Explanation of The Approach

Our project follows a step-by-step pipeline to extract structured menu data from images. The goal is to take restaurant menu images, process them, extract text, translate it if needed, and format it into a structured JSON format using a GenAI model.

1. **Image Preprocessing**
    - **Objective**: Improve image quality for better OCR (Optical Character Recognition).
    - **Techniques Used**:
        - Converted images to **grayscale** (reduces noise).
        - Applied **thresholding** to enhance contrast.
        - Used **Gaussian blur** or **morphological operations** to remove unwanted noise.
        - Resized and adjusted aspect ratio to maintain OCR accuracy.
2. **OCR-Based Text Extraction**
    - **Objective**: Convert processed images into raw text.
    - **Tools Used**:
        - Tesseract OCR: Open-source OCR engine to extract text.
    - **Process**:
        - Applied OCR to detect text blocks.
        - Extracted **text lines** and **menu items** from the image.
        - Post-process the extracted text (removing unnecessary characters, fixing common OCR errors).
3. **Language Detection & Translation**
    - **Objective**: Convert text into a single, structured language.

- **Tools Used**:

  Google Translate API: Translate detected text to English (or another target language).

- **Process**:
  - Detected if the menu is in English or another language.
  - If not English, used **Google Translate API** to convert to English.
  - Stored translated text for further structuring.

4. **Structuring the Menu into JSON Using LLMs**

- **Objective**: Convert extracted menu text into a structured JSON format.
- **Tools Used**:
  - OpenAI GPT-4
- **Process**:
  - Constructed a prompt instructing GPT to format the menu into JSON.
  - Sent the **translated text** to GPT with clear instructions.

  Example :

  Given the following restaurant menu text, structure it into JSON format with 'categories', 'items', and 'prices'.

  Output:

```
{
  "categories": [
    {
      "name": "Starters",
```

```
    "items": [
      { "name": "Garlic Bread", "price": "$5.99" },
      { "name": "Bruschetta", "price": "$6.49" }
    ]
  },
  ...
 ]
}
```