

# *From Image Parsing to Painterly Rendering*

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# Introduction

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- Non-Photorealistic Rendering (NPR)
- Stroke-Based Rendering (SBR)

## Task 1: Stroke Element Modeling

[Strassmann 86], [Meier 96], [Curtis 97], [Litwinowicz 97], [Hertzmann 98], etc.

## Task 2 : Stroke Placement

[Turk & Banks 96], [Teece 98], [Litwinowicz 97], [Hertzmann 98;03], etc.

# Introduction

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- Problem:

Computer Does NOT Know What It Is Painting

- Observation:

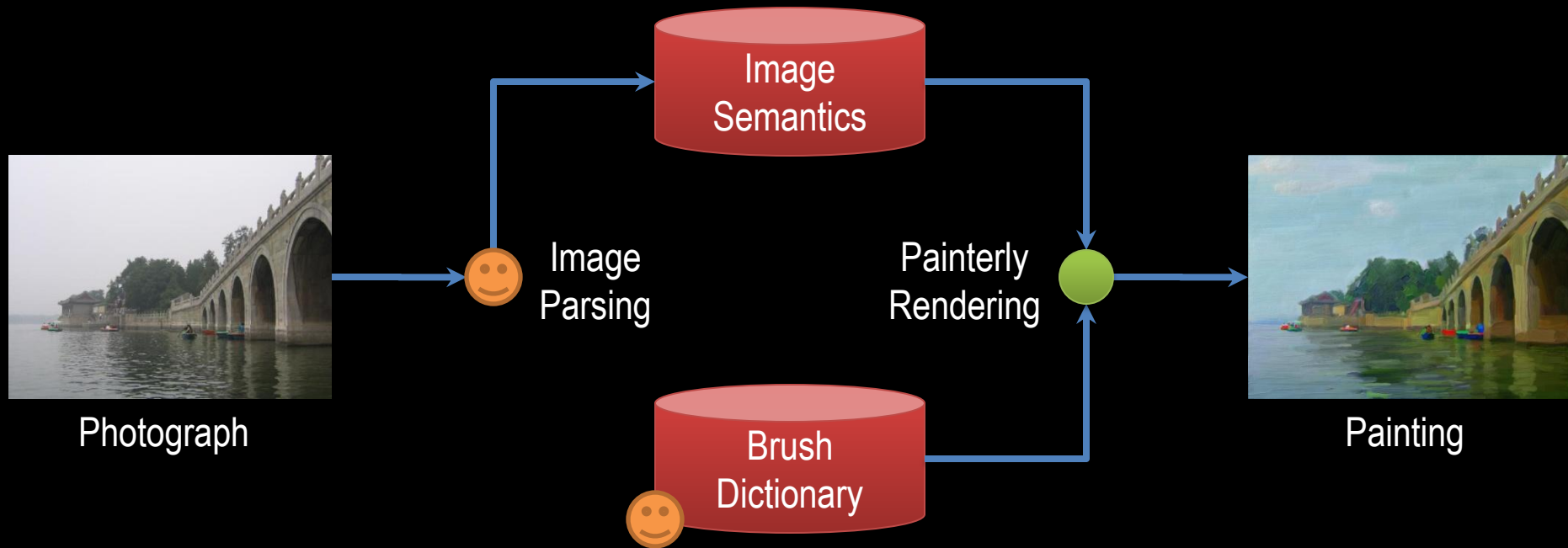
Painters DO Know What They Are Painting

- Solution:

