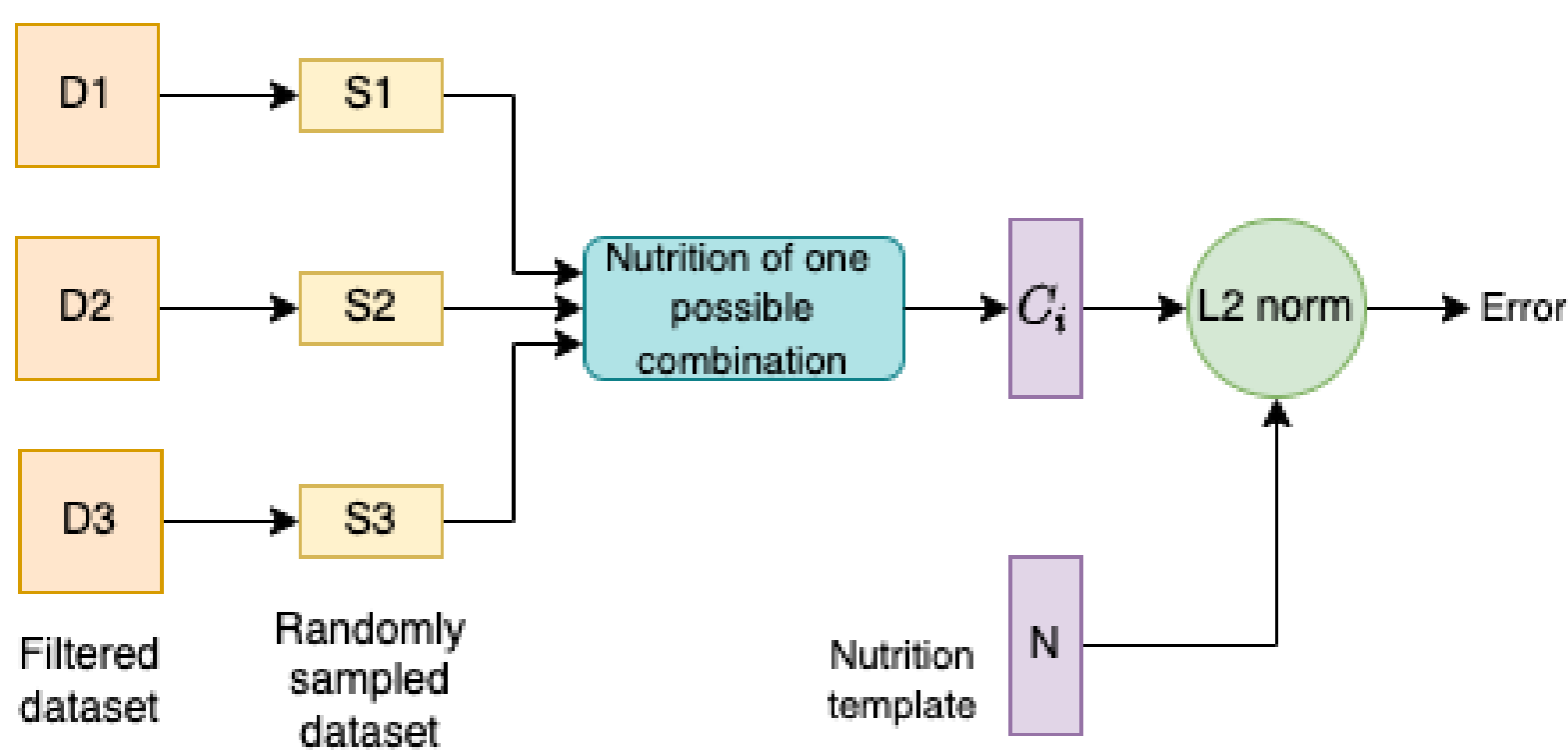
Input from user:

- Time budget for each meal (t) - most solutions do not incorporate
- Ingredients to include/exclude per meal
- Target nutritional content for one day (N) (default from [3])

Filter dataset according to:

