# AI/ML Intern Test Assignment: Carpet Visualization

**Objective:**

This assignment aims to assess your ability to develop a machine learning model capable of enhancing carpet visualization for our product line. You will work on creating a model that can assist in rendering high-quality visualizations of carpets in different room environments, including color adjustments and pattern simulations.

**Assignment Overview:**

You are required to create a basic prototype for a carpet visualization tool using AI/ML techniques. The prototype should involve:

1. **Image Processing:**
    - Analyze carpet textures and colors from provided images.
    - Adjust the carpet's appearance to fit different room environments (e.g., varying lighting conditions, furniture, and floor types).
2. **Pattern Recognition:**
    - Implement a model that recognizes different carpet patterns (e.g., geometric, floral, abstract) and suggests similar styles.
3. **Color Adjustment:**
    - Create a functionality that allows users to change the carpet's color, simulating different shades while maintaining the texture and pattern accuracy.
4. **Visualization in Context:**
    - The final output should render the carpet in various room types (e.g., living rooms, bedrooms) with changes in perspective, lighting, and furniture arrangements.

**Database:**

- A dataset of carpet images with various textures, patterns, and colors. (Ref: https://www.freepik.com/free-photos-vectors/carpet-texture)
- Sample room images for visualization. (https://www.livspace.com/in/design-ideas)
- Metadata describing carpet types (e.g., wool, silk, synthetic) and dimensions. (https://www.jaipurrugs.com)

**Tasks:**

1. **Data Preprocessing:**
    - Clean and preprocess the provided image data.
    - Perform any necessary augmentation techniques (e.g., rotation, scaling) for better model performance.
2. **Model Development:**
    - Develop an AI model (CNN, GAN, or any suitable model) to analyze and adjust carpet images.

    - The model should recognize and adjust the carpet patterns and colors to suit different room environments.
    - The model should be capable of integrating the carpet images into the room environments realistically.
3. **Visualization and Testing:**
    - Test the model by placing different carpets into the room environments.
    - Allow color modifications and pattern adjustments, ensuring high fidelity of texture and perspective.
4. **Documentation and Explanation:**
    - Provide clear documentation on how the model works, the algorithms used, and the preprocessing steps taken.
    - Include a brief explanation of how you handled challenges (e.g., lighting, texture details).

**Expected Deliverables:**

- Python code (Jupyter notebook or scripts) with all functionalities implemented.
- A folder containing the visual outputs showing carpets placed in different room environments.
- A report explaining the approach, model performance, and any improvements you would make.

**Tools and Libraries:**

- Python
- OpenCV, PIL for image processing
- TensorFlow or PyTorch for model development
- Any additional libraries/tools you deem necessary

**Evaluation Criteria:**

- **Innovation & Creativity:** How well the model simulates realistic carpet visualizations.
- **Technical Approach:** The effectiveness of the model and image processing techniques.
- **Accuracy & Realism:** Quality of the carpet images in different room environments.
- **Code Quality & Documentation:** Clarity, organization, and explanation of your work.

**Bonus:**

- Implementation of real-time carpet placement using computer vision techniques.
- Incorporation of additional features like dynamic lighting or interactive color changes.

**Submission Deadline:**

Please submit your assignment within 7 days. Submit only the application link and video.

**NO CODE SUBMISSION**