Novel Recipe Generation

PRESENTATION 6 - OCTOBER, 28

Indraprastha Institute of Information Technology

TEAM MEMBERS:

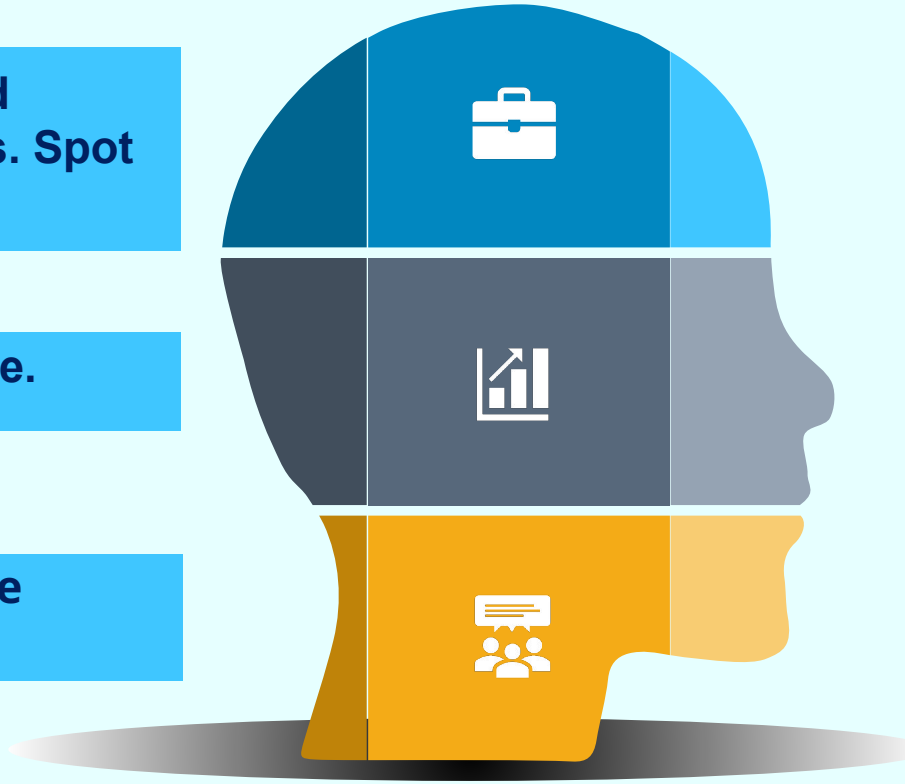
Adarsh Singh Kushwah
Niharika
Parul Sikri
Shrey Rastogi

TASKS TO BE DONE:

1. Train the GPT2 model on the updated RecipeDB data. Generate 500 recipes. Spot the errors and rectify them.

2. Generate as many recipes as possible.

3. Suggest some new ideas to generate recipes.



The instructions in the pre-processed file contained some extraneous symbols.

We then created a logic to pre-process the instructions and eliminate any extraneous symbols.

['| 1.\tPlace 3 cups water, lentils, tomato, carrot, onion, garlic, and chicken bouillon in a stockpot over medium heat.',
 'Cook until vegetables and lentils are softened, 20 to 25 minutes. Remove from heat and cool to lukewarm. | 2.\tBlend vegetable and lentil mixture with an immersion blender until smooth. Stir 1 cup water, cumin, sea salt, pepper, and coriander into soup.',
 'Heat over medium heat until warmed. |
----------.']

['place 3 cups water , lentils , tomato , carrot , onion , garlic , and chicken bouillon in a stockpot over medium heat ; cook until vegetables and lentils are softened , 20 to 25 minutes . remove from heat and cool to lukewarm . blend vegetable and lentil mixture with an immersion blender until smooth . stir 1 cup water , cumin , sea salt , pepper , and coriander into soup ; heat over medium heat until warmed . ']

After that, we tokenized the data and added some unique tokens.
The resulting train and test files were then transformed into plain text files.

