Noise Search Method for Improving Control Performance of Image Transformation in Diffusion Model

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The diffusion model has the potential to enhance individuals' expressive capabilities. This model has image transformation capabilities and it is possible to control the transformation results through text instruction (prompts). However, in existing methods, there is a drawback where parts other than the prompts also undergo changes. In this study, we propose a novel noise search method to suppress changes in non-prompt-related parts to, enhance the controllability of image generation.

In the proposed method, multiple noises are applied to the duplicated images, and the denoised results are averaged to obtain an image that only reflects the trends of changes induced by the prompts. The resulting image is considered as the target image (an image that only transforms the parts instructed by the prompts), and the optimal noise for image transformation is searched. By using the optimal noise obtained through noise search instead of random noise in existing methods, changes in non-prompt-related parts are suppressed, thereby achieving the desired image transformation expressed by the prompts. The effectiveness of the proposed method was validated through experiments.