

# Fine-Tuning GPT for Personalized Recipe Recommendation and Generating Visualizations with GANs

## Summary

The proposed project aims to develop an AI-powered system for personalized recipe recommendation and image generation utilizing advanced Deep Learning techniques. By fine-tuning the GPT model and implementing image generation algorithms with GANs, the project seeks to enhance users' culinary experiences through tailored recipe suggestions and visually appealing representations.

## Objectives

- Develop a fine-tuned deep learning model based on GPT to generate personalized recipe recommendations tailored to user preferences and dietary restrictions.
- Implement image generation algorithms to create visually appealing representations of recommended recipes, including images for each step of the cooking process and a final dish image.
- Design a user-friendly web interface where users can input their preferences and receive personalized recipe suggestions along with visual guides.
- Evaluate the performance of the system through user testing and feedback, assessing the accuracy of recipe recommendations and the quality of generated images.

## Methodology

The project will involve fine-tuning a pre-trained GPT model on the Food.com Recipes and Reviews dataset, which contains comprehensive data on over 500,000 recipes and 1,400,000 reviews. Transfer learning techniques will adapt the model to the culinary domain. Image generation algorithms utilizing GANs will be developed to create realistic images corresponding to the recommended recipes.

## Evaluation

Evaluation will encompass qualitative and quantitative analysis. Qualitatively, user feedback and satisfaction surveys will assess the usability and effectiveness of the system. Quantitatively, metrics such as the accuracy of recipe recommendations and the visual similarity of generated images to real dishes will be measured.

## Dataset

The project will utilize the Food.com Recipes and Reviews dataset, providing a rich resource for training and evaluating the system. With data on over 500,000 recipes and 1,400,000 reviews, the dataset offers comprehensive coverage of various culinary domains.

## References

1. How to Fine-Tune BERT for Text Classification? by Sun et al. (2019)
2. Fine-Tuning Pretrained Language Models: Weight Initializations, Data Orders, and Early Stopping by Raffel et al. (2019)
3. Language Models are Unsupervised Multitask Learners by Radford et al. (2019)
4. Image-to-Image Translation with Conditional Adversarial Networks by Isola et al. (2017)
5. Progressive Growing of GANs for Improved Quality, Stability, and Variation by Karras et al. (2018)
6. Semantic Image Synthesis with Spatially-Adaptive Normalization by Park et al. (2019)
7. Generative Adversarial Nets by Goodfellow et al. (2014)

## Note

This proposal provides an initial overview of the project. As the project progresses, methodologies and approaches may be refined to better align with requirements and suggestions. Therefore, this proposal remains open to adjustment and refinement throughout the project's development.