

Optical Fingerprinting to Protect Data: A Proposal pp. 23-28

Nachiketh R. Potlapally

The pervasive use of optical discs—the preferred media for storing and distributing digital information—is motivated by their low cost, versatility, and durability. Unfortunately, circuit technology advances have made it easy to create high-fidelity copies of these discs. The trend toward progressive ease of disc copying has spawned a burgeoning parallel economy based on illegal software copying and merchandizing.

Thor is a proposed security scheme to prevent unauthorized disc duplication and illegal use of the data. Thor relies on a combination of software and hardware strategies using time-tested cryptographic algorithms to provide resistance to tampering and malicious operations.

Training for Information Assurance pp. 30-37

Donald Welch, Daniel Ragsdale, and Wayne Schepens

The US is at great risk from terrorist manipulation of the intangible bits and bytes of cyberspace. US military institutions are already preparing for cyberspace terrorism and warfare by educating cadets in information assurance. In January 2000, the US Military Academy at West Point created an information assurance course that centers on a competitive, hands-on defensive project: protect a real network from real attack.

This project forced the cadets to pull together what they know theoretically and apply it to a real network under attack *without* risking the damage that mistakes would cause on a live network. The authors encourage other organizations to follow their lead by conducting similar competitive exercises.

Large-Vocabulary Speech Recognition Algorithms pp. 42-50

Mukund Padmanabhan and Michael Picheny

Providing the computer with a natural interface, including the ability to understand human speech, has been a research goal for almost 40 years. Practical versions of such systems have become moderately usable and commercially successful only in the past few years, however.

To date, statistical modeling techniques trained from hundreds of hours of speech have provided most speech recognition advancements. Although it may appear that we have far to go before these systems can match human performance, if researchers maintain the current rate of yearly progress in reducing word error rates, that objective should be within reach in less than a decade.

Automated Natural Spoken Dialog pp. 51-56

Allen L. Gorin, Alicia Abella, Tirso Alonso, Giuseppe Riccardi, and Jeremy H. Wright

Traditional menu-driven speech recognition systems force users to learn the machine's jargon, but many people can't or won't navigate such highly structured interactions. AT&T's "How May I Help You?" technology shifts the burden to the machine by requiring it to adapt to human language and understand what people actually say rather than what a system designer expects them to say.

For a given task, it is more crucial to recognize and understand some linguistic events than others. The authors have developed algorithms that automatically learn the salient words, phrases, and grammar fragments for a given task far more reliably than other methods.

From Multimedia Retrieval to Knowledge Management pp. 58-66

Pedro J. Moreno, J-M. Van Thong, Beth Logan, and Gareth J.F. Jones

Despite recent advances, multimedia use in knowledge management remains largely limited to retrieval systems. Multimedia data introduces several challenges to KM systems, including the uncertainties associated with media analyzers and the need for good scalability and effective user interfaces. Architectures capable of handling system complexity will also play a crucial role in deploying multimedia-based KM solutions.

The prospects for fully exploiting multimedia content are promising. Given current trends in audio and video analysis, multimedia storage and distribution over the Internet, developments in XML representations, and integration with knowledge portals, the authors expect multimedia data to become truly pervasive.

Software System Engineering: A Tutorial pp. 68-73

Richard H. Thayer

Software, the dominant technology in many technical systems, often provides the cohesiveness and data control that enable a complex system to solve problems. Yet the vast majority of large software systems do not meet their projected schedule or estimated cost, nor do they completely fulfill the system acquirer's expectations.

The application of system engineering principles to software development produces activities, tasks, and procedures called *software system engineering*, or SwSE—a distinct and powerful tool for managing the technical development of large software projects. This tutorial integrates the definitions and processes from the IEEE software engineering standards into the SwSE process.