

LLMs for recipes

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Goal

How well do LLM work on recipes?



Models and data which we used

We focused on OpenAI GPT-3 models because of their ease of use and availability.

We used sample of Food.com dataset which we used for first project.



Ingredients extraction

The following is a list of ingredients used in recipe and product names extracted from list as json:

1 medium **onion**, chopped coarse. 1 medium **red bell pepper**, chopped coarse. 5 medium **garlic cloves**, chopped coarse. 1 lb **extra large shrimp**, shelled and deveined. **salt**. **hot pepper sauce**. 1 tablespoon **vegetable oil**. 3/4 lb **andouille sausage**, halved lengthwise and then cut into 1/4 inch slices. 1 1/2 cups **long grain rice**. 4 **bay leaves**. 1 (14 ounce) can **diced tomatoes**, briefly drained. 2 (8 ounce) bottles **clam juice**. 1/4 cup **fresh parsley**, chopped

Response:

Ingredients:

- Onion
- Red bell pepper
- Garlic cloves
- Shrimp
- Salt
- Hot pepper sauce
- Vegetable oil
- Andouille sausage
- Long grain rice
- Bay leaves
- Diced tomatoes
- Clam juice
- Fresh parsley

Dietary tags classification

The following is a list of ingredients used in recipe and its dietary tags

onion, red bell pepper, garlic cloves, large shrimp, salt, hot pepper sauce, vegetable oil, andouille sausage, long grain rice, bay leaves, diced tomatoes, clam juice, fresh parsley

Dietary tags:

Response:

Gluten-Free, Dairy-Free, Low-Carb, Low-Sodium

Testing models

For our project we were interested in testing LLMs capabilities in recipes domain. Because of that we tested different prompts followed by ingredients to see how well those models understand this domain.

Evaluating models

Ingredients Extraction

- Comparing to ground truth product names.

Dietary tags

- Evaluating model on selected tags.



Final prompts that we used

```
"specified_dietary_tags_classification": [  
    "Return json which has true if dietary tags from list below\nDIETARY_TAGS\nmatch below ingredients:\nINPUT_TEXT"  
],  
"dietary_tags_classification": [  
    "Give me list of dietary tags based on below ingredients in json format\nINPUT_TEXT\nDietary tags: "  
],
```



Results

Ingredients Extraction

Metric	Score
Ground truth ingredient in prediction	0.79
Prediction ingredient in GT	0.83
IoU	0.72

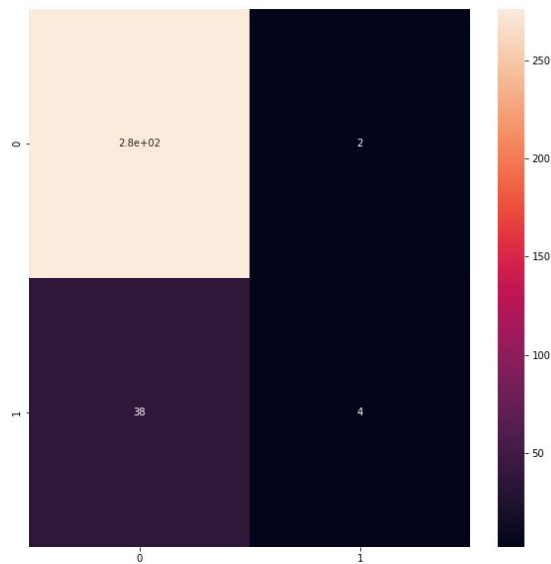
Dietary Tags

Dietary Tag	F1	Accuracy	Support
vegetarian	0.64	0.76	79
vegan	0.48	0.86	46
sweet	0.36	0.62	30
seafood	0.96	0.99	25
meat	0.79	0.90	50
low-sodium	0.44	0.56	105
low-carb	0.26	0.67	81
low-cholesterol	0.53	0.66	109
low-calorie	0.46	0.66	106
low-protein	0.35	0.71	87
low-saturated-fat	0.43	0.67	76
low-fat	0.43	0.67	76
dairy	0.36	0.58	53
nuts	0.35	0.82	31
diabetic	0.11	0.70	29
kosher	0.00	0.85	23

