

# Structural and Navigational Analysis of Hypermedia Courseware

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**Index Terms**—Algorithmic analysis, courseware structure, educational hypermedia, hypermedia navigation.

## I. SUMMARY

In addition to providing flexible access to instructional information and supporting convenient learning styles, educational hypermedia offer a nonsequential information presentation that markedly differs from conventional instructional systems. Many pedagogical issues are attributed to the nonlinear structures of educational hypermedia systems. Consequently, an ideal educational hypermedia system should provide navigation guidance, knowledge construction assistance, and courseware analysis tools. By emphasizing courseware structure and navigational behavior in an educational hypermedia environment, this work presents several algorithmic analytical models of ideal educational hypermedia systems. Three graph algorithms and educational hypermedia analyses are used to identify courseware structures: minimum cut-set, strongly connected components, and cut vertex. The algorithms allow us to construct a knowledge hierarchy, analyze a courseware network to determine whether it is well-structured, and automatically generate a hierarchical guidance map to help users navigate in a hypermedia environment. This work also provides two quantitative measures, hyperdegree and hyperdistance, to further describe navigational behavior in hypermedia environments. These methods were applied to the data accumulated during instructional experiments.

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