SPECIAL TOKENS ADDED

```
["<BEGIN_RECIPE>" ,
 "<BEGIN_INPUT>" ,
 "<NEXT_INPUT>",
 "<END_INPUT>" ,
 "<BEGIN_TITLE>",
 "<END_TITLE>" ,
 "<BEGIN_INGREDS>" ,
 "<NEXT_INGREDS>" ,
 "<END_INGREDS>" ,
 "<BEGIN_INSTR>" ,
 "<NEXT_INSTR>",
 "<END_INSTR>" ,
 "<END_RECIPE>"
    ]
```

<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Spicy Italian Parmesan Chicken<END_TITLE> <BEGIN_INGREDS> oregano <NEXT_INGREDS> parmesan cheese <NEXT_INGREDS> olive oil
<NEXT_INGREDS> chicken breast <NEXT_INGREDS> garlic powder <NEXT_INGREDS> cayenne pepper <NEXT_INGREDS> thyme <NEXT_INGREDS> basil <NEXT_INGREDS> marjoram <END_INGREDS> <BEGIN_INSTR> heat skillet . coat bottom of skillet with olive oil . place thawed chicken breast in pan . lightly coat one side of chicken breast with spice mixture . cook until partially cooked on one side . flip chicken breast . lightly coat side of chicken breast with spice mixture . place 12 of parmesan on top of upwards facing side of chicken . cook until no longer pink . flip some parmesan will fall off . . let cook for about 3045 seconds . place remaining parmesan on the opposite side of the chicken breast . flip . let cook for about 3045 seconds . cheese will form a sort of crust . . serve . <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Easy 5 Ingredient Vegetable Lasagna<END_TITLE> <BEGIN_INGREDS> part ricotta cheese <NEXT_INGREDS> vegetable ie broccoli
<NEXT_INGREDS> part mozzarella cheese <NEXT_INGREDS> no boil lasagna noodle <NEXT_INGREDS> pasta sauce <END_INGREDS> <BEGIN_INSTR> preheat oven to 350f . spread a thin layer of sauce on the bottom of a 9x13 casserole . cover with a layer of noodles 3 or 4 noodles should be enough . place ricotta in a bowl and add about 14 cup of water , stirring until blended . spread 13 of this mixture over the pasta you can use a cake spatula . spread 13 of the remaining pasta sauce over the cheese . spread 13 of the vegetables over the sauce . sprinkle 13 of the mozzarella over the veggies . repeat twice starting with the noodles and ending with the mozzarella . cover and bake until the noodles are tender 35 to 40 minutes . remove cover and bake 5 minutes until cheese starts to become golden . remove from oven and allow to stand for 5 minutes before cutting into squares . <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Tuna, Olive, and Caper Sauce<END_TITLE> <BEGIN_INGREDS> tuna brine <NEXT_INGREDS> butter <NEXT_INGREDS> black olive <NEXT_INGREDS>
chive <NEXT_INGREDS> purpose flour <NEXT_INGREDS> salt <NEXT_INGREDS> milk <NEXT_INGREDS> caper <NEXT_INGREDS> tabasco sauce <NEXT_INGREDS> white pepper <NEXT_INGREDS> lemon <NEXT_INGREDS>
parsley <END_INGREDS> <BEGIN_INSTR> drain tuna and reserve brine . melt butter in a large saucepan and add flour . cook stirring until smooth and golden . add milk and reserved brine and gradually stir to a thick smooth sauce . season to taste with salt and pepper and stir in parsley and chives . add lemon juice ; stir well . break up tuna into small chunks and add to sauce ; heat through . <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Very Easy Creme Fraiche<END_TITLE> <BEGIN_INGREDS> whipping cream <NEXT_INGREDS> brown sugar <NEXT_INGREDS> salt <NEXT_INGREDS> cream
<END_INGREDS> <BEGIN_INSTR> in small bowl , sprinkle sugar and salt over sour cream . let stand 2 minutes . gently fold in cream 1 tbs at a time , until thoroughly blended . cover and refrigerate . <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Oma's Cream of Wheat Pudding (German Griesbrei)<END_TITLE> <BEGIN_INGREDS> cinnamon sugar <NEXT_INGREDS> fruit cocktail
<NEXT_INGREDS> cream <NEXT_INGREDS> butter <NEXT_INGREDS> applesauce <NEXT_INGREDS> salt <NEXT_INGREDS> milk <NEXT_INGREDS> vanilla sugar <NEXT_INGREDS> berry <NEXT_INGREDS> pear
