Development of Aesthetic Algorithms for Acquired and Generated Digital Image

Xiaoyan Zhang,
School of Electrical & Electronic Engineering
Supervisors:
Assoc Prof. Chan Kap Luk, School of Electrical and Electronic Engineering.
Asst. Prof Martin Constable, School of Art Design and Media.
Outline

- Motivation
- Objective
- Research Problems
- Previous work
- Research gap
- Current work
1. Motivation

- 3D computer graphics and animation, games, and films, need the scene be more beautiful and expressive.

1. Motivation

- Painters can arrange light, form, texture and color in a considered and beautiful way.
- Even the best photograph is essentially an optical artifact not easily subject to such consideration.

- Can we learn from paintings on captured digital photographs?

- Francisco De Goya y Lucientes (Spanish, 1746-1828), “Lavendimia Goya lou”
Outline

- Motivation
- Objective
- Research Problems
- Previous work
- Research gap
- Current work
2. Objective

- Study of pre-existent art works and attempt to identify what constitutes a style.
- Apply styles to acquired and generated digital images.
Outline

- Motivation
- Objective
- Research Problems
- Previous work
- Research gap
- Current work
What constitutes a style?

In the visual arts, style refers to the aspects of the visual appearance of a work of art.

Factors affecting a style: formal principles such things as the content, paint thickness, choice of medium, size of canvas and brushstrokes.
3. Research Problems

- In paintings these aspects have been deliberately arranged according to formal, instinctive, cultural and personal preferences.
- Even the painter finds it difficult to clearly identify them.
- This presents a real problem to computerized analysis.

Qualitative → Quantitative

- We concentrate on color saturation, color value, tone (lightness), focus, line, corner, edge that are retrievable.
3. Research Problems

- How to express the style mathematically and apply it to acquired and generated digital images?

- We need a general model for all of the attributes and principles.
Outline

- Motivation
- Objective
- Research Problems
- Previous work
- Research gap
- Current work
4. Previous work

- Painterly rendering
  - An area of computer graphics mostly to emulate the brush strokes effects seen in traditional paintings.

4. Previous work

- Related Papers about Painterly rendering:
  - Romer Rosales, Kannan Achan, and Brendan Frey, “Unsupervised Image Translation”, International Conference on Computer Vision, 2003. (Probabilistic and Statistical Inference Laboratory, University of Toronto)
4. Previous work

- Re-Colour: shifts the colour of the photograph to match the colours of the reference image.


(Department of Computer Science, Tokyo Institute of Technology)

- It only considers the colours of the source image but not their distribution and styles. In other words: the above example would achieve unnatural results if the target painting was not green.
4. Previous work

- Related Papers about re-coloring:
Motivation
Objective
Research Problems
Previous work
Research gap
Current work
The reviewed work only consider one element (e.g. brush stroke, color) separately.

Differently, we consider color saturation, color value, tone (lightness), focus, line, corner, edge that are retrievable as a layered operations.

Each operation would be passed through the image in a way that is selective and is in a dynamic relationship to all the other operations.
Outline

- Motivation
- Objective
- Research Problems
- Previous work
- Research gap
- Current work
Currently, we define the global style of painting in the use of colour as the hue spread in artist’s colour space, and saturation/lightness distributions guided by the contrast.

Two artists used:

- Sir Lawrence Alma-Tadema (English 1836-1912), one of the most renowned painters of the late nineteenth-century.
- Vincent Van Gogh (Dutch 1853-1890) whose paintings had a far-reaching influence on 20th century art for their vivid colours and emotional impact.
Currently, our work considers painting style as being defined as the global contrast of the three attributes Hue, Saturation and Lightness.

Our current results are encouraging and future work will explore other constituent aspects of a painter's style.
Thank you!

Q&A