

Region-Adaptive Texture-Aware Image Resizing

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WHY IMAGE RETARGETING?

PROBLEM OF EXISTING SOLUTIONS

Texture Redundancy

- Ignored by most existing solutions.
- Solutions that deal with this issue are very **SLOW**.

TEXTURE-DEPENDENT PERFORMANCE

Regular Textures are more sensitive to resizing methods than **Stochastic** Textures.

PROPOSED ALGORITHM

Region Map Generation

Shape-preserving Mesh Warping

- Quad-shape Deformation: $R(V) = \sum_{v \in \mathcal{V}} \|C(v) - v\|$
- Curve Laplacian Coordinate: $\sum_{v \in \mathcal{V}} \|L(v) - T(v)\|^2$
- Mean Value Preservation: $\sum_{v \in \mathcal{V}} \|v - \sum_{u \in \mathcal{N}(v)} v_u\|^2$

Energy Minimization

$$\min \|DV - a(V)\|^2 + \|LV - \delta(V)\|^2 + \|CV\|^2 + \|PV - Q\|^2$$

$$\min_V \|AV - b(V)\|^2$$

$$A = \begin{pmatrix} D \\ L \\ C \\ P \end{pmatrix}, \quad b(V) = \begin{pmatrix} a(V) \\ \delta(V) \\ Q \\ Q \end{pmatrix}$$

Texture Re-synthesis

Exemplar-based Synthesis

- Guided by illumination map (decoupling filtered).
- Use priority queue to store patch placement locations.

Output: Retargeted Image

EXPERIMENTAL RESULTS

COMPUTATION EFFICIENCY

	Getty	Blueman	Boy
Vertex Number ($ V_q + V_c $)	425+232	425+213	600+148
Region Map Generation	0.28s	0.27s	0.27s
Matrix Factorization	0.20s	0.21s	0.23s
Back Substitution	0.01s	0.01s	0.01s
Texture Re-synthesis	-	-	0.08s

Comparable to existing real-time image resizing methods.

CONCLUSION

Region-Adaptive

- Basic unit for resizing: **Pixels-Regions**.
- Different regions (*saliency, regular, irregular*) resized differently.

Texture-Aware

- Texture redundancy effectively reduced through re-synthesis.