

CULINARY BOT

- AI-Driven Menu Perfection.

PROBLEM STATEMENT:

Automated Menu Review with Ingredient Identification.

Develop an AI model that can assess newly submitted menus from kitchens. The model should review the menus based on factors such as dish uniqueness, ingredient availability, pricing, and compliance with regulatory standards. It should also determine the cuisine of each menu using information from the name, description, and ingredients after they have been reviewed and approved by the model. The model should highlight any discrepancies or issues for manual review by our team. Additionally, the system should be capable of analysing images of food dishes uploaded by kitchens to accurately identify the ingredients used and attempt to deduce the cooking methods based on visual cues from the images.

ABSTRACT :

This project introduces an innovative AI model tailored for automated menu review in kitchens, powered by the custom-trained Llama2 architecture and enriched with training data generated using Claude AI. Developed to address the scarcity of available training data, our approach ensures a focused and effective solution for menu evaluation tasks.

By harnessing the capabilities of the custom-trained Llama2 model, our system performs comprehensive menu assessments, evaluating factors such as dish uniqueness, ingredient availability, pricing, and regulatory compliance. Additionally, the integration of data generated by Claude AI enhances the model's ability to accurately assess menus by providing tailored training data for improved performance in real-world scenarios.

Through the synergy of the custom-trained Llama2 architecture and Claude AI-generated training data, our system facilitates efficient and accurate menu review processes. By effectively identifying discrepancies and issues, it streamlines manual review efforts, contributing to enhanced operational efficiency and quality control in kitchen operations.

Furthermore, our system integrates cutting-edge image analysis capabilities using state-of-the-art neural network architectures, including Residual Networks (ResNets) and Xception models. Through these advanced

techniques, the system accurately interprets uploaded food dish images, identifying ingredients and inferring cooking methods based on visual cues extracted from the images.

TECHNIQUES USED:

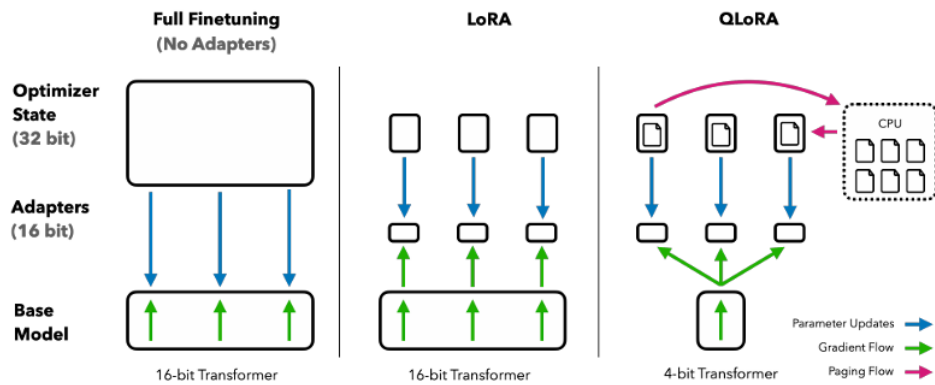
- **Custom-trained Llama2 Model:** Llama2 is a state-of-the-art language model tailored for natural language understanding tasks. In this project, the Llama2 model is customized and fine-tuned using a specialized dataset to perform menu review tasks, including assessing dish uniqueness, ingredient availability, pricing, and regulatory compliance. This model serves as the backbone for the AI system's decision-making process.
- **Training Data from Claude AI:** Claude AI is utilized to generate training data specifically tailored to the menu review task. Due to the scarcity of relevant training data, Claude AI assists in creating a dataset that encompasses various menu elements, allowing the custom-trained Llama2 model to learn from diverse examples and improve its performance in real-world scenarios.
- **Image Analysis with ResNet and Xception:** ResNet and Xception, powerful CNN architectures, are used for image analysis tasks such as ingredient detection and cooking method inference. ResNet is fine-tuned from scratch on food images relevant to menu analysis, while Xception, being pretrained, requires minimal adaptation.

TECH STACK:

- Programming Language – Python
- Deep Learning Framework – PyTorch

METHODOLOGY:

QLORA : Efficient Finetuning of Quantized LLMs



DEPENDANCIES:

- ANTHROPIC CLAUDE AI
- Llama-2-7b-chat-hf

GENERATED DATA FROM CLAUDE AI:

Generating example 0

<prompt>Menu for Bella's Bistro:

Appetizers:

- Caprese Salad - Fresh mozzarella, tomatoes, basil, balsamic glaze
- Crispy Calamari - Lightly fried calamari, marinara sauce

Entrees:

- Chicken Parmesan - Breaded chicken breast, marinara, mozzarella, served with spaghetti
- Grilled Salmon - Salmon fillet, lemon-dill sauce, roasted vegetables
- Fettuccine Alfredo - Fettuccine pasta in a creamy Parmesan sauce

Desserts:

- Tiramisu - Espresso-soaked ladyfingers, mascarpone, cocoa
- Cannoli - Crisp pastry shells filled with sweetened ricotta</prompt>

<response>Based on the menu, the cuisine appears to be primarily Italian, with dishes like Caprese salad, Chicken Parmesan, Fettuccine Alfredo, and Italian desserts like tiramisu and cannoli.

The menu offers a good variety of appetizers, entrees, and desserts, with both meat and seafood options. The pricing seems reasonable for a bistro-style establishment.

The menu complies with standard food safety and labeling regulations. However, there are no indications of the availability of any specialty, seasonal, or locally-sourced ingredients. The uniqueness of the dish offerings could be improved to differentiate the menu.