<NEXT_INGREDS> lemon <NEXT_INGREDS> egg <NEXT_INGREDS> honey <END_INGREDS> <BEGIN_INSTR> using a heavy saucepan so as not to scorch the milk , bring the milk salt just to a boil .
gradually stir in the cream of wheat , whisking mom used a wooden spoon until well blended . return to a boil . reduce heat to low ; simmer uncovered , 2 12 minutes or until thickened , stirring frequently . meanwhile , beat eggs well with a fork in a glass measuring cup . add about one tablespoon of thickened hot porridge to the beaten eggs and stir well to combine . add one more tablespoon of the hot porridge to the egg mixture ; stir well . gradually add the egg mixture into the pot of hot porridge , stirring well to combine . remove from heat and stir in the lemon juice . let cool slightly before serving . top with butter while warm . enjoy pudding warm or chilled , sweetened to your taste and with fruit toppings of your choice .
<END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Rice Cooked in Black Bean Broth<END_TITLE> <BEGIN_INGREDS> tomato <NEXT_INGREDS> olive oil <NEXT_INGREDS> jalapeno chile
<NEXT_INGREDS> cream <NEXT_INGREDS> anise seed <NEXT_INGREDS> queso fresco <NEXT_INGREDS> salt <NEXT_INGREDS> cilantro <NEXT_INGREDS> grain brown rice <NEXT_INGREDS> garlic clove
<NEXT_INGREDS> broth <NEXT_INGREDS> scallion <NEXT_INGREDS> white onion <END_INGREDS> <BEGIN_INSTR> heat the olive oil in a 3 quart saucepan . add the onion and saute over medium high heat for 45 minutes . add the rice , garlic , and anise and stir to coat the rice . cook until the rice is light gold , 34 minutes , then add the broth , tomatoes , and 12 teaspoons salt and bring to a boil . cover and cook over low heat until the rice is done , 1825 minutes . turn into a serving dish and add desired garnishes . enjoy <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Broccoli and Cavatelli (Italian)<END_TITLE> <BEGIN_INGREDS> vegetable broth <NEXT_INGREDS> parmesan cheese <NEXT_INGREDS> olive oil
<NEXT_INGREDS> black pepper <NEXT_INGREDS> salt <NEXT_INGREDS> garlic clove <NEXT_INGREDS> cavatelli <NEXT_INGREDS> broccoli floret <END_INGREDS> <BEGIN_INSTR> you may substitute any shape macaroni for cavatelli . lightly brown garlic in oil , add salt and pepper . cool oil slightly and add chicken broth . reheat . meanwhile , cut broccoli in small pieces . parboil until just tender . do not overcook . cook macaroni and drain . mix cooked cavatelli and broccoli with olive oil mixture . garnish with parmesan cheese and serve . <END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Greek Summer Salad (Anamikti Salata)<END_TITLE> <BEGIN_INGREDS> oregano <NEXT_INGREDS> red pepper <NEXT_INGREDS> tomato
<NEXT_INGREDS> olive oil <NEXT_INGREDS> salt black pepper <NEXT_INGREDS> green pepper <NEXT_INGREDS> red onion <NEXT_INGREDS> cucumber <NEXT_INGREDS> parsley <NEXT_INGREDS> green olive
<END_INGREDS> <BEGIN_INSTR> combine all ingredients except olive oil in a large bowl . toss to combine , sprinkle with olive oil about 14 cup . chill for 30 min . , serve chilled .
<END_INSTR> <END_RECIPE>
<BEGIN_RECIPE> <BEGIN_INPUT> <END_INPUT> <BEGIN_TITLE> Campari Sorbetto (Intermezzo) from the Hags<END_TITLE> <BEGIN_INGREDS> caster sugar <NEXT_INGREDS> angostura bitter <NEXT_INGREDS>
campari <NEXT_INGREDS> pink grapefruit juice <END_INGREDS> <BEGIN_INSTR> mix together all ingredients until sugar dissolves . churn in an ice cream maker , according to manufacturers

After that, we tried to train the GPT2 model on the generated train file, however we faced some issues like: We were unable to install the Torch library on the server. Also, we were unable to upgrade the version of Python.

