A Common Framework for Interactive Texture Transfer

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Motivation

The proposed common framework is capable of multiple challenging user-controlled texture transfer tasks:
(a) turning doodles into artworks
(b) editing decorative patterns
(c) generating texts in special effects
(d) controlling effect distribution in text images
(e) swapping textures

Framework

Motivation
Results
Methods

Structure Propagation

Guided Texture Transfer

The goal is to synthesize the target stylized image using stylized textures in source. We pose this problem as a patch-based optimization task with the following energy function.

Energy function

\[ E = \sum_{p,q} \min(\lambda, E_{\text{sim}}(p,q) + \lambda E_{\text{struct}}(q) + E_{\text{sem}}(p,q)) \]

\[ \lambda = \frac{l_1 - l_2}{l_1 - l_2} \beta, \quad l_1 \leq l \leq l_2 \]

\[ \lambda_2 = \exp\left(-\frac{1}{|\Omega_{\text{patch}}|} \sum_{p \in \Omega} d(c(p), cp)\right) \]

Semantic Guide

We define the semantic guidance term using L2-norm of two sampled patches in RGB space.

Structure Guide

We describe structure term as the similarity of the target structural patch and temporary stylized patch.

Coherence Guide

The coherence term aims to synthesize the target image using the consistent stylized textures in source.

Structure Propagation

Guided Texture Transfer

The coherence term is defined as:

\[ E_{\text{coherence}}(p,q) = ||\tau \Phi_{\text{struct}}(N_p) - \Phi_{\text{struct}}(N_q)||^2 \]

Function Optimization

The energy function is optimized by EM-like iterations with two steps (guided search and vote) performed alternatively.

Methods

\[ \text{Function Optimization} \]

Guided Initialization \rightarrow Guided Search \rightarrow Vote

The multi-scale structure guidance is used for guided initialization and search.

Results

Doodles-to-Artsworks

Special Effect Text Generation

Texture Swap

Decorative Pattern Editing

Input (source) Input (semantics) Output (target)

Input (source) Input (text) Output (target)

Input (source) Input (path 1) Input (path 2) Output (target)

Internal Salient Structure Extraction

Framework

Input

Salience Detection

Structure Extraction

Structure Propagation

Structure Correspondence

Output

Guided Texture Transfer

Vote

Guided Search

Guided Initialization

\[ \text{Input (source)} \rightarrow \text{Input (semantics)} \rightarrow \text{Output (target)} \]

\[ \text{Input (source)} \rightarrow \text{Input (text)} \rightarrow \text{Output (target)} \]