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Section 4

What I plan to do:

For this project, I plan to build a model(s) that, using a novel dataset, takes as inputs a recipe ingredient list, a recipe title, and yield information and generates step-by-step recipe instructions. I plan to develop at least a couple different core models to understand which perform best for this task across a variety of evaluation metrics.

Why it's important and challenging:

Eating, and by extension, cooking, is a huge part of many people's lives. Many people do not necessarily plan their shopping strictly the recipes they plan to make that week. Rather, people often choose to make a certain dish based on the ingredients they have at home. This can be a challenging task for home cooks, which my project attempts to address. This problem is also technically challenging task because the relationship between ingredients to instructions is one:many, in that there may be different ways of using similar ingredients. Ensuring we can accurately encode this information and relevant context will be critical.

Dataset I plan to use:

I plan to leverage a novel dataset of recipes that I plan to web scrape from the NYTimes Cooking website, one of the most popular platforms online for recipes. I have already written code as proof of concept that allows me to scrape the relevant fields I'm interested in from the site given a URL, and I plan to scale this to generate a robust and varied set of recipe text data. I am choosing to use this data because the recipe text data is well-written in accordance with the New York Times editorial standards, organized in a clean and consistent manner that considers not just ingredient lists but also quantities of said ingredients and yield/serving information, and because the site contains a huge and varied corpus of recipes. This all lends itself well to building an NLP model.

Algorithms I plan to use:

I plan to utilize a model appropriate for sequence-to-sequence learning, leveraging an encoder-decoder architecture, either through an LSTM (with or without attention to understand how this affects performance), or a pre-trained transformer architecture fine-tuned on the recipe data. I plan to assess the quality and coherence of generated recipes using BLEU score (Bilingual Evaluation Understudy), ROUGE score (Recall-Oriented Understudy for Gisting Evaluation), BERT score, and/or perplexity.

References:

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Galanis, Nikolaos-Ioannis, and George A. Papakostas. "An update on cooking recipe generation with Machine Learning and Natural Language Processing." *2022 IEEE World Conference on Applied Intelligence and Computing (AIC)*. IEEE, 2022.

Fujita, Jumpei, Masahiro Sato, and Hajime Nobuhara. "Model for cooking recipe generation using reinforcement learning." *2021 IEEE 37th International Conference on Data Engineering Workshops (ICDEW)*. IEEE, 2021.

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