NUS Generative AI: Fundamentals to Advanced Techniques

Week 10: Capstone Project Part 3.3

Done by: A Alkaff Ahamed

A Alkaff Ahamed
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Assignment Instructions

Learning Outcome Addressed

- Develop effective prompts to generate high-quality, contextually-relevant images
- Utilise APIs for seamless integration and adapt models for specific use cases

Objective

Master technical prompt engineering by understanding how specific terms and structures affect image generation results.

Prerequisites

- Access to Bing Image Creator (DALL-E 3)
- Note-taking capability for tracking results

Tasks

- **Part 1: Technical Specifications Impact (7 minutes)**
    1. Generate and compare these exact pairs
    2. Document for each
- **Part 2: Lighting Experiments (7 minutes)**
    - Generate all three variations
    - Compare and note
- **Part 3: Style and Medium Control (6 minutes)**
    - Create each version:
    - Analyse
- **Extension Challenge**
    - Create your own “perfect” technical prompt for: “A still life of vintage cameras”
    - Document your iterations and reasoning!
    - Remember: The goal isn’t just to use technical terms, but to understand why and how they affect the output.

Documentation Requirements

Create a document with:

- Image Results Section:
    - All generated images
    - Prompts used
    - Brief analysis of each result
- Observations Section:
    - Most effective technical terms
    - Terms that didn’t work as expected
    - Surprising results
- Conclusions Section:
    - Best practices discovered
    - Optimal prompt structures

    - Technical terms to keep in mind

Tips for Best Results

- Wait for complete generation before analysis
- Use exact prompts first, then experiment
- Note any rejected prompts and why
- Compare multiple generations of same prompt

Common Patterns to Watch For

- Technical Terms:
    - Camera bodies (Hasselblad, Phase One, Leica)
    - Lenses (focal length, aperture)
    - Film stocks (Portra, Ektar, Tri-X)
- Lighting Descriptions:
    - Natural vs artificial
    - Specific modifiers
    - Time of day
- Quality Markers:
    - Resolution specifications
    - Detail references
    - Professional equipment

Please note

Note: The field of AI is evolving rapidly. By the time you work on these exercises:

- APIs and services mentioned may have changed or been discontinued
- Free tiers might no longer be available
- Pricing structures could be different
- Python libraries may have new versions with different syntax
- Example code might need adaptation

The core concepts remain valid, but you may need to:

- Find alternative services
- Adapt code to current API versions
- Use different model versions
- Modify prompts for newer models
- Research current best practices

This is normal in AI development. Learning to adapt to these changes is part of working with AI tools.

Resources:

- Check current documentation
- Review service status pages
- Join developer communities

- Research alternatives

Estimated time: 60-90 minutes

Submission Instructions:

- Select the **Start Assignment** button at the top right of this page.
- Upload your answers in the form of a Word or PDF file.
- Select the **Submit Assignment** button to submit your responses.

This is a graded and counts towards programme completion. You may attempt this assignment only once.

Assignment Answers

Part 1: Technical Specifications Impact

Generate and compare these exact pairs:

Base Prompt:

portrait of a young woman with blonde hair

Technical Prompt:

portrait of a young woman with blonde hair, shot on Hasselblad H6D, 80mm lens at f/2.8, natural window light, Kodak Portra 400 film simulation, shallow depth of field

Try this second pair:

Base Prompt:

modern city street at night

Technical Prompt:

modern city street at night, Sony A7R IV, 24mm f/1.4 lens, long exposure, high contrast, neon reflections on wet pavement, 8K resolution

Document for each:

- Difference in detail level
- Lighting quality
- Overall mood
- Professional feel

Young Woman with Blonde Hair Observations

Base Prompt:
portrait of a young woman with blonde hair

Technical Prompt:
portrait of a young woman with blonde hair, shot on Hasselblad H6D, 80mm lens at f/2.8, natural window light, Kodak Portra 400 film simulation, shallow depth of field

1. **Detail Level**: The base prompt generated a soft, stylized image with a fantasy-like appearance. The technical version introduced realistic textures in skin, hair and clothing giving it a photographic quality.
2. **Lighting Quality**: The base image used bright and even lighting while the technical prompt introduced more nuanced lighting — soft shadows from window light and a subtle glow that enhanced realism.
3. **Overall Mood**: The base version feels cheerful and dreamy. The technical version is calmer, more intimate and resembles a natural light portrait session.
4. **Professional Feel**: The technical image closely mimics the aesthetics of a professional portrait shot on a medium format camera with film simulation and controlled depth of field.

