ENHANCING IMAGE RESTORATION THROUGH DEEP INTEGRATION OF MULTIMODAL LARGE LANGUAGE MODEL INTO ONERESTORE.

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What ?

- We propose a framework to enhance image restoration using OneRestore.

- Proposed integration of E5-V (MLLM) with Pseudo-Prompt Generator.

- Built a pipeline for dynamic semantic restoration of degraded images.

Why ?

- Image restoration is crucial for applications like medical imaging and heritage preservation.

- Existing methods (Restormer, OneRestore, RestoreAgent) struggle with complex degradations (noise, blur, rain).

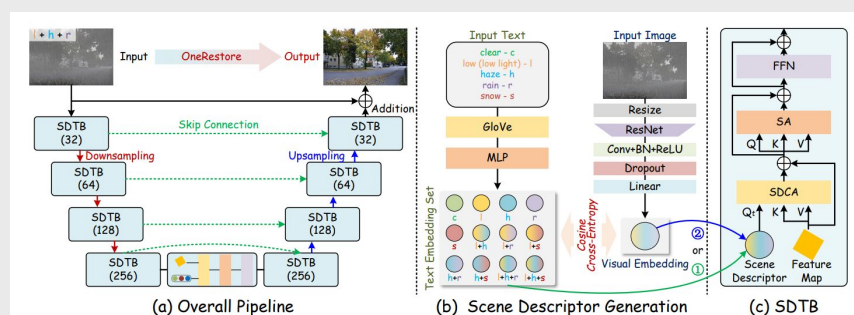- Our approach *reduces computational cost* and *improves restoration quality using MLLM.*

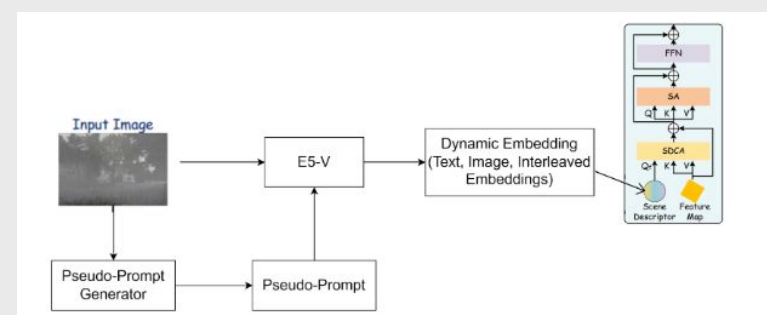## Overview

Figure 1 . Vanilla OneRestore pipeline.

Figure 2 . Our proposal for customizing scene descriptor based on Input Image and Pseudo-Prompt

Description

Degradation Analysis	Pseudo-Prompt Generation and E5-V Integration	Restoration with Dynamic Scene Descriptor

- Plan to extract degradation features (e.g., noise, blur, rain) from the Input Image.
- Utilize Visual Embedding generated by ResNet within the OneRestore framework.
- Aim to create a static Scene Descriptor using cross-attention, as depicted in the original OneRestore pipeline.
- This step sets the foundation for identifying degradation types and levels.

- Intend to implement a Multi-Layer Perceptron (MLP) in the Pseudo-Prompt Generator to predict degradation types and levels (e.g., "This image has 2 degradations, include blur level 3 in top-left").
- Plan to feed the Input Image and generated Pseudo-Prompt into E5-V (MLLM) to produce Dynamic Embeddings.
- Aim to enhance semantic understanding by integrating Dynamic Embeddings into Scene Descriptor.

- Plan to apply Dynamic Embeddings as an improved Scene Descriptor within the SDTB module.
- Aim to restore the Input Image to a higher quality, addressing complex degradations.
- Expect to evaluate the output in future tests, targeting improved restoration performance.

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