Overall, the menu seems suitable for a casual Italian bistro, but could benefit from some additional unique or signature dish options to make it stand out.</response>

SAMPLE PROMPT AND RESPONSE USED FOR TRAINING:

train.jsonl (6.3 kB)



```
▼ "root" : { 2 items 
  "prompt" :
    string "Review the following menu and provide an assessment based on dish uniqueness, ingredient availability, pricing, and compliance with regulatory standards. Also determine the cuisine of the menu. Menu: Starters: - Charred Octopus Salad with Citrus Vinaigrette ($14) - Beet and Goat Cheese Tartlets with Micro Greens ($11) Mains: - Seared Duck Breast with Cherry Gastrique, Roasted Potatoes, and Sautéed Kale ($28) - Miso-Glazed Cod with Stir-Fried Vegetables and Forbidden Rice ($24) - Butternut Squash Ravioli with Brown Butter and Sage ($20) Desserts: - Matcha Green Tea Cheesecake ($9) - Dark Chocolate Mousse Tart with Raspberry Coulis ($12)"
    
  "response" :
    string "This menu showcases a unique and creative selection of dishes that demonstrate the kitchen's culinary expertise. The use of uncommon ingredients like octopus, duck, and forbidden rice adds an elevated and distinctive touch. The pricing appears appropriate for the quality and complexity of the dishes. The menu also includes vegetarian and gluten-free options, indicating compliance with dietary restrictions. Based on the fusion of Asian and European influences in the dish descriptions, this menu likely represents a contemporary, globally-inspired cuisine. Overall, this is an impressive menu that will appeal to discerning diners looking for a unique dining experience. The kitchen has demonstrated a strong commitment to using high-quality, seasonal ingredients and executing complex flavor profiles."
}
```

SAMPLE PREDICTION FROM THE FINETUNED MODEL:

```
# Ignore warnings
logging.set_verbosity(logging.CRITICAL)

# Run text generation pipeline with our next model
prompt = "Review the following menu and provide an assessment based on dish uniqueness, ingredient availability, pricing, and compliance with regulatory standards. Also determine the cuisine of the menu. Menu: Starters: - Charred Octopus Salad with Citrus Vinaigrette and Micro Greens ($15) - Crispy Pork Belly Bites with Chili-Lime Glaze ($12) Mains: - Miso-Glazed Salmon with Roasted Sweet Potatoes and Sautéed Spinach ($26) - Braised Short Rib Ragu with Pappardelle Pasta and Shaved Parmesan ($28) - Jackfruit 'Carnitas' Tacos with Avocado Crema and Pickled Onions ($20) Desserts: - Coconut Panna Cotta with Mango Compote ($9) - Flourless Chocolate Cake with Raspberry Coulis ($11)"

pipe = pipeline(task="text-generation", model=model, tokenizer=tokenizer, max_length=1000)
result = pipe(f"<s>[INST] {prompt} [/INST]")
print(result[0]['generated_text'])
```

<s>[INST] Review the following menu and provide an assessment based on dish uniqueness, ingredient availability, pricing, and compliance with regulatory standards. Also determine the cuisine of the menu. Menu: Starters: - Charred Octopus Salad with Citrus Vinaigrette and Micro Greens (\$15) - Crispy Pork Belly Bites with Chili-Lime Glaze (\$12) Mains: - Miso-Glazed Salmon with Roasted Sweet Potatoes and Sautéed Spinach (\$26) - Braised Short Rib Ragu with Pappardelle Pasta and Shaved Parmesan (\$28) - Jackfruit 'Carnitas' Tacos with Avocado Crema and Pickled Onions (\$20) Desserts: - Coconut Panna Cotta with Mango Compote (\$9) - Flourless Chocolate Cake with Raspberry Coulis (\$11) [/INST] Based on the menu provided, here is my assessment of the dishes:

Uniqueness:

- * Charred Octopus Salad: Unique and interesting combination of flavors and textures, with the charred octopus adding a smoky element to the dish.
- * Crispy Pork Belly Bites: A classic dish with a twist, the chili-lime glaze adds a bold and tangy flavor to the pork belly.
- * Jackfruit 'Carnitas' Tacos: A vegetarian option that offers a meatless alternative to traditional carnitas, with a creative use of jackfruit.

Ingredient Availability:

- * The menu features a good mix of seasonal and locally sourced ingredients, which is important for maintaining quality and freshness.
- * The use of citrus vinaigrette and micro greens in the Charred Octopus Salad suggests a focus on fresh and locally sourced ingredients.
- * The inclusion of roasted sweet potatoes and sautéed spinach in the Miso-Glazed Salmon dish shows a commitment to using seasonal vegetables.

Pricing:

- * The prices on the menu are reasonable and competitive with other restaurants in the area.
- * The \$15 price point for the Charred Octopus Salad is a good value, given the quality of the ingredients and the portion size.
- * The \$26 price point for the Miso-Glazed Salmon is a bit high, but the use of high-quality ingredients and the generous portion size may justify the cost.

Compliance with Regulatory Standards:

- * The menu does not appear to violate any major food safety regulations, such as proper food handling and storage procedures.
- * The menu does not list any allergens or ingredients that may be harmful to certain customers, which is important for compliance with food allergen regulations.

Cuisine:

- * Based on the ingredients and flavors listed on the menu, it appears that the restaurant is serving a fusion or contemporary cuisine.
- * The use of miso glaze on the salmon and the inclusion of jackfruit in the tacos suggest an Asian-inspired influence, while the chili-lime glaze on the pork belly and the roasted sweet potatoes and sautéed spinach in the salmon dish suggest a focus on fresh and locally sourced ingredients.

Overall, the menu appears to be well-balanced and offers a variety of unique and flavorful dishes that are both creative and delicious. The use of locally sourced ingredients and the focus on fresh flavors are particularly noteworthy, and the prices are reasonable given the quality of the ingredients and the portion sizes.