

# User Modeling and Personalization

## Exam - Summer Term 2014

Eelco Herder

### Exam Content

#### **General remarks**

- The examination date is Wednesday 10 September 2014 at 16:00 in the Multimedia Hrsaal (3703-023).
- The exam is a written exam, to be filled out in one hour.
- The exam will be in English. Answers can be given in English or in German. You are allowed to make use of a dictionary.
- It is highly recommended that you bring a (non-graphical) calculator to the exam.

#### **Lecture 1: Adaptive Hypermedia**

- Definitions of hypertext and hypermedia
- Understanding of the concept of links and the functions that they serve
- Definition of adaptive hypermedia and knowledge on the process of adaptation
- Ability to mention at least two or three goals and application areas of adaptive hypermedia
- Ability to reason about common techniques for content-level and navigation-level adaptation
- Understanding of the four components of a logic-based adaptive hypermedia system
- Ability to interpret adaptation rules in basic second-order logic (as used in the slides) and to produce similar rules

- You do *not* need to memorize the structure of the example ‘Simple’ systems

## **Lecture 2: User Modeling - Introduction**

- Definition of a user model and the differences between explicit and implicit user modeling
- Ability to mention types of information that can be represented
- Survey knowledge on the process of the acquisition, inference and representation of user model data
- Ability to produce and work with stereotype user models (including triggers)

## **Lecture 3: User Modeling - Techniques**

- Ability to work with domain models and overlay models
- You are expected to understand the AHA! example, but you do not need to be able to reproduce specifics of the system
- Ability to read and write basic probabilistic formulas, including Bayes’ Theorem
- Ability to construct and work with Bayesian Networks and Joint Probability tables
- You do *not* have to memorize the derivation of the formulas

## **Lecture 4: User Modeling Frameworks and Interoperability**

- Survey knowledge on the advantages, requirements and services of generic user modeling frameworks
- Understanding of the basic properties of RDF triples and ontologies, survey knowledge on the use of linked data for personalization
- Understanding of the differences between the lingua franca (e.g. ontology) and conversion approaches for user modeling interoperability
- Knowledge on the concepts of form-based and tag-based (aggregated) user models
- You do *not* need to memorize the formulas for entropy, self-information or overlap

### **Lecture 5: Web Personalization and Web Usage Mining**

- Definition and applications of Web Usage Mining, and passing knowledge on the sources of Web Usage Data
- General knowledge on the basic steps of WUM: preprocessing, data cleaning, user and session identification, path completion
- Passing knowledge on the concept of client-side data collection
- Difference between a priori and conditional probabilistic methods, including the concepts of a Markov model
- Ability to produce and work with association rules, including the definitions of support and confidence

### **Lecture 6: Collaborative Filtering**

- Definitions of recommender systems and collaborative filtering and understanding of its purposes
- Survey knowledge on the process of acquiring user data for collaborative filtering
- Ability to perform user-based and item-based collaborative filtering with overseeable (paper-based) data
  - Formulas for similarity measures will be given during the exam, you do *not* need to memorize them
  - You are expected to be able to fill out user-item and item-item matrices and to generate recommendations

### **Lecture 7: Content-Based and Hybrid Recommender Systems**

- The definition of content-based recommender systems and the steps for content-based recommendation
- Understanding of the concept of utility-based recommenders
- Understanding of the steps of the information retrieval approach
  - You are expected to know the purposes of text preprocessing and term weighting
  - You do *not* need to memorize the similarity measures or the tf-idf formulas
- Ability to describe the basic functionality of the four hybrid recommender systems discussed in the slides

## Lecture 8: User Evaluation of Adaptive Systems

- Passing knowledge on techniques for requirement analysis and preliminary and final user evaluation
- Understanding of the purposes of observational methods
- Knowledge on the steps for carrying out and reporting controlled experiments
  - This includes knowing the difference between dependent and independent variables, and the differences between between-group and repeated measure experiments
- Passing knowledge on how to collect the user's opinion and how to observe the user
- Difference between descriptive statistics and inferential statistics
- Understanding the characteristics of a normal distribution, ability to calculate the mean, median or mode
- Knowledge of the purposes of correlation measures and the existence of non-parametric tests
- Understanding the difference between systematic and unsystematic variation and the concepts behind the dependent and independent t-tests (you do *not* need to memorize the formulas)
- Passing knowledge on key issues in the evaluation of adaptive systems

## Lecture 9: Evaluation of Adaptive Systems

- Knowledge on the purposes of formative and summative evaluation
- Passing knowledge on the steps of layered evaluation and the ability to reason about individual evaluation steps
- Passing knowledge on the advantages and disadvantages of dataset-based evaluation
- Ability to work with the Precision and Recall measures (these will not be given during the exam)
- Ability to interpret and reason about the F-measure, P@k, S@k and mean reciprocal rank (formulas will be given, when appropriate)
- Understanding of the differences between the three correlation measures (you do *not* need to memorize them)

### **Lecture 10: Information Foraging and Web Navigation**

- Passing knowledge on the main concepts of information foraging (patches, information scent, diet selection) and their purposes (you do *not* need to memorize formulas or specific details of the examples)
- Survey knowledge on the different types and purposes of (Web) links)

### **Lecture 11: Human-Computer Interaction**

- Passing knowledge on the concept and aspects of usability
- Survey knowledge on (Gestalt) principles of form perception (you do *not* need to memorize them)
- Survey knowledge on memory models and the causes of human errors
- Ability to reason about generic usability issues (you do not need to memorize or refer to the Golden Rules)

### **Lecture 12: Personalization and Privacy**

*This lecture will NOT be part of this year's exam, as there were not sufficient lecture slots.*