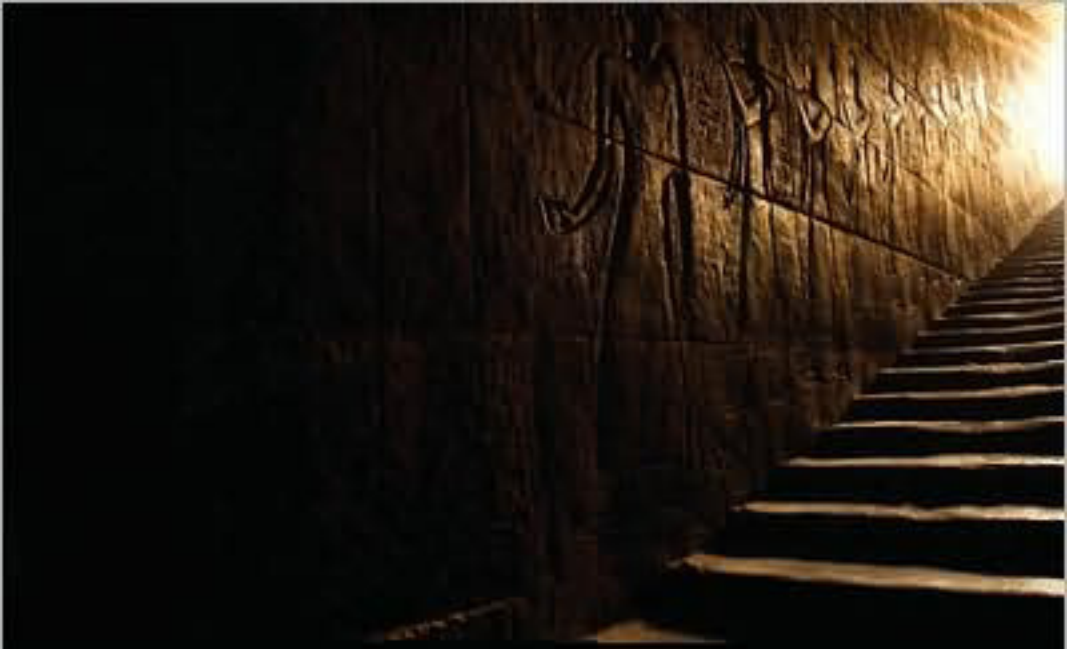

Mark Grundland

Style and Content in Digital Imaging

Reconciling Aesthetics with Efficiency in Image Representation

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Preface

Style and Content in Digital Imaging:
Reconciling Aesthetics with Efficiency in Image Representation

Who decides the rendering style of a digital photograph? The artist or the algorithm?

This book explores the technical challenges surrounding representation, compression, and stylization in digital imaging. Its story began in the spring of 2001 with a casual observation. At that time, I was starting my graduate studies at the Computer Laboratory of the University of Cambridge. I spent a rainy day visiting the National Gallery in London, enjoying my chance to see up close some of the great masterpieces of the past. Each painting offered a unique testament to its artist's original vision. Each one had its distinct character, its own way of making the brush strokes come alive. On my way back on the Underground, I came face to face with the popular art of our day, the giant posters offering for sale everything I could possibly wish for and so much more besides. Suddenly, I was struck with the impression that something was not quite right with the picture. Amidst all the ingenious techniques that graphic design employs to steal a glance from a passerby, the endless variety of colors, fonts, icons, illustrations and layouts, it seemed to have missed a trick. Up close, all the photographs looked the alike. Their very texture seemed so mundane as to appear almost bland. They all proudly displayed the same repetitive grain, the mechanical artifact of an imaging process rather than the intentional expression of an artistic creation. Though they may have reflected the point of view of a photographer, they lacked the sense of style of a graphic designer. Such a state of the art leaves much to be desired.

From calligraphy to typography, from painting to photography, from paper to screen, the evolution of visual representations has been driven by advances in the technology used to produce them. Modern document editing systems enable the graphic designer to apply fonts to control how text is displayed. It is easy to alter the text without changing the font or change the font without altering the text because the document representation stores the text and the font separately. However, image editing systems tend to make the task of applying styles to control how pictures are displayed much more cumbersome. The graphic designer cannot effectively edit the style and the content of a picture independently because exiting image representations cannot distinguish style from content. As a result, the stylistic design of digital photographs has not kept pace with the typographical design of digital documents. However, there have recently emerged the computational tools required for restoring the balance between aesthetic expression and efficient encoding in a new approach to image representation.

Today, all that stands between the image and the imagination is image processing.

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July 1, 2008

“We do not see things as they are. We see them as we are.”
— The Talmud.

For my father,
Alfred M. Grundland.

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Graphic design draws a fundamental distinction between style and content, as in font and text. Applying the same principle to digital photography, this work proposes a novel image representation that separates the specification of rendering style from the description of informative content, enabling style and content to be saved, changed and reused independently. From the abstract to the figurative, this technique represents images at progressive levels of detail. It also supports interactive style design using genetic programming. As every image has a grain, there is always a resolution where stylized depiction must take the place of exact reproduction. Intentional stylization enables visual artifacts to play a constructive role in visual communication by making abstraction and simplification appear legitimate. Painterly rendering styles that encourage the viewer`s imagination to complete the picture can act as a powerful form of image compression. Based on University of Cambridge research, this book presents students, researchers, and practitioners of image processing and computer graphics with a new perspective on representation, compression, and stylization in digital imaging.

Mark Grundland

Mark Grundland is a research and development consultant. Combining computer graphics, computer vision and visual art, his research investigates how image processing tools can be designed to express the imagination and expand the creative possibilities of digital media. He received a PhD in image processing from the University of Cambridge in 2007.

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