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Reflection Journal: Digital Image Processing Lab

Section 1: Technical Understanding

One thing that really surprised me during this lab was seeing how images are actually represented as matrices of numbers. I've always thought of pictures as just... well, pictures. But each pixel has separate red, green, and blue values, and tweaking those numbers can completely change what we see. It made me realize that even simple visual effects are really just math behind the scenes.

Playing around with brightness, contrast, and filters showed me exactly how math translates into what we perceive. For example, sharpening filters highlight edges by looking at differences between neighboring pixels, while blurring smooths things out by averaging values. Honestly, the trickiest part for me was histogram equalization. I understood the idea—it's about spreading out pixel intensity values—but actually doing it manually made me appreciate how much is going on behind the scenes when we “enhance” an image.

Section 2: Connections and Applications

This lab also connected nicely to the Nano Banana demo we saw in class. The AI in that demo basically does a lot of what we did manually—but faster and smarter. Things like edge detection or contrast adjustments are happening automatically, but it's cool to see the same principles at work.

I can also see a lot of real-world uses for these techniques. Adjusting brightness and contrast is obvious in photography and media, but filters like blurring or edge detection are used in everything from facial recognition to medical imaging. Geometric transformations could be applied in AR or robotics, and CLAHE enhancement is super handy for low-light images. I can imagine combining traditional methods with AI in a project to automatically enhance photos or even create artistic effects based on learned patterns—it opens up a lot of creative possibilities.

Section 3: Personal Reflection

What excites me most about image processing is the creative side. Being able to combine filters and transformations to make something visually unique was a highlight for me. This lab changed how I think about digital photos—I now see them as data I can manipulate, not just something to look at.

That said, I still have questions. How does AI know what adjustments will look natural versus fake? How can I mix traditional and AI methods to get both accuracy and creativity? Those are the kinds of things I want to explore more in future projects.