SEMANTIC-ENHANCED WEB-PAGE RECOMMENDER SYSTEMS

A dissertation submitted for the degree of
Doctor of Philosophy in Computing Sciences

By

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CERTIFICATE OF ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

This thesis presents a new framework for a semantic-enhanced Web-page recommender (WPR) system, and a suite of enabling techniques which include semantic network models of domain knowledge and Web usage knowledge, querying techniques, and Web-page recommendation strategies. The framework enables the system to automatically discover and construct the domain and Web usage knowledge bases, and to generate effective Web-page recommendations. The main contributions of the framework are fourfold: (1) it effectively changes the fact that knowledge base construction must rely on human experts; (2) it enriches the pool of candidate Web-pages for effective Web-page recommendations by using semantic knowledge of both Web-pages and Web usage; (3) it thoroughly resolves the inconsistency problem facing contemporary WPR systems which heavily employ heterogeneous representations of knowledge bases. Knowledge bases in the system are consistently represented in a formal Web ontology language, namely OWL; and (4) it can generate effective Web-page recommendations based on a set of thoughtfully-designed recommendation strategies. A prototype of the semantic-enhanced WPR system is developed and presented, and the experimental comparisons with existing WPR approaches convincingly prove the significantly improved performance of WPR systems based on the framework and its enabling techniques.

Keywords: Web-page recommender systems, Web usage mining, domain knowledge modelling, knowledge representation, semantic network, semantic reasoning