



Cyprus  
University of  
Technology

Faculty of  
Engineering and  
Technology

**Doctoral Dissertation**

**Designing and Evaluating Intelligent Context-Aware  
Recommender Systems: Methodologies and Applications**

**Panayiotis Christodoulou**

**Limassol, December 2017**



CYPRUS UNIVERSITY OF TECHNOLOGY  
FACULTY OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF ELECTRICAL ENGINEERING, COMPUTER  
ENGINEERING AND INFORMATICS

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## Approval Form

Doctoral Dissertation

### Designing and Evaluating Intelligent Context-Aware Recommender Systems: Methodologies and Applications

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## **ABSTRACT**

This research introduces new concepts and methodologies for Recommender Systems aiming to enhance the user experience and at the same time to improve the system's accuracy by dealing with the challenges of RS. The thesis and the corresponding research is structured in three main parts. The first part of this thesis concentrates more on the development of new Multi-criteria RS to improve the accuracy and performance of RS. Our study examines solutions on how to deal with data sparsity, scalability issues and the cold-start problem by utilizing various techniques. The second part deals with the classification prediction problem. We propose a new methodology for developing hybrid models to improve the accuracy of classification models and thus provide better recommendations. The final part introduces a Recurrent Latent Variable framework based on a variational Recurrent Neural Network that deals with data sparsity and uncertainty met on session-based recommendations and sequence-based data. Experimentation was performed in all three parts mentioned and the results demonstrated the validity of the proposed methodologies when compared with state-of-the-art methods.

**Keywords:** Multi-criteria Recommender Systems, Recommendations utilizing classification models, Session-based recommendations, Sequence-based data