Note: The mention of “Hasselblad H6D” and “Kodak Portra 400” likely directed the model toward realism, even though it doesn't simulate those tools precisely. These terms influence lighting, focus, and color tonality.

Modern City at Night Observations

Base Prompt:
modern city street at night

Technical Prompt:
modern city street at night, Sony A7R IV, 24mm f/1.4 lens, long exposure, high contrast, neon reflections on wet pavement, 8K resolution

1. **Detail Level**: The base image included decent structure but leaned toward an illustrative style. The technical prompt produced crisp, detailed architecture and lighting effects that resemble high-resolution photography.
2. **Lighting Quality**: The base prompt showed standard lighting across the frame. The technical prompt introduced dynamic neon lighting with reflections and contrast, especially visible on the wet roads and pavements.
3. **Overall Mood**: The base image feels vibrant and energetic, like a bustling Asian city at night. The technical prompt evokes a more cinematic, cyberpunk aesthetic — moody and atmospheric.
4. **Professional Feel**: The technical image looked like a long-exposure photo taken with a high-end camera in urban photography. It captured motion through light streaks, depth and dramatic tones.

Note: Specific photography terms (camera model, lens aperture, lighting effects) added realism and control. “Long exposure” and “high contrast” influenced light play and depth significantly.

Part 2: Lighting Experiments

Generate all three variations:

1. elderly man portrait, natural light
2. elderly man portrait, split lighting setup, black background, studio strobe with 36-inch octabox
3. elderly man portrait, golden hour sunlight through window, dust particles visible, cinematic, Arri Alexa

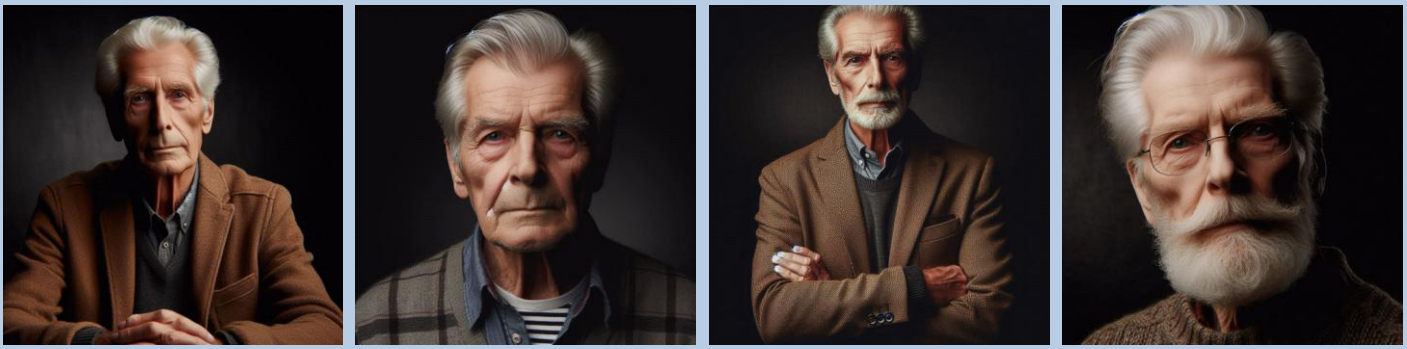
Compare and note:

- Shadow characteristics
- Skin texture rendering
- Mood differences
- Background treatment

Lighting Experiments Observations

Prompt 1:
elderly man portrait, natural light

Prompt 2:
elderly man portrait, split lighting setup, black background, studio strobe with 36-inch octabox



Prompt 3:
elderly man portrait, golden hour sunlight through window, dust particles visible, cinematic, Arri Alexa

Natural Light Portrait

1. **Shadow Characteristics**: Soft, diffused shadows due to ambient daylight – minimal contrast.
2. **Skin Texture Rendering**: Balanced and slightly textured; realistic but with a subtle vintage softness.
3. **Mood Differences**: Feels warm and timeless with a serene or contemplative vibe.
4. **Background Treatment**: Well-lit interior with window light. Visible details like plants and books enhance the natural lifestyle feel.

Split Lighting Studio Setup

1. **Shadow Characteristics**: High contrast with one side of the face in strong shadow – classic split lighting effect.
2. **Skin Texture Rendering**: Extremely sharp and defined – every wrinkle and pore is emphasized, simulating high-end studio lighting.
3. **Mood Differences**: Dramatic, serious and almost interrogative or editorial in tone.
4. **Background Treatment**: Deep black background, minimal distractions, emphasizes isolation and contrast.