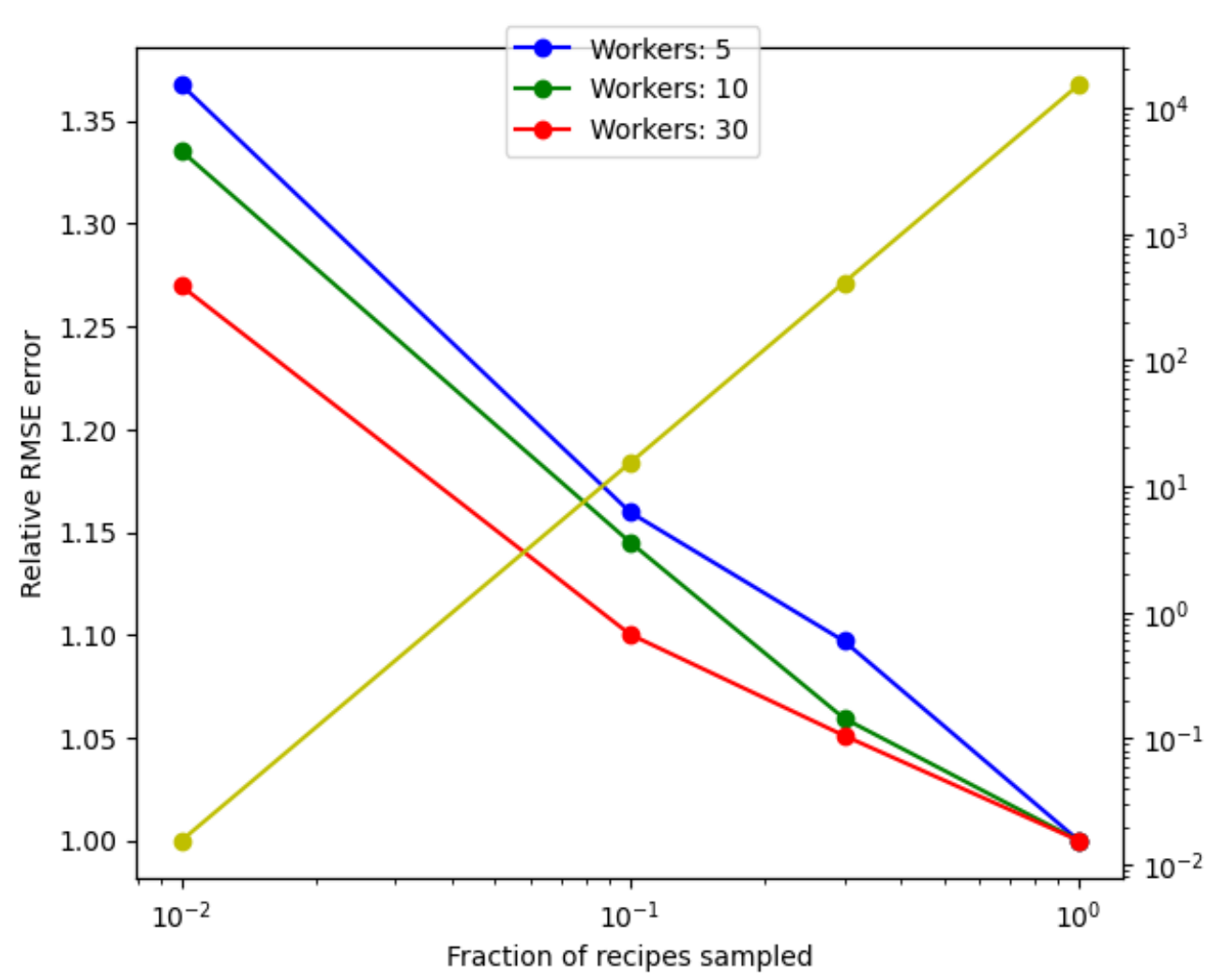
- Time: only keep recipes with time $[t - 5, t + 5]$
- Ingredients: keep recipes which include/exclude given ingredients
- D1, D2, D3 – list of allowed recipes for each slot

