

Edge preservation image enlargement and enhancement method based on the adaptive Perona–Malik non-linear diffusion model

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- [« Previous Article](#)
- [Table of contents](#)
- [Next Article »](#)

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Article

In this study, the authors have proposed a new super resolution (SR) model based on the Perona–Malik regularisation scheme. The new model integrates into its regularisation component an adaptive exponential term which automatically adjusts itself depending on the local image features. This lends more sensitivity and adaptability to the proposed model, thereby making the reconstruction process much less punishing against semantically important features. Therefore, regularisation is stronger in homogeneous regions, and weaker in the neighbourhood of boundaries. The proposed method has a promising capability of suppressing noise more effectively, while preserving important image features. The approach used differs significantly from the available methods, especially in the manner in which adaptability has been deployed. Noting that SR methods are less sensitive to the local image topography, a factor that causes the super-resolved images to be visually poor, the new method sensitively probes the local features of the image, and determines the necessary level of reconstruction and regularisation. Additionally, the formulation robustly introduces a backward diffusion, a phenomenon proved from literature to have a tendency of sharpening edges. The authors have included empirical reconstruction results to demonstrate that their model produces better images in comparison with other classical methods.