Golden Hour Cinematic Look

1. **Shadow Characteristics**: Backlighting creates soft rim light around the subject and dust particles create glowing highlights.
2. **Skin Texture Rendering**: Moderate detail softened by golden light but still realistic.
3. **Mood Differences**: Cinematic, nostalgic and warm. Evokes emotion and storytelling.
4. **Background Treatment**: Artistic use of window and light direction, blurred background with sunlight filtering in.

Part 3: Style and Medium Control

Create each version:

1. **Photography**: mountain landscape, morning mist, shot on Phase One IQ4, 150mm lens, HDR bracketing
2. **Digital Art**: mountain landscape, morning mist, digital art, 4K concept art, matte painting style, atmospheric perspective
3. **Traditional Medium**: mountain landscape, morning mist, oil painting on canvas, impressionist style, visible brushstrokes

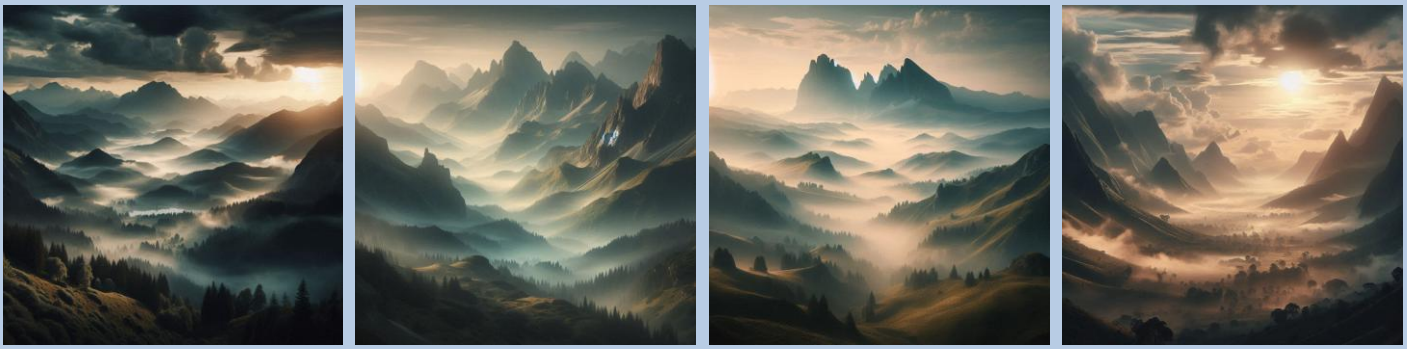
Analyse:

- How technical terms affect each medium
- Which terms work best for each style
- Consistency of results

Style and Medium Control Observations

Photography Prompt:
mountain landscape, morning mist, shot on Phase One IQ4, 150mm lens, HDR bracketing

Digital Art Prompt:
mountain landscape, morning mist, digital art, 4K concept art, matte painting style, atmospheric perspective



Traditional Medium Prompt:
mountain landscape, morning mist, oil painting on canvas, impressionist style, visible brushstrokes

Photography Prompt

1. **Effect of Technical Terms**: The use of camera specs (Phase One IQ4, 150mm lens) and “HDR bracketing” created a very photorealistic and high-dynamic range image. The lighting transitions smoothly from highlights to shadows and distant mountains maintain clarity due to long focal length simulation.
2. **Best Fit**: These terms are highly effective for simulating realistic, professional photography output.
3. **Result Consistency**: The result aligns very well with high-end landscape photography aesthetics.

Digital Art Prompt

1. **Effect of Technical Terms**: “Matte painting style” and “atmospheric perspective” introduced exaggerated depth layers and stylized lighting. The 4K and digital art terms influenced the high detail especially in rock and mist textures, mimicking concept art for films or games.
2. **Best Fit**: This set of terms works best for cinematic or fantasy-style concept art, emphasizing depth and mood.
3. **Result Consistency**: Very consistent with what you’d expect from a matte painting – realistic yet artistically heightened.

Traditional Medium Prompt

1. **Effect of Technical Terms**: The term “impressionist style” and “visible brushstrokes” effectively introduced painterly texture and vibrant color patches. Forms are softened and stylized and the lighting appears diffused like oil on canvas.
2. **Best Fit**: The terms work well for achieving traditional and handcrafted visual styles.
3. **Result Consistency**: Consistently matches traditional oil painting aesthetics—less focused on precision, more on mood and technique.