Algorithm:



- Check all possible combinations -> return one with least error
- Run multiple 'workers' with different subsets and get best result across workers
- More random subsets -> higher chance of finding optimal combination

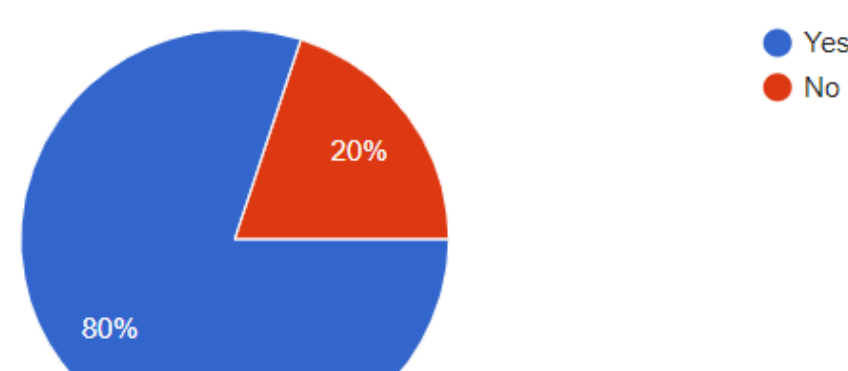
Experiments



User survey of web app:

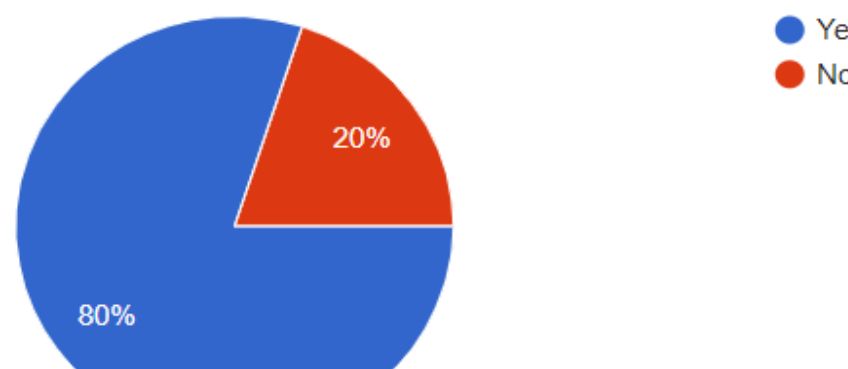
Was the initial screen of inputting the times easy to use?

10 responses



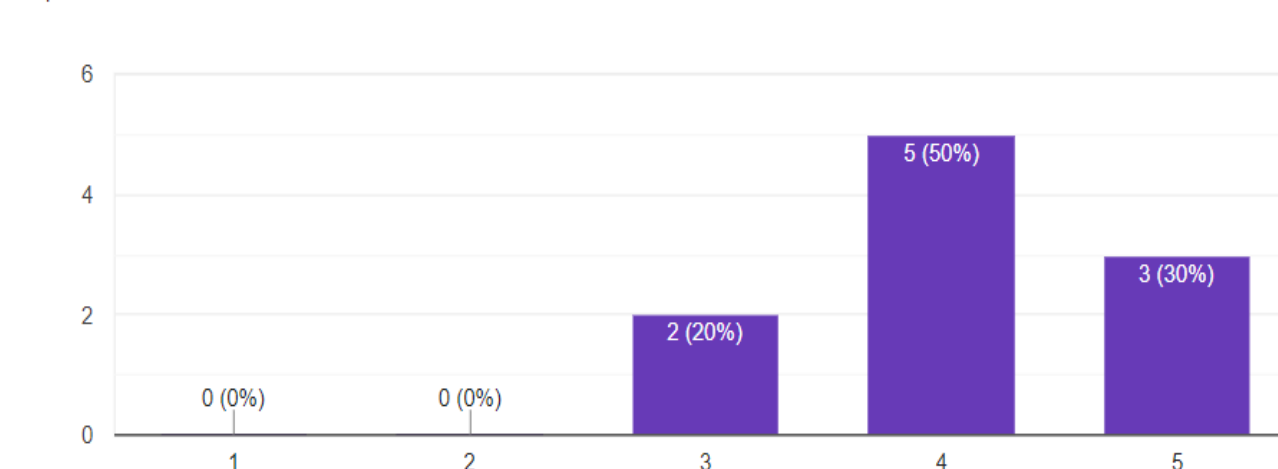
Did the app recommend useful recipes for you?

