

eXpairing

Smart pairings. Zero waste.

Recommender Systems Workshop · Tel Aviv University

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Tired of throwing away expired food?



Don't know what to cook for dinner?

We have a solution for you!



Most fit recipes



Perfectly suitable drinks



Minimal waste



Simple and Accessible

Demo

Datasets

food.com · recipes

1.07M explicit ratings	231k unique recipes
76% are 5-star	0.0024% matrix density

Positivity bias: global mean ≈ 4.4 .

Wine dataset

Metric	 Wine
Unique items	100,646
Explicit reviews	21,013,536
Unique users	1,056,079
Matrix density	0.0198%

Additional datasets:

- **OpenFoodFacts**
- **Wine and Food Pairing Dataset**

Database schema

users

id · name · beta · diet_tags · has_cf · has_cb

pantry_items

user_id · ingredient (canonical) · raw_name · expiry_date

"Tnuva 3%" → "milk" - brand to Food.com vocab

recipes

id · name · ingredients_csv · tags_csv · avg_rating

Read-only. Seeded from Food.com. 231k rows.

user_events

user_id · recipe_id · event_type · rating · n_missing

"rate" trains CF · "cook" feeds beta · "skip" 7d

shopping_list_items

user_id · ingredient · source_recipe_id · is_checked

Items added from recommended recipes.

wines

id (FK→drinks) · grapes_csv · body · acidity · region

Wine subtype · acidity High/Med/Low

wine_events

id · user_id · drink_id · event_type · rating · synthetic · created_at

synthetic rows excluded from CF training

Architecture

Frontend

React + TypeScript

- Onboarding · Pantry · Feed · Wine
- Profile · Shopping · Search

REST / JSON



Backend

FastAPI · Python

- Routers: /users /pantry /recipes /wines
- Services: scoring · expiry · match
- ML: serve_cf · serve_cb · cold_start
(for both recipes and wines)

DB + models



Data + Models

SQLite · models

- Users · Pantry · Recipes · Events
- cf_model.pkl (Funk SVD)
- item_sim.npz · cb_matrix.npz

Recipes - Ranking

CF 35%

Collaborative filtering - user taste from rating history

CB 10%

Content-based - TF-IDF cosine sim against pantry profile.

Expiry 35%

Exponential decay - urgency amplifier.

Match $\beta\%$

Fuzzy pantry overlap. β per-user, learned from cook history.

Ranking Pipeline - from 231k to 20

1

→ 200 Candidates

Using Bayesian avg quality filter · user's diet · skipped (7d)

2

Score by the models and normalize → top 60

CF (item-based or MF) · CB (TF-IDF cosine) · expiry $e^{(-days/3)}$ · ingredient match

3

MMR diversity rerank → top 20

$MMR = 0.7 \cdot score - 0.3 \cdot max_Jaccard_to_selected$

Prevents 20 variations of the same dish.

Pantry - Expiry Urgency in practice



Vision scan → canonical name

GPT vision strips brand → "milk"



Expiry decay

$e^{(-\text{days}/3)}$ · tomorrow = 0.72 urgency



Canonicalization

Bridges real-world labels to Food.com vocab

Food x Wine Pairing

Flavor & Ingredient Profile - 60%

12 dim Vector Cosine Similarity

Pairing Rules - 40%

As provided in dataset + Sommelier Verification

Pure Wine Suggestions

CF 45%

Matrix Factorization

CB 45%

Sommelier-based feature matching

Popularity 10%

Future Work

Expand Israeli Wine Dataset

Filter by Price

Local Ingredient Availability

Beer Pairing

Landing Page



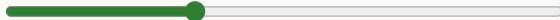
eXpairing

Rank recipes to minimize food waste

Your name (optional)

e.g. Rubi

Recipe suggestions style



Discover new recipes

Use what I have

"Some flexibility is fine"

This adjusts automatically as you cook — it's just a starting point.

Dietary preferences (optional)

vegetarian

vegan

gluten-free

dairy-free

keto

paleo

low-carb

nut-free

Used to personalize recommendations from your first visit.

Get started →

Pantry Page

[Recipes](#)[Wine](#)[Pantry](#)[Profile](#)

My Pantry

[📷 Scan fridge](#)[+ Add item](#)

Your pantry is empty

Add ingredients to start getting recipe recommendations.

Shopping list



Nothing to buy

Add missing ingredients from your recipe feed or a recipe detail page.

Item Scan

My Pantry

Found 1 items



Pasta REGGIA Fettuccine · 500g

Add 1 items to pantry

Cancel

× Cancel

Add pantry item

Ingredient *

Expiry date *



Quantity

Add

Recipe Recommendation Page

[Recipes](#)[Wine](#)[Pantry](#)[Profile](#)

What to cook tonight?

