

Multimedia Data Mining and Knowledge Discovery

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Preface

In recent years we witnessed the real revolution in media recordings and storage. Because of advances in electronics, computing engineering, storage manufacturing, and networking, the market is flooded with cheap computers, mass memory, camera phones, and electronic devices for digitizing and producing visual and audio information. Ten years ago only a professional studio could create an audio CD or a DVD, but today everybody can do it, using a home computer. Under threat of the digital expansion, the entertainment, show, and education industries started changing their business models. Tomorrow nobody will be surprised to find that a personal computer has a terabyte hard disk and four gigabyte RAM. This phenomenon has made corporate, public, and personal multimedia repositories widespread and fast growing. Currently, there are some commercial tools for managing and searching multimedia audio and image collections, but the need for tools to extract hidden useful knowledge embedded within multimedia collections is becoming pressing and central for many decision-making applications. The tools needed today are tools for discovering relationships between objects or segments within images, classifying images on the basis of their content, extracting patterns in sound, categorizing speech and music, recognizing and tracking objects in video streams, etc.

Today data mining efforts are going beyond the databases to focusing on data collected in fields like art, design, hypermedia, and digital media production, medical multimedia data analysis and computational modeling of creativity, including evolutionary computation. These fields use variety of data sources and structures, interrelated by the nature of the phenomenon. As a result there is an increasing interest in new techniques and tools that can detect and discover patterns that can lead to a new knowledge in the problem domain, where the data have been collected. There is also an increasing interest in the analysis of multimedia data generated by different distributed applications, like collaborative virtual environments, virtual communities, and multiagent systems. The data collected from such environments include record of the actions in them, audio and video recordings of meetings and collaborative sessions, variety of documents that are part of the business process, asynchronous threaded discussions, transcripts from synchronous communications, and other data records. These heterogeneous multimedia data records require sophisticated

preprocessing, synchronization, and other transformation procedures before even getting to the analysis stage.

On the other hand, researchers in multimedia information systems, in the search for techniques for improving the indexing and retrieval of multimedia information are looking into new methods for discovering indexing information. Variety of techniques from machine learning, statistics, databases, knowledge acquisition, data visualization, image analysis, high performance computing, and knowledge-based systems, have been used mainly as a research handcraft activity. The development of ontologies and vocabularies for multimedia data fosters the adoption and merging with the Semantic Web technology. The emerging international standards for multimedia content description (MPEG-7) and multimedia resources delivery and usage (MPEG-21) promise to expedite the progress in the field giving a uniform data representation and the open multimedia framework.

This book is based mostly on extended and updated papers that have been presented at the two Multimedia Data Mining Workshops—MDM KDD 2003 and MDM KDD 2004 that held in conjunction with the ACM SIGKDD Conference in Washington, DC, August 2003 and the ACM SIGKDD Conference in Seattle, WA, August 2004, respectively. The book also includes several invited surveys and papers. The book chapters give a snapshot of research and applied activities in the multimedia data mining.

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