

Computed tomography image quality: conventional vs no-reference methods

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Teaching Computers to "See" Quality: Making CT Scans Smarter

- The Goal: We are developing an automated way for computers to judge the quality of a medical scan, like a human expert would.
- The Problem: Doctors need clear images to make accurate diagnoses, but checking every scan manually is slow and subjective.
- Our Approach: Using an algorithm called NIQE (Natural Image Quality Evaluator) to measure quality objectively.

What is NIQE?

Analysis

Requires far fewer high-quality images

Logic: "How much does this deviate from a perfect image?"

Use Case: Measuring variance objectively

Reasons For Choosing

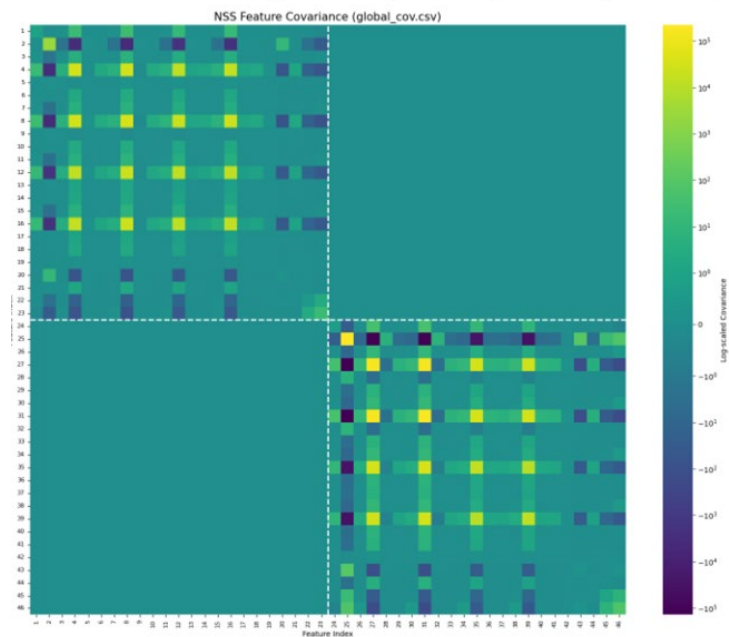
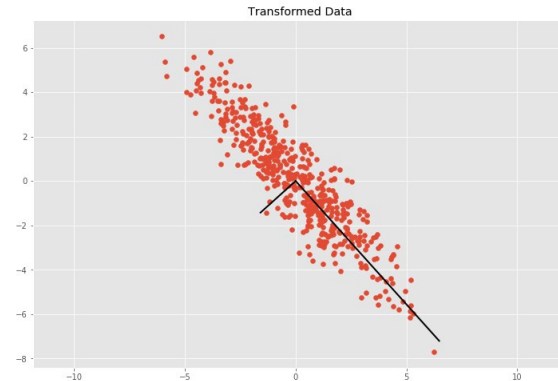
Can be optimized better

Less data required to function

No need for human intervention and only needs a couple dozen "high quality" images

NIQE - Steps

- 1) Normalization
 - The computer removes lighting and shadows to create a "clean" image
- 2) Gaussian Modeling
 - It fits the data into a "profile" to understand the the image
- 3) Multivariate Gaussian Model
 - Combines features into Covariance Matrix (spread) & Mean Vector (mean)
- 4) Distance
 - Calculates final score by measuring the deviation from the model



Next Steps

- Further testing the NIQE algorithm with actual scans
- Research different statistics we can implement

