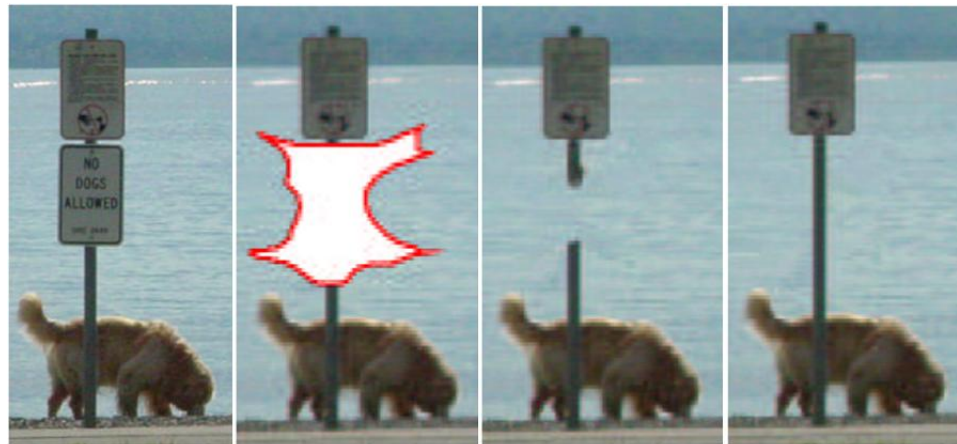# Image Inpainting

- Idea
  - Fill holes by propagating linear structures into the target region via diffusion
  - Advantage
    - Preserves the linear structures
  - Disadvantage
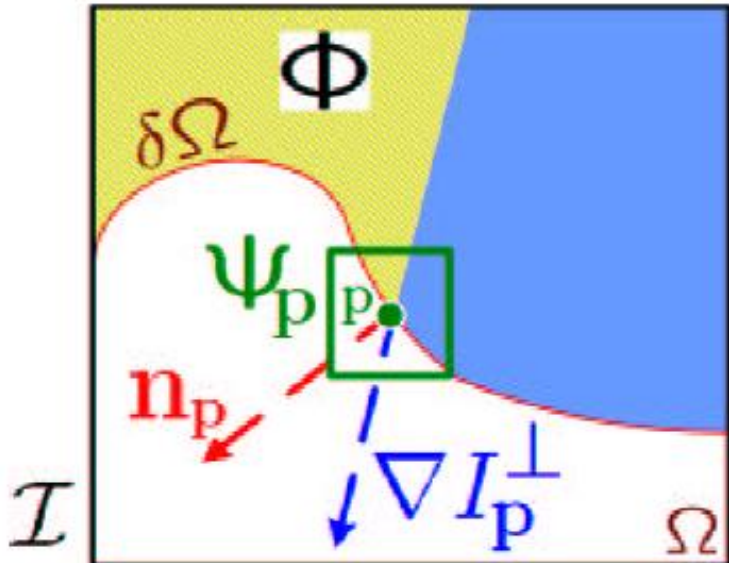   - Diffusion will cause blurs, which are usually noticeable

Criminisi's Approach

- Combine the strengths of two approaches
  - Use a texture synthesis algorithm
  - Give higher priority to linear structures
- Result
  - Linear structures are preserved
  - No blurs introduced

• Antonio Criminisi, Patrick Perez, Kentaro Toyama. Object Removal by Exemplar-based Inpainting. IEEE Conference on Computer Vision and Pattern Recognition, 2003.

Priority Order for Patch Inpainting

Assign each pixel with a priority value

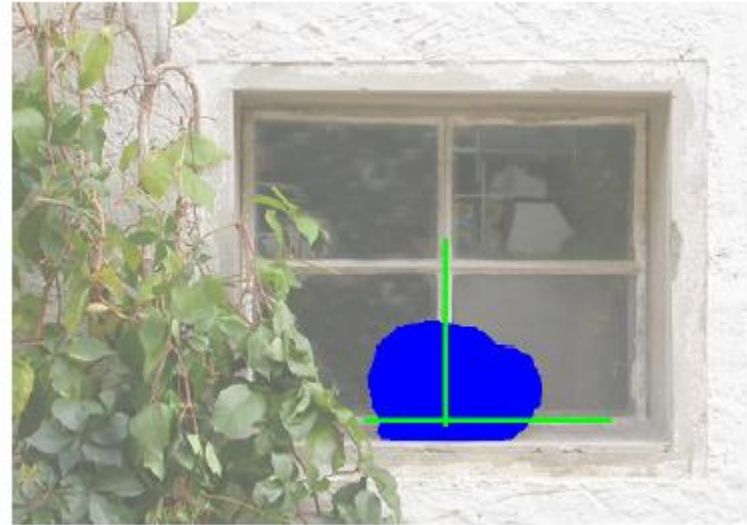Give linear structures higher priorities

$$P(\mathbf{p}) = C(\mathbf{p})D(\mathbf{p})$$

$$C(\mathbf{p}) = \frac{\sum_{\mathbf{q} \in \Psi_{\mathbf{p}} \cap (\mathcal{I} - \Omega)} C(\mathbf{q})}{|\Psi_{\mathbf{p}}|}, \qquad D(\mathbf{p}) = \frac{|\boldsymbol{\nabla} I_{\mathbf{p}}^{\perp} \cdot \mathbf{n}_{\mathbf{p}}|}{\alpha}$$

Exemplar-Based Patch Inpainting

- **Step 1**: calculate the **filling priority** for every patch centers

- **Step 2**: search for the **best match** of the local patch for each reference frame

- **Step 3**: **fill the unknown** pixels in the local patch

Results

Results (2)