Interactive Image Parsing for Semantic Descriptions

# Our Approach

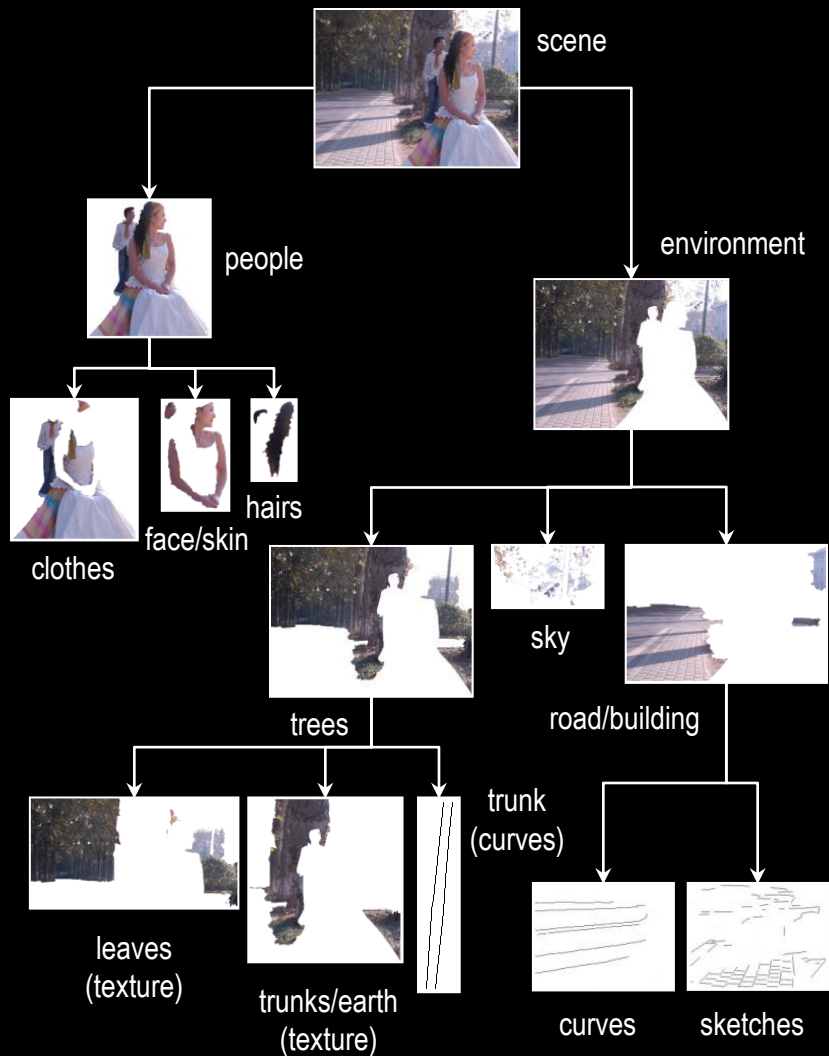
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# Image Parsing

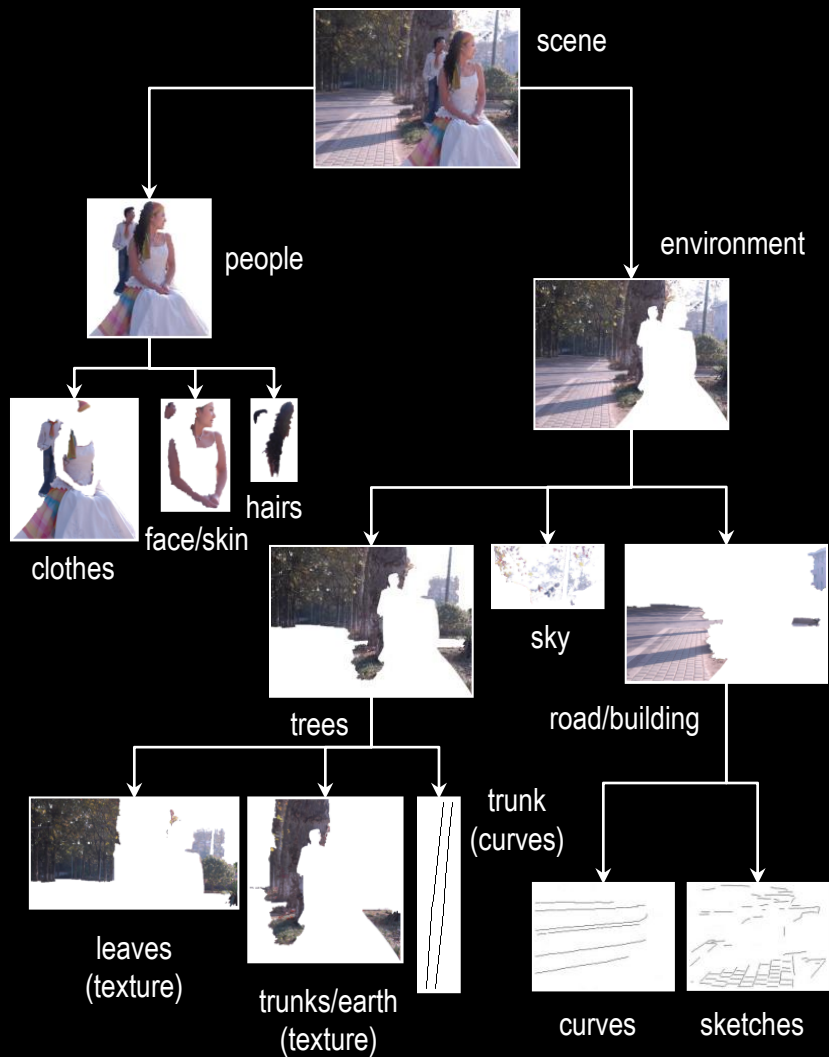
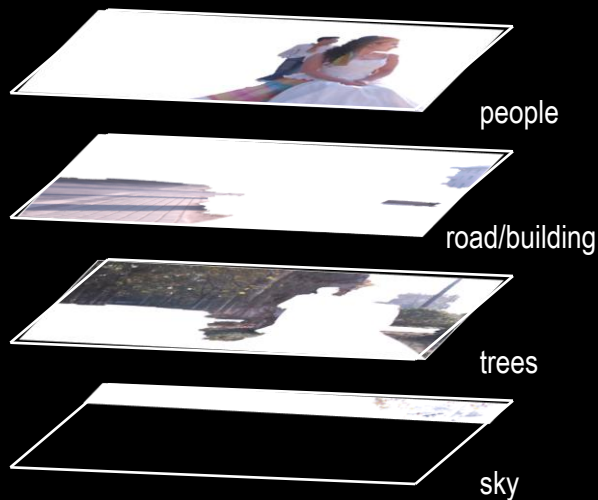
- Hierarchical Decomposition
  - Interactive Segmentation  
[Boykov & Jolly 01]
  - Object Classification  
[Li et al. 05]

Parse Tree  
[Tu et al. 05]



# Image Parsing

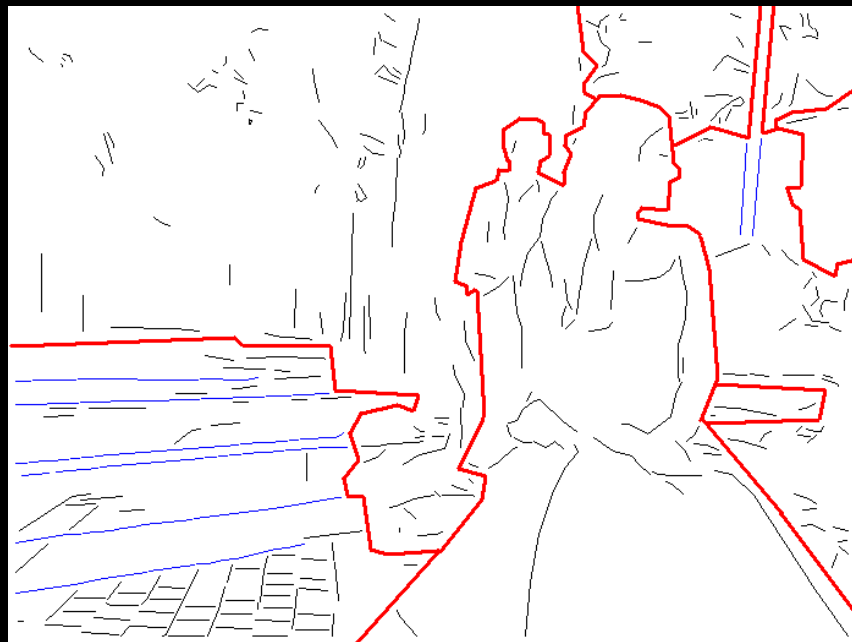
- Hierarchical Decomposition
- Layering



# Image Parsing

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- Sketch Map
    - Segmentation Boundary
    - Primal Sketch
- [Guo et al. 07]



# Image Parsing

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- Sketch Map
  - Segmentation Boundary
  - Primal Sketch

[Guo et al. 07]

- Orientation Field
  - MRF Optimization

[Perona 98]

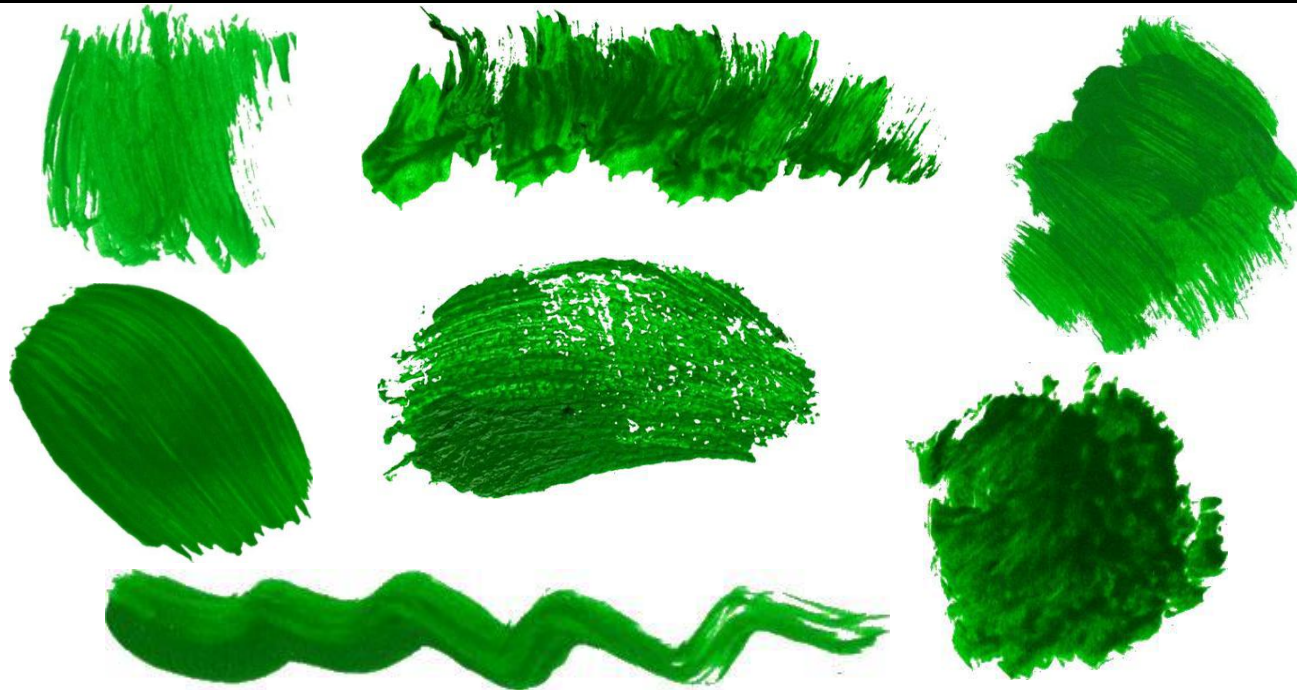
$$\Theta^* = \arg \min_{\Theta} E_{\text{sketch}}(\Theta) + \alpha E_{\text{smoothness}}(\Theta) + \beta E_{\text{prior}}(\Theta)$$



# Painterly Rendering

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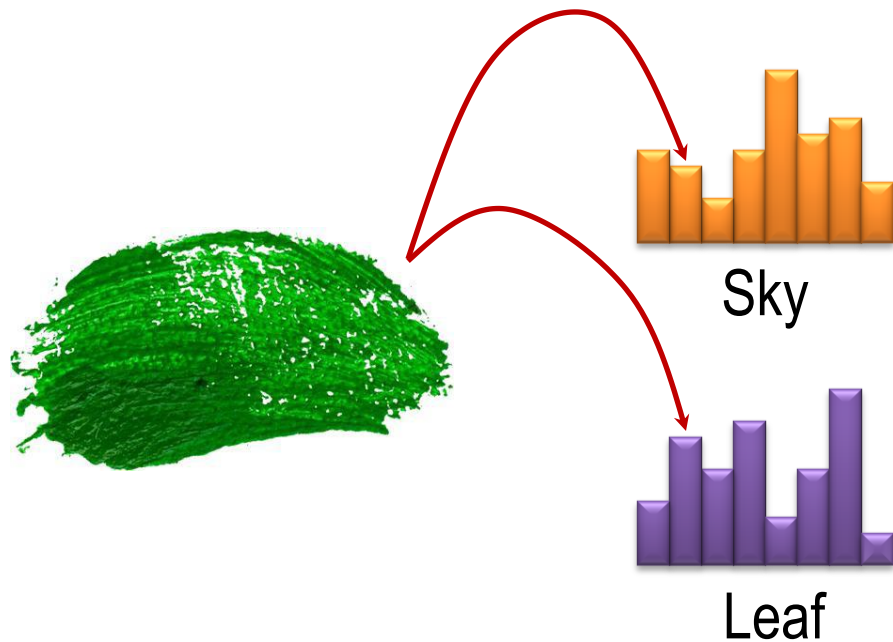
- Brush Dictionary



