# Image Recreation Workflow Document

## Workflow: Process, Tools, and Techniques

Instance Tested on : A40

### Phase 1: Pre-Production - Image Analysis & Planning

1. Deconstruct the Source Image:

- Proportions: Extract aspect ratio (e.g., 16:9) and dimensions (e.g., 1920x1080).

- Composition: Identify focal points, symmetry, rule of thirds, and leading lines.

- Resolution: Determine target output size (e.g., 4K, 8K) and quality requirements.

- Style: Analyze color palettes, textures, lighting, and artistic influences.

2. Tools Selection:

- Generative Models:

- Stable Diffusion (SDXL) + ControlNet for structural control.

- DALL·E 3 for enhanced prompt fidelity.

- Upscaling:

- Topaz Gigapixel or ESRGAN for resolution enhancement.

- Image Processing:

- OpenCV, scikit-image, scikit-learn, and Pillow for feature extraction.

- Pre-trained CNN model (e.g., VGG16) for advanced style detection.

### Phase 2: Image Generation Process

#### Step 1: ControlNet Setup

- Extracted edges (Canny) and depth maps from the source image.

- Applied these as ControlNet inputs to enforce structural alignment.

#### Step 2: Prompt Engineering

Positive Prompt:  
"A painting of a muscular teenage girl in a weathered blue bathing suit, standing in a dimly lit room with a muted palette (#8e9098, #252940, #c7c0c1), textured brushstrokes, weathered skin, high contrast lighting, realism (1.3), chiaroscuro (1.2), canvas texture (1.2), aspect ratio 936:1210, 8K resolution, Saatchi art style."

Negative Prompt:  
"cartoonish, smooth textures, oversaturated colors, plastic skin, low contrast, symmetry, anime."

#### Step 3: Image Generation

- Used Stable Diffusion + ControlNet to maintain structural fidelity.

- Refined outputs with histogram matching to align with source colors.

#### Step 4: Post-Processing & Validation

- Upscaling: ESRGAN or Topaz Gigapixel to improve resolution.

- Validation:  
 - Structural Similarity Index (SSIM) score calculation.  
 - Visual inspection and histogram color matching.

## Challenges & Solutions

### 1. Structural Accuracy Issues

- Challenge: Loss of structure in generative outputs.

- Solution: Implemented ControlNet with edge and depth map inputs to enforce alignment.

### 2. Color & Texture Inconsistencies

- Challenge: Colors deviating from source.

- Solution: Used K-means clustering for palette extraction and applied histogram matching.

### 3. Style Mismatch

- Challenge: Generated images not adhering to intended style.

- Solution: Fine-tuned prompts with CLIP Interrogator and added brushstroke detection via CNN models.

### 4. Resolution & Clarity Loss

- Challenge: Low-resolution results from generative models.

- Solution: Used Topaz Gigapixel AI and ESRGAN for upscaling without quality degradation.

## Final Workflow Summary

1. Analyze: Extract proportions, colors, and textures from the source.

2. Generate: Use Stable Diffusion + ControlNet with optimized prompts.

3. Refine: Upscale and correct colors for realism.

4. Validate: Check similarity using SSIM scores and visual inspection.

Source Image:A painting of a person in a garment

Description automatically generated

A person in a blue bathing suit

Description automatically generatedRecreated Image: