Algorithmic Image Enhancement by Combining Multiple Images

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The purpose of this project is to find a mathematical process to enhance images of a subject, deriving results purely from data in the subject being observed rather than relying on AI assumptions. AI can produce inconsistent results that are not created purely from our source data and can raise ethical concerns. An AI model that has been trained on a large number of images may be able to enhance an image in a way that looks good to the eye but may not reflect the actual details of the original subject of that image. It was hypothesized that it is possible to enhance image resolution by applying repeatable algorithms across multiple similar images. Data was collected by taking 100 pictures of the same illegible text, intentionally not aligned at a pixel level. The text used was 50 assorted words, in five-point Arial font. The same text was tested in uppercase, lowercase, and propercase. Algorithms from OpenCV were then applied across the images. The images were cropped, greyscaled, normalized, inverted, upscaled with bilinear interpolation, and correlated. They were then shifted to the point of maximum alignment and averaged. This process was continued across all images, and the result was stored as a greyscale image. The input and output images were analyzed using eight optical character recognition engines to measure the improvement. The results for all samples were significant, although improvements were most drastic for lowercase words. Both color and greyscale art were also tested, with visible improvement occurring in clarity.

Awards Won: