Chapter I

Multimedia Systems and Content-Based Image Retrieval

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ABSTRACT

In this chapter, we present a basic introduction of the two very important areas of research in the domain of information technology, namely, multimedia systems and content-based image retrieval. The latter is still a widely unresolved problem. We discuss some of the works done so far in content-based image retrieval in the context of multimedia systems.

INTRODUCTION

Research on multimedia systems and content-based image retrieval has gained tremendous momentum during the last decade. This is due to the fact that multimedia databases cover the text, audio, video and image data which help us to receive enormous amounts of information and which has brought fundamental changes in our life style. Content-based image retrieval (CBIR) is a bottleneck of the access of multimedia databases simply because there remains vast differences in the perception capacity between a human being and a computer. We give an introduction of these two areas in this chapter along with an idea of the research being conducted in CBIR over the last few years in the context of multimedia systems. The section on multimedia databases
describes general background of multimedia databases. The section on Content-based image retrieval talks about general background, problems and some of the works done so far in content-based image retrieval. A summary is presented at the end.

**MULTIMEDIA DATABASES**

**General Background**

Multimedia environment, much talked-about topic in computers, is adding new dimensions in the area of information technology and all relevant fields. Multimedia and imaging applications are enriching existing applications by integrating images, voices, text and video. The ultimate goal is to have all information types digitized and computerized. As we proceed to convert enormous amounts of non-digitized information into multimedia objects, the outcomes are extremely significant with its effects in various activities of life.

The available literature talks about certain advanced technologies which are:

- Computer-aided design and manufacturing (CAD/CAM) using 2-D and 3-D graphics, animation and visualization
- Network standard, such as asynchronous transfer mode (ATM) and fibre distributed data interface (FDDI) which allow multimedia information to flow through wide area networks (WANS) as well as local area networks (LANS)
- Image processing systems which include more sophisticated techniques to segment and process images
- Character and object recognition systems using pattern recognition and neural networks
- Software systems such as object-oriented languages, databases and operating systems
- Hardware components such as video cameras, video boards, sound boards and high-resolution monitors
- Storage devices such as optical disks and magneto-optic technologies

All of the above developments in information technology are lending support to multimedia information technology.

Multimedia environments can be available in PC-based systems, then in more advanced Power PCs with built-in audiovisual capabilities and to more advanced and sophisticated UNIX workstations.

There are some similarities between object-oriented databases and multimedia databases. Just as an object-oriented database tries to depict the real world as much as possible so are multimedia databases because of their ability to capture and play back the sounds and images of the real world as realistically as possible.

Other features of multimedia databases are:

1. Automatic feature extraction and indexing where image processing and pattern recognition systems for images often extract the various features and content of multimedia objects. When large amounts of non-digitized information are converted into digital multimedia objects, quite a few automatic indexing features are
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