

Weekly Report 2

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Week: 2 (Super-Resolution Implementation Phase)

Project Title: Super Resolution using Classical Interpolation Methods

1. Total work done

a. Implementation of Interpolation Methods.

- Written code to generate Super-Resolved (SR) images using three interpolation techniques: cv2.INTER_NEAREST cv2.INTER_LINEAR cv2.INTER_CUBIC
- Upscaled LR (256×256) images back to HR (1024×1024) resolution.
- Saved all generated SR images in separate folders for each method
- The known evaluation metrics to compare the quality of the SR and HR image are PSNR (Peak Signal-to-Noise Ratio) and SSIM (Structural Similarity Index Measure).

b. Visualization Enhancement.

- Updated visualization to display LR image on top and SR image below for better clarity and layout in google Colab
- Verifying that SR images indeed had higher resolution and maintained aspect ratio correctly.

- Interpolation Methods: To generate SR pictures, the traditional approaches such as nearest-neighbor, bilinear and bicubic interpolation are used.
- Performance Evaluation: We evaluate the quality of the image using PSNR(peak signal to noise ratio) and SSIM(structural similarity index measure)
- Visualization: Compare and explain results with the help of quantitative and visual analysis.

c. Evaluation Metric Implementation

- Implemented PSNR and SSIM calculations to compare SR images with the original HR images.
- Low-Resolution Generation: The HR pictures were resized to 256x256 using the INTERAREA interpolation of OpenCV, which generated equivalent LR pictures.

d. Observations (Initial Findings)

- Bicubic interpolation produced the best perceptual quality among the three methods.
- Nearest neighbor method depicted observable pixelation and lower PSNR/SSIM values.
- Verified findings both visually and numerically to check correctness..
- LR-HR picture pairings were verified and displayed to ensure that the dataset was accurate.

2. Work Planned for Next Week

- Perform further in-detail quantitative analysis
- Check average PSNR and SSIM values for all images and compare them.
- Create graphs depicting results and observations along with result tables
- Application of image enhancement filters (e.g., sharpening or contrast improvement) to find effects of them on PSNR/SSIM