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Nota di contenuto	Color Constancy; Contents; Series Preface; Preface; 1 Introduction; 1.1 What is Color Constancy?; 1.2 Classic Experiments; 1.3 Overview; 2 The Visual System; 2.1 Eye and Retina; 2.2 Visual Cortex; 2.3 On the Function of the Color Opponent Cells; 2.4 Lightness; 2.5 Color Perception Correlates with Integrated Reflectances; 2.6 Involvement of the Visual Cortex in Color Constancy; 3 Theory of Color Image Formation; 3.1 Analog Photography; 3.2 Digital Photography; 3.3 Theory of Radiometry; 3.4 Reflectance Models; 3.5 Illuminants; 3.6 Sensor Response; 3.7 Finite Set of Basis Functions 4 Color Reproduction4.1 Additive and Subtractive Color Generation; 4.2 Color Gamut; 4.3 Computing Primary Intensities; 4.4 CIE XYZ Color Space; 4.5 Gamma Correction; 4.6 Von Kries Coefficients and Sensor Sharpening; 5 Color Spaces; 5.1 RGB Color Space; 5.2 sRGB; 5.3 CIE L*u*v*Color Space; 5.4 CIE L*a*b*Color Space; 5.5 CMY Color Space; 5.6 HSI Color Space; 5.7 HSV Color Space; 5.8 Analog and Digital Video Color Spaces; 6 Algorithms for Color Constancy under Uniform Illumination; 6.1 White Patch Retinex; 6.2 The Gray World Assumption; 6.3 Variant of Horn's Algorithm 6.4 Gamut-constraint Methods6.5 Color in Perspective; 6.6 Color Cluster Rotation; 6.7 Comprehensive Color Normalization; 6.8 Color Constancy Using a Dichromatic Reflection Model; 7 Algorithms for

Color Constancy under Nonuniform Illumination; 7.1 The Retinex Theory of Color Vision; 7.2 Computation of Lightness and Color; 7.3 Hardware Implementation of Land's Retinex Theory; 7.4 Color Correction on Multiple Scales; 7.5 Homomorphic Filtering; 7.6 Intrinsic Images; 7.7 Reflectance Images from Image Sequences; 7.8 Additional Algorithms; 8 Learning Color Constancy; 8.1 Learning a Linear Filter 8.2 Learning Color Constancy Using Neural Networks8.3 Evolving Color Constancy; 8.4 Analysis of Chromatic Signals; 8.5 Neural Architecture based on Double Opponent Cells; 8.6 Neural Architecture Using Energy Minimization; 9 Shadow Removal and Brightening; 9.1 Shadow Removal Using Intrinsic Images; 9.2 Shadow Brightening; 10 Estimating the Illuminant Locally; 10.1 Local Space Average Color; 10.2 Computing Local Space Average Color on a Grid of Processing Elements; 10.3 Implementation Using a Resistive Grid; 10.4 Experimental Results; 11 Using Local Space Average Color for Color Constancy 11.1 Scaling Input Values11.2 Color Shifts; 11.3 Normalized Color Shifts; 11.4 Adjusting Saturation; 11.5 Combining White Patch Retinex and the Gray World Assumption; 12 Computing Anisotropic Local Space Average Color; 12.1 Nonlinear Change of the Illuminant; 12.2 The Line of Constant Illumination; 12.3 Interpolation Methods; 12.4 Evaluation of Interpolation Methods; 12.5 Curved Line of Constant Illumination; 12.6 Experimental Results; 13 Evaluation of Algorithms; 13.1 Histogram-based Object Recognition; 13.2 Object Recognition under Changing Illumination 13.3 Evaluation on Object Recognition Tasks

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## Sommario/riassunto

A human observer is able to recognize the color of objects irrespective of the light used to illuminate them. This is called color constancy. A digital camera uses a sensor to measure the reflected light, meaning that the measured color at each pixel varies according to the color of the illuminant. Therefore, the resulting colors may not be the same as the colors that were perceived by the observer. Obtaining color constant descriptors from image pixels is not only important for digital photography, but also valuable for computer vision, color-based automatic object recognition, and color imag

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