

SUMMARY:

Visual information retrieval (VIR) is an active and vibrant research area, which attempts at providing means for organizing, indexing, annotating, and retrieving visual information (images and videos) from large, unstructured repositories. This tutorial provides an excellent opportunity to get acquainted with the latest developments in the field of visual information retrieval, in a technical and practical way.

BIO:

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Dr. Oge Marques is Associate Professor and Associate Chairman in the Department of Computer and Electrical Engineering and Computer Science at Florida Atlantic University in Boca Raton, Florida. He has more than 20 years of teaching and research experience in the fields of image processing and computer vision. He is the (co-) author of five books in these topics, including "Content-Based Image and Video Retrieval" (with Borko Furht) (Springer, 2002), the recently published textbook "Practical Image and Video Processing Using MATLAB" (Wiley, 2011), and the upcoming book "Visual Information Retrieval using Java and LIRE" (with Mathias Lux) (Morgan & Claypool, 2013). He has also published several book chapters and more than 50 refereed journal and conference papers in these fields. He serves as a reviewer and Editorial Board member for several leading journals in computer science and engineering. He is a senior member of both the ACM and the IEEE.

Dr. Mathias Lux studied Mathematics at Graz University of Technology. After finishing his Master's studies in 2004, he started his PhD studies in multimedia retrieval based on semantic metadata, also in Graz, which he finished in 2006 with distinction. From 1998 to 2001 he worked in industry in the area of web-based applications, before being employed as a researcher at the Know-Center, a competence center for knowledge-based applications in Graz, focusing on information retrieval. From 2004 to 2006 he worked at the Knowledge Management Institute (KMI) of Graz University of Technology as a university assistant. He is currently working on multimedia retrieval based on metadata and emergent semantics in social computing.

ABSTRACT:

In this tutorial, we present an overview of visual information retrieval (VIR) concepts, techniques, algorithms, and applications. Several topics are supported by examples written in Java, using Lucene (an open-source Java-based indexing and search implementation) and LIRE (Lucene Image REtrieval), an open-source Java-based library for content-based image retrieval (CBIR) written by Mathias Lux.

After motivating the topic, we briefly review the fundamentals of information retrieval, present the most relevant and effective visual descriptors currently used in VIR, the most common indexing approaches for visual descriptors, the most prominent machine learning techniques used in connection with contemporary VIR

solutions, as well as the challenges associated with building real-world, large scale VIR solutions, including a brief overview of publicly available datasets used in worldwide challenges, contests, and benchmarks. Throughout the tutorial, we integrate examples using LIRE, whose main features and design principles are also discussed. Finally, we conclude the tutorial with suggestions for deepening the knowledge in the topic, including a brief discussion of the most relevant advances, open challenges, and promising opportunities in VIR and related areas.

The tutorial is structured as follows:

1. Introduction
2. Selected concepts, principles, and techniques from Information Retrieval (IR)
3. Visual features: global and local
4. Indexing visual features
5. Machine learning aspects
6. Real-world VIR system design and evaluation
7. LIRE: a Java library for CBIR
8. Where to go from here?

The tutorial is primarily targeted at experienced Information Retrieval researchers and practitioners interested in extending their knowledge of document-based IR to equivalent concepts, techniques, and challenges in VIR. The acquired knowledge should allow participants to derive insightful conclusions and promising avenues for further investigation.