# Painterly Rendering

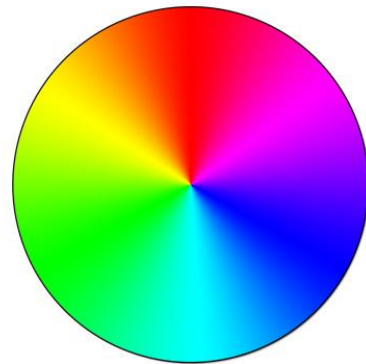
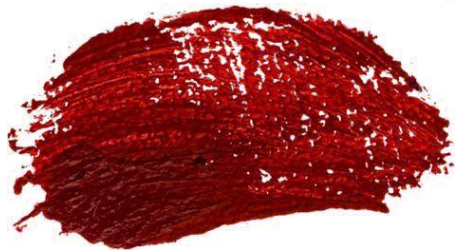
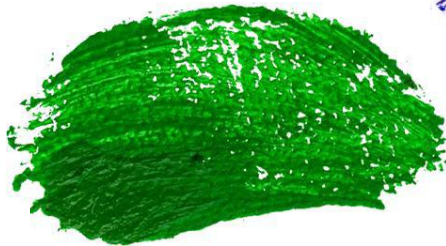
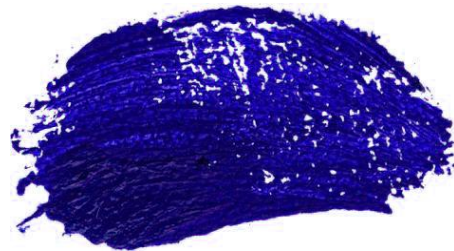
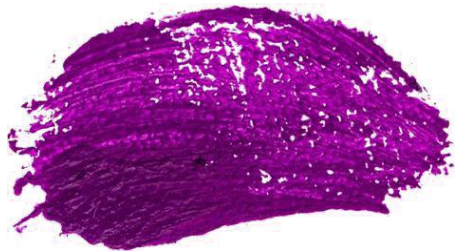
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- Brush Selection