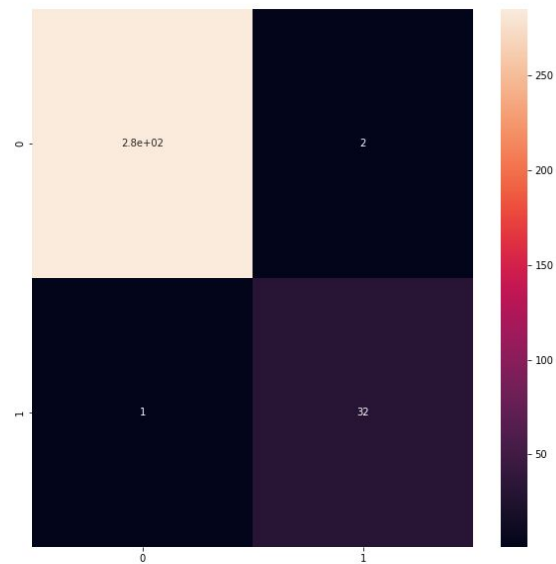


Results

Vegan



Seafood



Other prompts
that we found
interesting



NER

Do Named Entity Recognition on below text and return result in json format

- 1/3 cup toasted pumpkin seeds
- 4 ounces softened reduced-fat cream cheese or 4 ounces cream cheese
- 4 ounces goat cheese (I used La Buchette with Fine Herbs)
- 1 (16 ounce) jar salsa (Frontera Jalapeno Cilantro recommended)
- chopped fresh cilantro

```
"entities": [  
  {  
    "text": "1/3 cup",  
    "type": "Quantity"  
  },  
  {  
    "text": "toasted pumpkin seeds",  
    "type": "Food"  
  },  
  {  
    "text": "4 ounces",  
    "type": "Quantity"  
  },  
  {  
    "text": "reduced-fat cream cheese",  
    "type": "Food"  
  },  
  {  
    "text": "4 ounces",  
    "type": "Quantity"  
  }  
]
```



Ingredients replacement

Prompt: How to replace below ingredients to make it Vegan?

- 2 tablespoons olive oil
- 1 cup onion (chopped)
- 2 -3 garlic cloves
- 1 lb stewing beef
- 1 (32 ounce) box beef broth
- 1/2 cup red wine
- 1/2 cup water
- 1 cup barley
- barley, is not gluten free
- 2 bay leaves
- ground black pepper
- 1 -2 dash Worcestershire sauce
- 1 cup cherry tomatoes (halved, or a can of chopped tomatoes)
- 8 ounces sliced mushrooms (crimini best)
- 1 cup cabbage, 1 inch dice

To make this recipe vegan, replace the following ingredients:

- Olive oil: Replace with vegan-friendly oil such as coconut oil or avocado oil.
- Stewing beef: Replace with vegan-friendly protein such as tempeh, seitan, or tofu.
- Beef broth: Replace with vegan-friendly vegetable broth.
- Red wine: Replace with vegan-friendly red wine or a non-alcoholic alternative.
- Barley: Replace with a gluten-free grain such as quinoa or millet.
- Worcestershire sauce: Replace with vegan-friendly Worcestershire sauce.
- Cherry tomatoes: Replace with a can of diced tomatoes or fresh tomatoes.
- Mushrooms: Replace with vegan-friendly mushrooms such as shiitake or oyster mushrooms.
- Cabbage: Replace with vegan-friendly vegetables such as kale, spinach, or bell peppers.



Ingredients replacement

Prompt: How to replace below ingredients to make it vegetarian?

