Mercoledì 23 Giugno 2021 ore 10.00

Texture and colour descriptors for visual recognition: an overview of methods applications

Abstract

Texture and colour, along with shape, gloss and transparency are the visual features that mostly determine the appearance of objects, materials and scenes. The automatic characterization of colour and texture via suitable descriptors plays therefore a crucial role in a number of applications, such as visual inspection (e.g. defect detection, surface grading, etc.), materials classification, remote sensing (e.g. satellite and aerial image analysis), medical image analysis (e.g. computer-assisted diagnosis and prognostication) and biometric classification. Texture and colour analysis has undergone rapid yet profound changes in recent years. Traditionally, the approach to the problem was essentially model-driven and consisted of designing suitable descriptors by hand (hence the term 'hand-crafted' or 'engineered' methods). This paradigm has recently been shifting towards data-driven approaches in which the descriptors are no longer designed a priori, but 'learned' from the data. Two elements have contributed to this change: on the one hand the of ever-increasing availability of data, on the other the advent of new methods like Convolutional Neural Networks.The aim of this talk is to introduce some basic concepts in colour and texture analysis, outline the potential applications in different fields and describe the evolution of the topic over time. We will, in particular, discuss the differences between the traditional (hand-crafted) approach and the convolutional methods, and delineate the pros and cons of the two paradigms.

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Francesco Bianconi received the M.Eng. in Mechanical Engineering from the University of Perugia, Italy, and the Ph.D. in computer-aided design from a consortium of Italian universities. He has been a Visiting Researcher with the University of Vigo, Spain; the University of East Anglia, U.K.; Queen Mary University of London, U.K. and City, University of London, U.K. He is currently an Associate Professor of Engineering Drawing with the Department of Engineering, University of Perugia, where he conducts research on computer vision, image processing, and pattern recognition with special focus on texture and colour analysis for industrial and biomedical applications. Prof. Bianconi is an IEEE Senior Member, Chartered Engineer and Court-Appointed Expert; has served as TPC/IPC member for more than 30 international conferences and symposia and is currently Associate Editor for two scholarly journals.

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