Poisson Blending

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P2...

Will be released tomorrow...
GPU Tricks

Topics?
Intelligent Blending

Demo:

Example:
How Can We Do This?

• Think of any sort of algorithm which could do this!
• If we expressed this as an objective function, what would it be?
• What is the minimum of this function?
• How could we compute this efficiently?
How can we store this?
Poisson Blending
\[ \phi = \frac{1}{2} \sum_{i,j} \left[ (x_i - x_j) - \Delta_{ij} \right]^2, \quad \Delta_{ij} = -\Delta_{ji} \]

\[ \frac{d\phi}{dx_i} = \sum_{j \neq i} (x_i - x_j - \Delta_{ij}) + \frac{1}{2} \sum_{j \neq i} \left( \frac{d}{dx_i} (x_j - x_i - \Delta_{ji}) \right)^2 \]

\[ \sum_{j \neq i} (x_i - x_j - \Delta_{ij}) = 0 \]

\[ (x_i - x_j + \Delta_{ji}) \]
$\text{Derivative Matrix} \begin{bmatrix} x_i \end{bmatrix} = \sum_{j=1}^{n} \Delta_{ij}$

$\text{Jacobi Iteration} \quad x_i = \frac{1}{n} \sum_{j=1}^{n} (x_j + \Delta_{ij})$

$\begin{bmatrix} -1 & 4 & -1 \\ -1 & 4 & -1 \\ -1 & 4 & -1 \end{bmatrix}$
Poisson Blending
(Jacobi Iterations)
Conjugate Gradient
Image Pyramid
Other Membranes

SIGGRAPH 2009

Coordinates for Instant Image Cloning

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Yaron Lipman
Princeton University

Daniel Cohen-Or
Tel Aviv University

Dani Lischinski
The Hebrew University

(a) Source patch
(b) Laplace membrane
(c) Mean-value membrane

\[ \lambda_i(x) = \frac{w_i}{\sum_{j=0}^{m-1} w_j}, \quad i = 0, \ldots, m-1, \]

where

\[ w_i = \frac{\tan(\alpha_{i-1}/2) + \tan(\alpha_i/2)}{\|p_i - x\|}, \]