

Benchmarks Directory

This directory contains image quality benchmarking tools for Smart Content Studio's multi-model AI image generation system.

Contents

- **benchmark_image_quality.py** - Main benchmarking script with CLIP and FID evaluation
- **benchmark_requirements.txt** - Python dependencies for benchmarking
- **BENCHMARKING.md** - Comprehensive guide with usage instructions and methodology
- **benchmark_results/** - Generated benchmark results and test images

Quick Start

From the project root directory:

```
# Install dependencies
pip install -r benchmarks/benchmark_requirements.txt

# Run quick benchmark (4 prompts, ~2 mins)
python benchmarks/benchmark_image_quality.py --quick

# Run full benchmark (12 prompts, ~10 mins)
python benchmarks/benchmark_image_quality.py
```

What It Tests

- **CLIP Score:** Semantic similarity between prompts and generated images
- **FID Score:** Image quality compared to MS-COCO real-world images
- **Multi-provider comparison:** Pollinations, Gemini Imagen, Grok (when available)
- **Quality tier evaluation:** Fast, Balanced, High, Ultra modes

Full Documentation

See **BENCHMARKING.md** for:

- Detailed installation instructions
- Interpretation of metrics
- Advanced usage options
- Troubleshooting guide
- Citation information

Prerequisites

1. **Backend must be running:** Ensure FastAPI server is active at <http://localhost:8000>

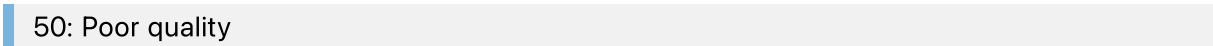
2. **API keys configured:** At least `GEMINI_API_KEY` in `backend/.env`
3. **Python 3.10+:** Required for PyTorch and CLIP
4. **Sufficient disk space:** ~2GB for CLIP models and MS-COCO stats (for FID)

Results Interpretation

CLIP Score (higher is better):

- 0.20-0.25: Acceptable
- 0.25-0.30: Good
- 0.30+: Excellent (industry-leading)

FID Score (lower is better):

- <20: High quality, photorealistic
- 20-30: Good quality
- 30-50: Acceptable quality
-  50: Poor quality

Related Documentation

- [Main README](#) - Project overview
- [Backend README](#) - API documentation
- [Benchmark Summary](#) - Latest results (if available)