

# Baikal: Unpaired Denoising of Fluorescence Microscopy Images using Diffusion Models

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## 1 Algorithm

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### Algorithm 1 Repaint

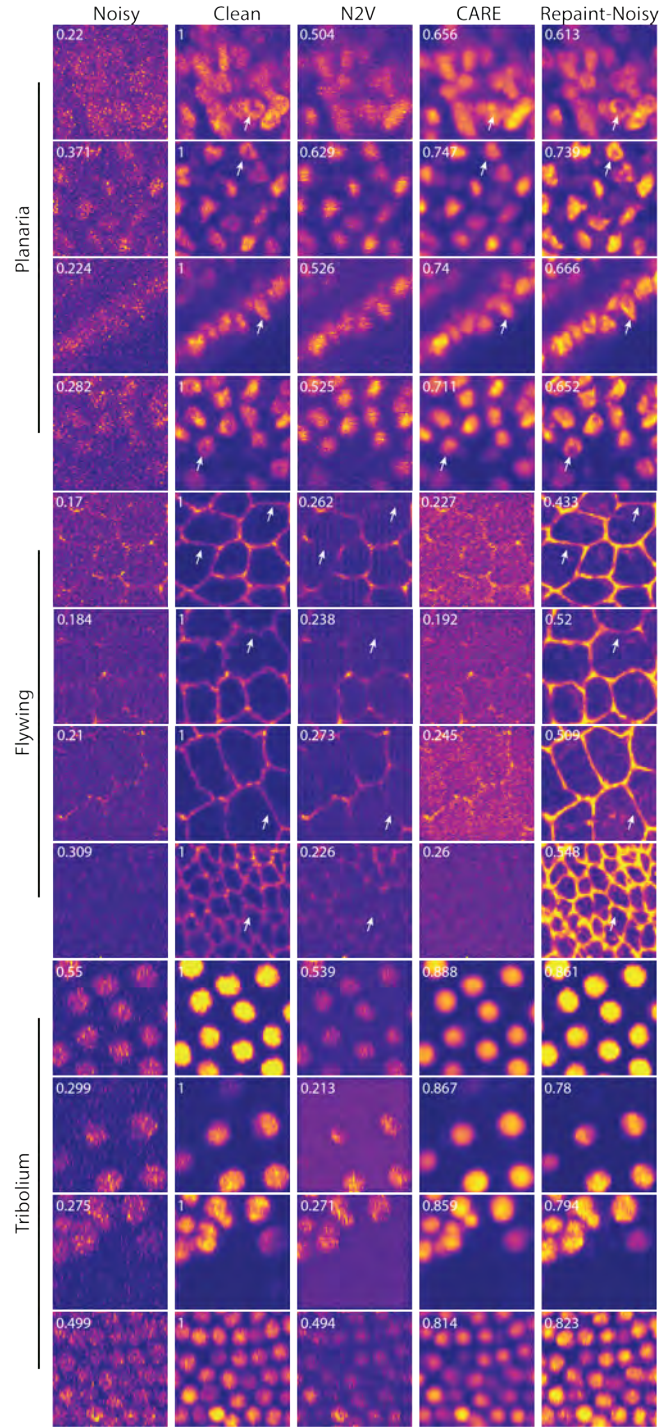
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**Input:** noisy image  $\mathbf{y}_0$ , starting time step  $N$ , mixing stop time step  $n$ , mixing weight scheduler  $f$ , repaint blocks size  $U$ , repaint repeats  $R$

**Output:** denoised output  $\mathbf{x}_0$

1.  $\mathbf{y}_N \sim q(\mathbf{y}_N|\mathbf{y}_0)$  using Eq. (3)
  2.  $\mathbf{x}_t = \mathbf{y}_N, t' = N, t = N$
  3. **while**  $t' \geq 0$  **do**
  4.     **for**  $r = 1, \dots, R$  **do**
  4.          $\mathbf{x}_{t'} = \mathbf{x}_t$
  5.         **for**  $t = t', \dots, \max(t' - U, 0)$  **do**
  6.              $\mathbf{x}_{t-1} \sim p_\theta(\mathbf{x}_{t-1}|\mathbf{x}_t)$  using Eq. (4)
  7.             **if**  $t \geq n$
  8.                  $\mathbf{y}_{t-1} \sim q(\mathbf{y}_{t-1}|\mathbf{y}_0)$  using Eq. (3)
  9.                  $w_t = f(t)$
  10.                  $\mathbf{x}_{t-1} = (1 - w_t)\mathbf{x}_{t-1} + w_t\mathbf{y}_{t-1}$
  11.             **end if**
  12.         **end for**
  14.     **end for**
  15.      $t' = t' - U$
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## 2 Qualitative examples



**Fig. 1.** Additional examples of denoising performance on *Planaria*, *Flywing*, *Tribolium* dataset. Numbers indicate SSIM wrt clean images. Arrows highlight examples of features preserved by our method but missed by other methods.