10 responses



Rate the usefulness of the shopping list functionality.

10 responses



- More workers -> less error
- Higher fraction of sampled recipes -> less error
- Time scales with f^3 where f is fraction of sampled recipes
- Advantage over other methods:
 - Can control trade-off between time and accuracy
 - Run threads in parallel and report best solution

References

[1] Rajveer Bhaskar. JUNK FOOD: IMPACT ON HEALTH. 2(3), 2012

[2] Bodhisattwa Prasad Majumder, Shuyang Li, Jianmo Ni, and Julian McAuley. Generating personalized recipes from historical user preferences. In Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing

[3] Johanna Dwyer. Nutritional requirements of adolescence. Nutrition reviews, 39(2):56–72, 1981.

Web App Visualization

Day	Breakfast			Lunch			Dinner		
	Time (min)	Includes	Excludes	Time (min)	Includes	Excludes	Time (min)	Includes	Excludes
Monday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Tuesday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Wednesday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Thursday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Friday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Saturday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>
Sunday	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>	30	<input type="button" value="ADD INCLUDES"/>	<input type="button" value="ADD EXCLUDES"/>

Constraint view: User inputs time and ingredient constraint for each slot

Day	Breakfast	Lunch	Dinner
Monday	Herbed Chicken Tenders 15min 210 cal Breakfast	Texas Governor S Mansion Cookies 25min 2456 cal Lunch	Garlicky Parsley Fried Potatoes 30min 272 cal Dinner
Tuesday	Poppy Seed Salad Dressing 15min 2081 cal Breakfast	Mom S Wilted Lettuce 30min 316 cal Lunch	Rosamarina Chicken Stir Fry 30min 538 cal Dinner
Wednesday	Zesty Burgers 15min 1605 cal Breakfast	Asparagus With Bow Ties 30min 997 cal Lunch	Szechwan Chicken Over String Green Beans 30min 335 cal Dinner

Week view: Recipes suggested by algorithm for each slot in the week

Herbed Chicken Tenders
15 min

Ingredients:

- Chicken Breast Tenders
- Fresh Lemon Juice
- Fresh Rosemary
- Thyme
- Garlic Powder
- Salt
- Fresh Ground Black Pepper
- Olive Oil

Nutrition

Nutrition	Value
Calories	210 cal
Fat	6 PDV
Sugar	0 PDV
Sodium	16 PDV
Protein	78 PDV
Sat Fat	4 PDV
Carbs	0 PDV

Steps:

- Step 1: Wash and drain chicken breast tenders
- Step 2: Mix all of the other ingredients in a small bowl and whisk thoroughly
- Step 3: Rub the herb mixture onto the chicken tenders thoroughly, until coated well on both sides of the chicken
- Step 4: Heat the olive oil in a large nonstick skillet over medium high heat
- Step 5: Add chicken to pan and saut approximately 4 minutes on each side, until the color is lightly golden brown

Tags: 15-minutes-or-less, time-to-make, course, main-ingredient, preparation, healthy, very-low-carbs, main-dish, poultry, easy

Recipe view: Name, ingredients, nutritional value, steps and tags for recipe

NutriFive CONSTRAINTS WEEK VIEW SHOPPING LIST

Filter: Garlicky Parsley Fried Pota...

- Salt
- Potatoes
- Garlicky Parsley Fried Potatoes Nov 7 (D)
- Light olive oil
- Garlicky Parsley Fried Potatoes Nov 7 (D)
- Garlic
- Fresh parsley

Shopping List view: List of ingredients aggregated across all suggested recipes