National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Development of Efficient Image Upscaling Techniques
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Venue	: Room No.: EC-303 (Seminar Hall of EC Department)
Date and Time	: 23 Dec 2024 (4:30 PM)
Abstract	: Image upscaling is a popular topic in recent years, and it is used to create a high resolution (HR) image from low resolution (LR) image data. An efficient image upscaling approach must preserve the original LR image's edge information, texture, geometrical regularities, and smoothness while producing its HR counterpart. Image upscaling uses a variety of polynomial interpolation algorithms due to their low computational complexity and applicability for a wide range of real-time applications. This might cause blurring effects in upscaled images due to high frequency deterioration. Most transform-domain interpolation algorithms in the literature produce blurring effects in upscaled images, particularly at edges and high-variance regions. Learning-based picture interpolation algorithms can produce high-quality results with fine features, but they often require significant computing resources and training data. This dissertation proposes several pre-processing algorithms to mitigate blurring effects in upscaled images, including an enhanced discrete cosine transform that recovers lost information due to upscaling via a bilateral filter. To further reduce blurring, the following approach employs a higher order Laplacian filter. The other method then performs additional iterative optimization sharpening. Some post-processing approaches are suggested, including sharpening after upscaling utilizing both transform and spatial domain techniques. Finally, certain hybrid strategies are proposed that use the edge details of both LR and upscaled images to lessen the blurring effect in the restored HR image. As a result, a sharpened, HR image is generated.