# Painterly Rendering

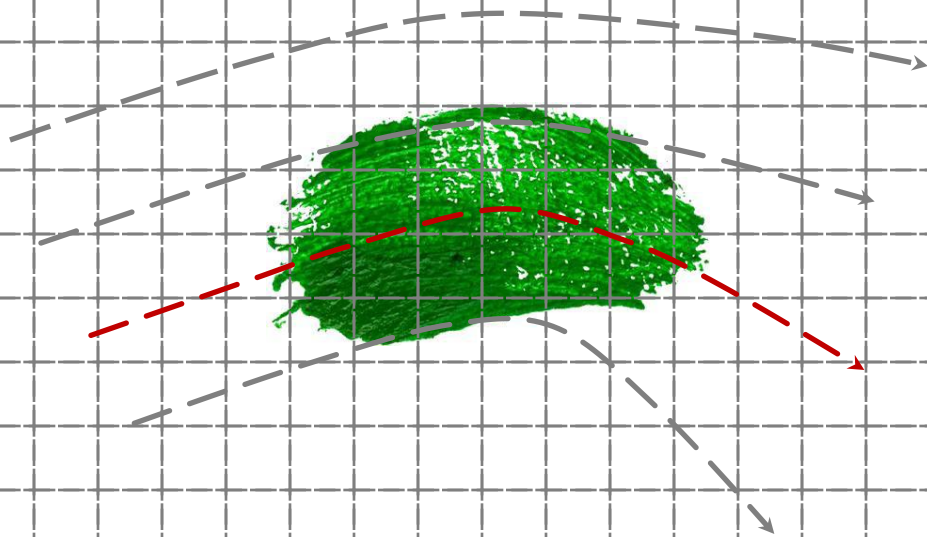
- Brush Color Transfer



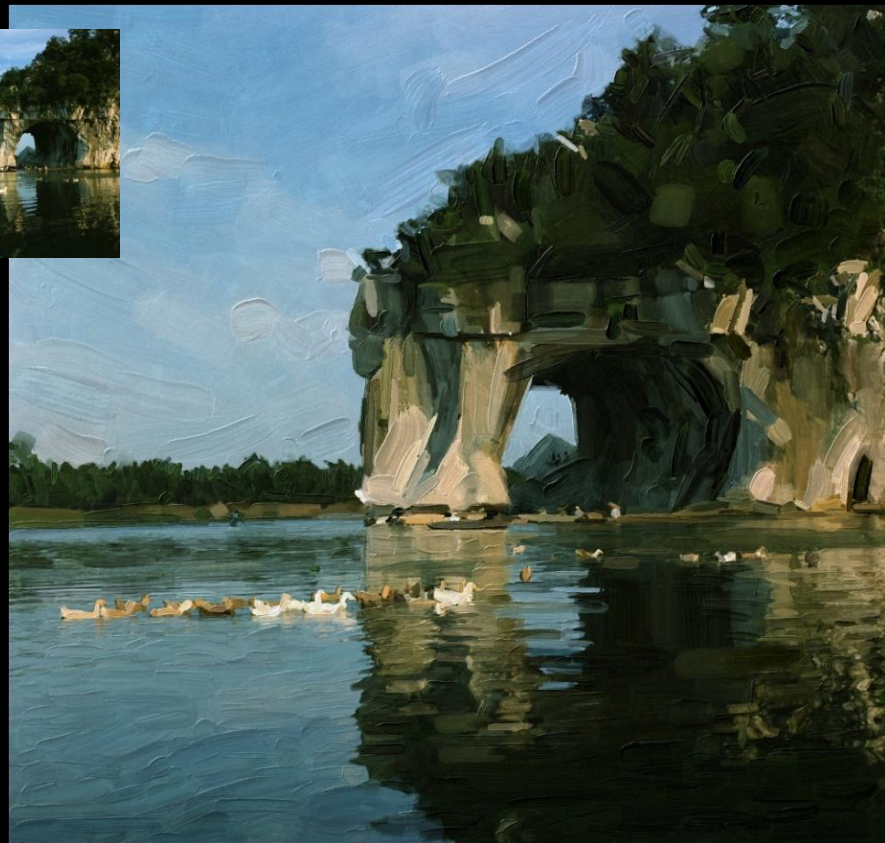
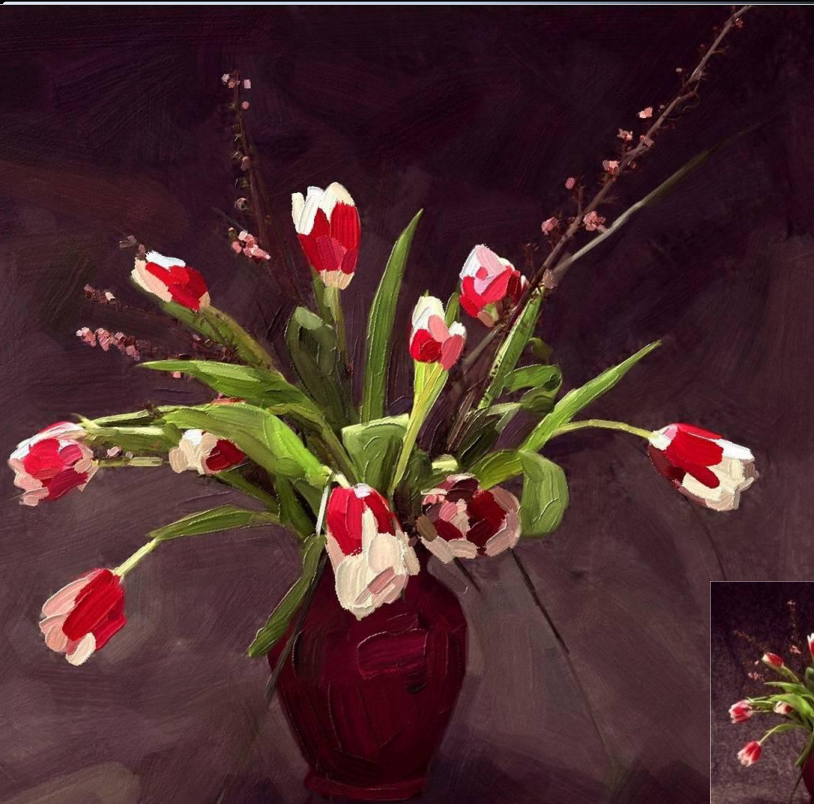
# Painterly Rendering

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- Stroke Placement



# Experimental Results



# Experimental Results

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# Optional Tool: Color Enhancement



# Summary and Future Studies

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- A **Semantics-Driven** Approach for Stroke-Based Painterly Rendering Based on Image Parsing and a High-Quality **Brush Dictionary**
- Future Work:
  - Richer Brush Model
  - More Steerable Stroke Placement Strategy
  - Better Interactive Image Parsing Engine

*Thank you!*

Questions?

Project Website:

<http://www.stat.ucla.edu/~mtzhao/research/parse2paint/>