Summary Observations

Technical Terms Impact:

- Camera and lens specs simulate photorealism.
- "Matte painting," "digital art," and resolution terms support cinematic and detailed stylization.
- Medium-specific phrases like “impressionist,” “visible brushstrokes,” or “canvas” steer results toward traditional fine art.

Best Terms by Style:

- Photography: Camera body, focal length, aperture, HDR.
- Digital Art: Concept art, 4K, matte painting, atmospheric perspective.
- Traditional Art: Medium name (oil, watercolor), brushstroke descriptors, style era (e.g., impressionist).

Result Consistency:

- All styles performed well with their respective technical descriptors.
- Medium-specific vocabulary is crucial in prompting accurate visual language.

Extension Challenge

Create your own “perfect” technical prompt for: “A still life of vintage cameras”

Consider:

- Lighting setup
- Camera/lens choice
- Film or digital aesthetic
- Post-processing hints

Document your iterations and reasoning!

Remember: The goal isn’t just to use technical terms, but to understand why and how they affect the output.

Original Prompt:
A still life of vintage cameras

Observations:

- Looks messy with so many cameras
- Doesn’t give the “old” feel
- Doesn’t feel nostalgia enough

Refined Prompt 1:
Still life of vintage Leica M3 and Canonet QL17 cameras on a worn leather table, against vintage wallpaper. Golden sunlight streaming through a window with visible volumetric rays in a dusty atmosphere. Cinematic mood, warm tones, shallow depth of field. Shot on Hasselblad H6D with 80mm lens at f/2.8, Kodak Portra 160 film simulation, editorial product style

Prompt Element	Visual Result
Still life of vintage Leica cameras	Realistic vintage rangefinder-style cameras rendered accurately (some Leica-like)
on a leather table	**Only plain or scratched wooden surfaces appeared.**
warm golden sunlight rays through a window	Strong directional sunlight with warm tone entering from left side window
volumetric lighting	Clear light shafts and atmosphere depth, cinematic light scattering
visible volumetric rays in a dusty atmosphere	**Fine particle effects visible in light rays; adds realism and depth. Still not enough to give the "old" feel**
shot on Hasselblad H6D	Medium-format "look" with clean sharpness and subtle dynamic range
80mm lens	Slight compression and shallow depth of field visible, nice subject isolation
vintage wallpaper background	Ornate, period-appropriate wallpaper rendered in most images
cinematic, soft focus	Soft falloff in shadows, gentle background blur, painterly and emotional feel

Changes for Next Prompt:

1. on a leather table → on a wooden desk with worn black leather inlay and gold trim
2. visible volumetric rays in a dusty atmosphere → visible volumetric rays, heavy dust in air, spiderwebs in corners

Refined Prompt 2:
Still life of vintage Leica M3 and Canonet QL17 cameras on a wooden desk with worn black leather inlay and gold trim, set against vintage wallpaper. Golden sunlight streaming through a window, with visible volumetric rays, heavy dust in air, spiderwebs in corners. Cinematic mood, warm tones, shallow depth of field. Shot on Hasselblad H6D, 80mm lens at f/2.8, Kodak Portra 160 film simulation.




Prompt Element	Visual Result
on a wooden desk with worn black leather inlay and gold trim	**Leather inlay with gold trim was not rendered. Only plain or scratched wooden surfaces appeared.**
dusty atmosphere	Dust particles and overall hazy atmosphere are present, contributing to a moody, aged environment.
spider web	Cobwebs were rendered in several images, especially around the window, corners, and equipment—clearly visible.

Changes for Next Prompt:

1. on a wooden desk with ~~worn~~ black leather inlay and gold trim → on a dark wood desk with black leather **writing inlay** and **ornate gold trim**

Refined Prompt 3:
Still life of vintage Leica M3 and Canonet QL17 cameras on a dark wood desk with black leather writing inlay and ornate gold trim, set against vintage wallpaper. Golden sunlight streaming through a window, with visible volumetric rays, heavy dust in air, spiderwebs in corners. Cinematic mood, warm tones, shallow depth of field. Shot on Hasselblad H6D, 80mm lens at f/2.8, Kodak Portra 160 film simulation.

Prompt Element	Visual Result
on a dark wood desk with black leather writing inlay and ornate gold trim	Mostly ignored. Some dark pads appeared, but not clearly leather or inlay style.

Conclusion

- The biggest gap is the leather inlay detail. Even with specific phrasing, Bing/DALL-E often struggles with highly niche material compositions unless they're very common in image datasets.

Workaround

- Try prompts like “black leather writing pad with gold edge detail on a polished wood desk”
- Then combine that visual with the camera scene through image editing or layered generation