## Objective:

Your task is to process a given set of SLAM-generated maps (in PGM format) and extract meaningful structural elements (walls, doors, and openings) to generate a simplified floor plan representation. The goal is to produce a clean, human-readable floor plan from the raw SLAM map data.

## Problem Statement:

Autonomous robots use SLAM (Simultaneous Localization and Mapping) to generate maps of their environment. These maps typically contain noise and lack clear structural segmentation. Your challenge is to apply image processing techniques to extract line structures that represent walls and generate a floor plan image that closely resembles the real layout.

## Input Data:

- A set of grayscale PGM images containing SLAM-generated maps.
- Corresponding YAML metadata files providing resolution and origin information (optional but useful).

## Expected Output:

- A processed image that visually represents the floor plan with clean, straight walls and properly segmented areas.
- Optional: A vector representation of the floor plan (SVG, DXF, or JSON format) showing the extracted structure.

## Requirements:

1. Extract walls and structural boundaries from the given SLAM map.
2. Use image processing techniques (e.g., edge detection, Hough Transform) to identify lines.
3. Generate a simplified floor plan with minimal noise.
4. Output should be a cleaned-up floor plan in PNG/JPG format.
5. (Bonus) Provide a vector format output for further use.

## Evaluation Criteria:

- Accuracy of wall detection and alignment.
- Clarity and readability of the generated floor plan.
- Code efficiency and performance.
- Modularity and documentation of the solution.

## Submission Guidelines:

- Submit your code as a GitHub repository or a ZIP file.
- Include a README file explaining your approach, dependencies, and how to run your code.

- Provide example outputs for the given input SLAM maps.

## Tools & Libraries (Suggested):

- OpenCV for image processing.
- NumPy and SciPy for numerical operations.
- Any additional libraries that help in extracting meaningful structures.

Good luck! We look forward to seeing your solutions.

You have been provided with slam maps for 3 rooms, along with a example solution for one of the rooms. Please send in you solutions for all the 3 rooms along with your code.