- 2 tablespoons olive oil
- 1 cup onion (chopped)
- 2 -3 garlic cloves
- 1 lb stewing beef
- 1 (32 ounce) box beef broth
- 1/2 cup red wine
- 1/2 cup water
- 1 cup barley
- barley, is not gluten free
- 2 bay leaves
- ground black pepper
- 1 -2 dash Worcestershire sauce
- 1 cup cherry tomatoes (halved, or a can of chopped tomatoes)
- 8 ounces sliced mushrooms (crimini best)
- 1 cup cabbage, 1 inch dice

To make this recipe vegetarian, you can replace the stewing beef with a plant-based protein such as seitan, tempeh, or tofu. You can also replace the beef broth with vegetable broth. The Worcestershire sauce can be replaced with a vegan Worcestershire sauce. The barley can be replaced with quinoa or brown rice. The mushrooms can be replaced with other vegetables such as bell peppers, zucchini, or eggplant. Finally, the cabbage can be replaced with kale or spinach.



Ingredients replacement

Prompt: What are some ways to adapt this recipe to be vegan?

- 2 tablespoons olive oil
- 1 cup onion (chopped)
- 2 -3 garlic cloves
- 1 lb stewing beef
- 1 (32 ounce) box beef broth
- 1/2 cup red wine
- 1/2 cup water
- 1 cup barley
- barley, is not gluten free
- 2 bay leaves
- ground black pepper
- 1 -2 dash Worcestershire sauce
- 1 cup cherry tomatoes (halved, or a can of chopped tomatoes)
- 8 ounces sliced mushrooms (crimini best)
- 1 cup cabbage, 1 inch dice

To make this recipe vegan, you could substitute the beef with a vegan alternative such as seitan, tempeh, or tofu. You could also use vegetable broth instead of beef broth. Additionally, you could omit the Worcestershire sauce and replace it with a vegan alternative such as tamari or soy sauce. Finally, you could replace the olive oil with a vegan alternative such as coconut oil.



Nutritional breakdown

Prompt: Can you give me a nutritional breakdown for this recipe?

[GRANDMA'S RAINY DAY KIMCHI NOODLE SOUP](#)

Nutritional breakdown per serving (4 servings):
Calories: 441
Fat: 22.3g
Carbohydrates: 39.3g
Protein: 22.3g
Sodium: 1290mg
Fiber: 5.2g
Sugar: 5.2g

×

NUTRITION INFO	
Serving Size: 1 (683) g	
Servings Per Recipe: 4	
AMT. PER SERVING	% DAILY VALUE
Calories: 685.6	
Calories from Fat 197 g	29 %
Total Fat 21.9 g	33 %
Saturated Fat 4.1 g	20 %
Cholesterol 132.6 mg	44 %
Sodium 854.9 mg	35 %
Total Carbohydrate 88.3 g	29 %
Dietary Fiber 5.8 g	23 %
Sugars 4.1 g	16 %
Protein 35.1 g	70 %



Asking what to do with leftovers

Prompt: How can I store leftovers from this recipe?

Response:

Leftovers from this recipe can be stored in an airtight container in the refrigerator for up to 3 days.

16 ounces of fresh Chinese egg noodles (Lo mein noodles)
3 tablespoons vegetable oil
6 garlic cloves, minced
8 ounces pork tenderloin, thinly sliced
2 teaspoons rice wine vinegar
6 -8 cups water
3 tablespoons soy sauce
2 tablespoons dashida, powder (Beef flavored soup stock)
2 teaspoons ginger, grated
2 cups cabbage kimchi, chopped in big pieces
4 ounces shiitake mushrooms, thinly sliced
7 ounces firm tofu, cut into 1-inch squares
4 baby bok choy, quartered
2 scallions, thinly sliced
2 teaspoons dark sesame oil
salt and pepper (Add a little salt and pepper at a time and taste as you go. The kimchi and soy sauce may be enough s)
sriracha sauce (Optional but highly recommended.)



**Thank you for your
attention**

