

Data Mining in E-Learning

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A book probably more suitable for educators than computer folks, this is a collection of both solicited and invited papers by international authorities in the intersection of data mining (DM) and electronic learning. Its goal is to provide a first glimpse at how DM can proceed in the arenas of Distance Learning (DL), Computer Based Teaching (CBT), Computer Aided Instruction (CAI), and the most recent, Life Long Learning (LLL). In a series of sixteen articles (chapters), the book lays out how DM can assist e-learning through recent research and case studies of best practice.

Modern on-line learning has transcended traditional delivery, either personally or by mailman/delivery company, that was print cost-effective, as well as CAI, CBT, and integrated learning centers with their use of interactive multimedia, laser discs, and CDs. Internet technologies have emerged as the more prominent form of delivery for data, information, and knowledge. The reasons are myriad, but obviously include accessibility, affordability, and maintainability, features unquestionably crucial for the vast educational community.

However, too often lacking in e-learning systems development and evolution has been a comprehensive evaluation of the hows and whys. Quite simply, what is often unknown and only merely speculated, is which of the more widely used methods and techniques are the more successful, and exactly how do specific knowledge products contribute to the learning process.

So-called "distance education" was among the first to adopt Web technologies for information sharing and course delivery. Environments such as Web-CT and Virtual-U were early providers of virtual lesson planning and workspaces, content structures, testing modules, grade reporters, and other pedagogical tools.

It is now recognized that e-learning further requires the means to summarize and classify learner trends and patterns. One serious candidate solution is DM, already quite successful in e-commerce and bio-informatics, where results are achieved through the use of associators, classifiers, clusterers, pattern analyzers, and statistical tools.

Since the mid-90's, e-learning has epitomized a broad range of learning categories while reinforcing four major pedagogical perspectives often neglected during e-learning system development. First, insight from cognitive learning processes can shed light on how the brain functions. Second, emotional aspects of learning can be traced, such as interest, motivation, interaction, fulfillment, and enjoyment. The third perspective incorporates skills and behaviors, such as role-playing, that are particularly useful in real settings. Lastly, a social perspective involving the interaction with other people permits a focus on collaborative discovery, namely, the interplay of peer pressure and support.

Twelve case studies range over DM for navigational behavior, e-textbook construction, e-tutoring, and the marketing of e-learning. E-learning system examples include ATutor, Blackboard, ILIAS, and Moodle, indicating transitions from a social-constructivist pedagogy towards more student-centered learning solutions. Further detailed is a blended e-learning approach incorporating online lectures, tutorials, performance and decision support systems, simulations and games, and more. Delineated devices include not only desk and laptops, CDROMs, and PDAs, but also TVs, MP3 players, and cell phones. It is clear that communication strengthens usage of browsing, individual email, list-servers, and WIKIs, but also benefits from software for collaboration, classroom management, and team learning. DM software and systems are proposed and suggested to answer the important questions of how and why.

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