Then, we emailed the IT helpdesk team to install the required libraries on the server.

```
parul21065@compute-0-3:~
login as: parul21065
Keyboard-interactive authentication prompts from server:
| Password:
End of keyboard-interactive prompts from server
Last login: Tue Oct 25 16:59:09 2022 from vpn.iiitd.edu.in
Rocks 7.0 (Manzanita)
Profile built 18:22 26-Jun-2019

Kickstarted 19:07 26-Jun-2019
(base) [parul21065@hpc ~]$ ssh compute-0-3
Last login: Tue Oct 25 16:59:55 2022 from hpc.local
Rocks Compute Node
Rocks 7.0 (Manzanita)
Profile built 19:53 26-Jun-2019

Kickstarted 20:01 26-Jun-2019
/usr/bin/id: cannot find name for group ID 1308
(base) [parul21065@compute-0-3 ~]$ python capstone_model_build_v1.py
Traceback (most recent call last):
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/utils/import_utils.py", line 1063, in _get_module
    return importlib.import_module("." + module_name, self.__name__)
  File "/share/apps/software/anaconda3/lib/python3.7/importlib/__init__.py", line 127, in import_module
    return _bootstrap._gcd_import(name[level:], package, level)
  File "<frozen importlib._bootstrap>", line 1006, in _gcd_import
  File "<frozen importlib._bootstrap>", line 983, in _find_and_load
  File "<frozen importlib._bootstrap>", line 967, in _find_and_load_unlocked
  File "<frozen importlib._bootstrap>", line 677, in _load_unlocked
  File "<frozen importlib._bootstrap_external>", line 728, in exec_module
  File "<frozen importlib._bootstrap>", line 219, in _call_with_frames_removed
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/trainer.py", line 71, in <module>
    from .modeling_utils import PreTrainedModel, load_sharded_checkpoint, unwrap_model
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/modeling_utils.py", line 37, in <module>
    from .activations import get_activation
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/activations.py", line 145, in <module>
    "gelu": GELUActivation(),
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/activations.py", line 50, in __init__
    self.act = nn.functional.gelu
AttributeError: module 'torch.nn.functional' has no attribute 'gelu'

The above exception was the direct cause of the following exception:

Traceback (most recent call last):
  File "capstone_model_build_v1.py", line 20, in <module>
    from transformers import (
  File "<frozen importlib._bootstrap>", line 1032, in _handle_fromlist
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/utils/import_utils.py", line 1053, in __getattr__
    module = self._get_module(self._class_to_module[name])
  File "/share/apps/software/anaconda3/lib/python3.7/site-packages/transformers/utils/import_utils.py", line 1068, in _get_module
    ) from e
RuntimeError: Failed to import transformers.trainer because of the following error (look up to see its traceback):
module 'torch.nn.functional' has no attribute 'gelu'
(base) [parul21065@compute-0-3 ~]$
```

Then we tried to debug the error that was coming in importing the trainer from the transformers library, as it is an internal library error and not in our code, We were not able to resolve this issue. Our code was running fine in google collab, so what we thought to do is use the same version of the library on the server which google colab is using to execute our code. We requested IT helpdesk team to kindly uninstall current version of below libraries and install the version which are mentioned below.

of libraries and their required version:

library name=torch ,version=1.12.1+cu113

library name=transformers ,version=4.23.1

library name=h5py ,version=3.1.0

This time we failed to generate any recipe because of the small problems that we faced in our way and tried to resolve them. However, next, we will train the GPT2 model on the train file as soon as the problem mentioned before gets resolved. Then, we will start generating as many recipes as possible.

Some ideas to generate recipes

Currently to generate a recipe, we have randomly chosen ingredients into our recipe proportional to their popularity across recipes.

We can also think of finding the popularity or prevalence of ingredient pairs across all recipes in our dataset. Then we can randomly sample ingredient pairs into our recipe proportional to their prevalence.

We can assign a fitness value to each ingredient based on the factors like aspect, flavour, versatility, cost and availability. Then we can randomly sample ingredients into a recipe proportional to their fitness value.

We can assign a fitness value to each ingredient based on its associations to diseases and also its nutritional value. Then we can randomly sample ingredients proportional to their fitness value. This will help us to generate recipes which are aimed at dietary interventions for better nutrition and health.

Thank You