Sort by

Total score

Refresh



Personalized from your history

Using your rating history with matrix factorization (CF model).



Search by name or ingredient...

Showing 20 of 20 recipes · ranked by CF · expiry urgency · pantry match

Angel Hair Pasta with Scallops Tomato Basil

⌚ 17m ★ 5.0 11% in pantry

Need 8 items

[+ Buy missing](#)

Cook this

[Skip](#)[Details](#)

Amazing Simple Pasta

⌚ 40m ★ 4.5 25% in pantry

Need 3 items

[+ Buy missing](#)

Cook this

[Skip](#)[Details](#)

15 Minutes Creamy Fettuccine Alfredo

⌚ 20m ★ 4.7 20% in pantry

Need 4 items

[+ Buy missing](#)

Cook this

[Skip](#)[Details](#)

Angel Hair Tuna

⌚ 20m ★ 5.0 20% in pantry

Need 4 items

[+ Buy missing](#)

Cook this

[Skip](#)[Details](#)

Recipe Page

← Back

Amazing Simple Pasta

⌚ 40 min

📖 5 steps

★ 4.5 (8)

60-Minutes-Or-Less

5-Ingredients-Or-Less

Main-Dish

Side-Dishes

Pasta

Easy

European

Beginner-Cook

Italian

Pasta-Rice-And-Grains

Brunch

Taste-Mood

Savory

3-Steps-Or-Less

How was it? Your rating improves future recommendations.



Skip rating

Serve as a side dish or as a light main dish. It doesn't get much simpler than this and you won't believe how good it tastes.

Ingredients

- Farfalle Pasta
- Butter
- Parmesan Cheese
- Salt

Instructions

- 1 Boil the pasta in at least 2 quarts of water until it is tender , but not falling apart
- 2 Drain well in a colander and return right away to the warm cooking pot
- 3 Cut up the butter into the pasta and add the grated parmesan cheese
- 4 Add the salt , less if desired
- 5 Toss carefully and serve when butter and cheese have fully melted

🍷 Wine pairing

Pair me a wine

Recipe Page - Wine Pairing

Instructions

- 1 Boil the pasta in at least 2 quarts of water until it is tender , but not falling apart
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Wine pairing

Bulas — 20 Anos Tawny Porto

Touriga Nacional, Touriga Franca, Tinta Roriz, Tinta Barroca, Douro, Portugal

71% match

Toro Albalá — Don PX Gran Reserva

Pedro Ximenez, Montilla-Moriles, Spain

71% match

Konzelmann — Vidal Special Select Late Harvest

Vidal Blanc, Niagara Peninsula, Canada

71% match

Ilha — Tinta Negra Rosé

Tinta Negra Mole, Madeirense, Portugal

71% match

Campo Viejo — Tempranillo Rosé

Tempranillo, Rioja, Spain

71% match

Wine Section



eXpairing

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[Wine](#)

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Not sure what to drink?

New here? Tell us which fruits you enjoy and we'll start your picks. They sharpen as you rate wines.

Fruits you enjoy (helps us start)

 Orange

 Lemon

 Grapes

 Apple

 Pear

 Peach

 Apricot

 Cherry

 Strawberry

 Raspberry

 Blackberry

 Plum

Styles (all you drink)

Red

White

Rosé

Sparkling

Dessert



Suggest me a wine

Wine Recommender

[Recipes](#)[Wine](#)[Pantry](#)[Profile](#)[🔄 Suggest again](#)

Styles

✓ Red

✓ White

Rosé

✓ Sparkling

Dessert

PICKED FOR YOU

Oenothèque Brut Champagne

Dom Pérignon

Sparkling · Pinot Noir, Chardonnay

★ 4.8 (208)

★ Rate

Dismiss

Pauillac (Premier Grand Cru Classé)

Château Lafite Rothschild

Red · Merlot, Cabernet Sauvignon

★ 4.7 (734)

★ Rate

Dismiss

Cabernet Sauvignon

Don Melchor

Red · Cabernet Sauvignon

★ 4.7 (1106)

★ Rate

Dismiss

Grange

Penfolds

Red · Syrah/Shiraz

★ 4.8 (642)

★ Rate

Dismiss

Pauillac (Premier Grand Cru Classé)

Château Mouton Rothschild

Red · Cabernet Sauvignon, Cabernet Franc, Merlot, Petit Verdot

★ 4.7 (1066)

★ Rate

Dismiss

Laurène Pinot Noir

Domaine Drouhin

Red · Pinot Noir

★ 4.8 (12)

★ Rate

Dismiss

Thank you

