Image Inpainting Model with Small-Sample Size Based on Generative Adversary Network and Genetic Algorithm

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Abstract : The performance of most machine-learning methods for image inpainting depends on the quantity and quality of the training samples. However, it is very expensive or even impossible to obtain a great number of training samples in many scenarios. In this paper, an image inpainting model based on a generative adversary network (GAN) is constructed for the cases when the number of training samples is small. Firstly, a feature extraction network (F-net) is incorporated into the GAN network to utilize the available information of the inpainting image. The weighted sum of the extracted feature and the random noise acts as the input to the generative network (G-net). The proposed network can be trained well even when the sample size is very small. Secondly, in the phase of the completion for each damaged image, a genetic algorithm is designed to search an optimized noise input for G-net; based on this optimized input, the parameters of the G-net and F-net are further learned (Once the completion for a certain damaged image ends, the parameters restore to its original values obtained in the training phase) to generate an image patch that not only can fill the missing part of the damaged image smoothly but also has visual semantics.
Keywords : image inpainting, generative adversary nets, genetic algorithm, small-sample size

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