three-dimensional imaging like PET and MRI scanning and all the image processing data; and (3) medical literature review and compilation. All three areas involve the accumulation of large amounts of data, and thus the possibility/need of analyzing these data to learn how to be more efficient and more accurate in management and diagnosis, etc.

We might categorize the patient/doctor type of medical informatics data coming from the following activities:

- Electronic prescribing
- Personal health records
- Computerized practitioner order entry
- Identity management of patients
- Electronic health records
- Good project management and software selection (for the preceding to be really successful)

Because of the large number of research papers and amount of data in text format (over 5,000 papers a month between medical informatics and bioinformatics), medical informatics requires text processing in addition to standard data mining methods. Thus, text mining algorithms must be added to data mining algorithms in the arsenal of tools needed to make sense out of all these data.

Additionally, because of the use of many 3D imaging methods in medicine, medical informatics requires analytical methods for image and structural informatics. Visual (and even auditory) data mining has not yet reached a plateau in its potential and possibilities; however, it is increasing in importance for diagnosis and decisions on actions to take in treatment (see Chapter 21).

The model in Figure 14.1 shows where medical informatics as a discipline fits into the fields of biological sciences, clinical and health services, and information technology and analysis.

The field of medical informatics is large, as is bioinformatics (the topic of the next chapter in this book), and it is not the primary purpose of this book to cover this topic comprehensively. So, only a brief summary of the field will be presented in this chapter; however, some of the most recent and important volumes written in this field will be provided in the References section, for any readers wanting to pursue this area in more detail.

### HOW DATA MINING AND TEXT MINING RELATE TO MEDICAL INFORMATICS

Knowledge management, data mining, and text mining have come into the mainstream of business during the past 10 years, and their full implementation into health care delivery is crucial to bring the efficiencies in cost and accuracy that are so badly needed. Medical informatics data are usually structured, factual, numeric, and historical. These data contain textual data referred to as “unstructured,” in that they do not consist of numbers or codes that can be contained in a database. But these data are factual and are every bit as important...