

Information Search and Retrieval
Exam Projects

Academic Year: 2014-2015



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Project



- ❑ The project is conducted in **small groups** (2 students)
- ❑ Design an innovative information search and advisory system in a given **application scenario** (e.g. bikes, courses, music, events, eGov., group travel, etc.)
- ❑ Tackle (at least) one specific **technical issue** among those listed afterwards in this presentation
- ❑ **Choose** the application scenario and the technical issue that you find more interesting, challenging and significant
- ❑ The project results include:
 - a written **report**
 - and **optionally** a system **prototype**
- ❑ It is not required to fully implement the proposed **system**, just focus on the core functionality and provide a user interface for it.

Structure of the report

1. *Abstract*
2. *Introduction*: Description of the selected application problem and tech issues that you have tackled
3. *Related Work*: survey relevant information search applications and techniques (read and quote **at least** 3-4 specific papers including those recommended)
 - Critical **evaluation/comparison** of the pros and cons of the techniques presented in the papers and in the course with respect to the selected problem
4. *System Description*: description of the proposed system functions and GUI design
5. *Technologies*: description of the **core techniques** (to be) used in the prototype and how they must be applied
6. *Evaluation Strategy*: Describe how you will evaluate the system/ techniques
7. *Conclusion and future work*

Use [Springer LNCS format](#) – max 12 pages

How the project will be evaluated



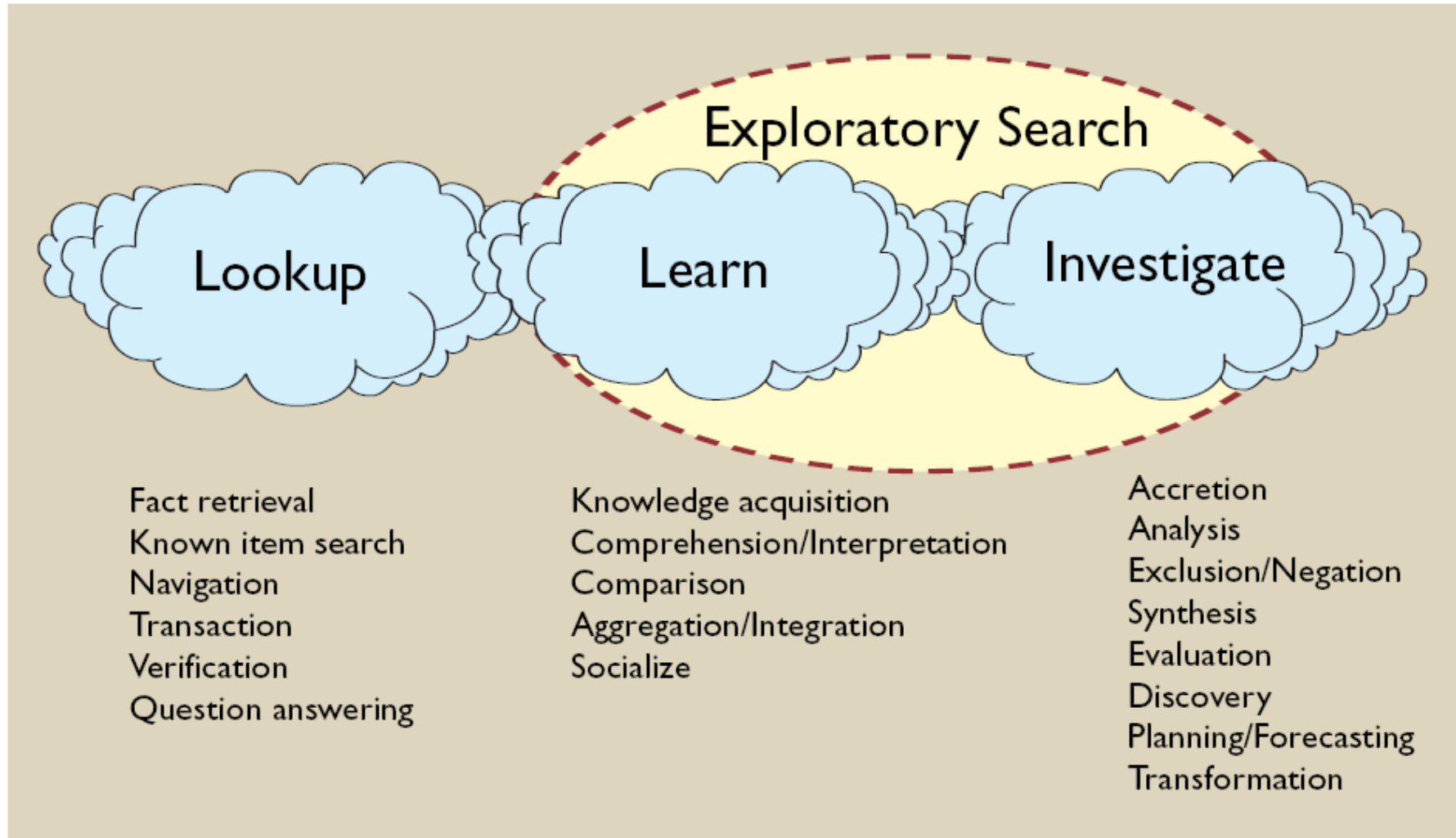
- ❑ The report **must follow the defined structure** (see a previous slide)
- ❑ The report must be **clearly written**
- ❑ The proposed functions and techniques must be **novel, significant and sound**
- ❑ The report must show that you have **deeply investigated** the problem (*consider alternative solutions*)
- ❑ The **system** idea should be enough developed to show some of the potential benefits for the users
- ❑ The presentation must be **understandable and raise the audience attention**
- ❑ The presenters must be **able to reply** to the questions of the other participants.



System Functions

- ❑ Identify some system functions (3/4) – a **core set**
- ❑ Functions should support **user needs** – *think about users not what could be done from a tech viewpoint*
- ❑ You *may* consider to categorize the needs in: **lookup, learn, investigate**
- ❑ Selects a **small subset** of these needs (even only one) – not yet addressed - and identify the techniques and GUI for supporting them
- ❑ *For instance*
 - **Learn-Comparison**
 - A tool for comparing different interpretations (CDs) of the same music composition (e.g. Ravel's string quartet)
 - Comparison is performed feature by feature – so features should be identified ...

Exploratory Search



[Marchionini, 2006]

Application Domain

- These are only some **suggestions** – feel free to select what you prefer and double check that it matches well the selected tech issue (see next)
 - Travel and Tourism
 - Mobile Applications (market)
 - Music
 - News
 - Books
 - Courses
 - Dating
 - Groups (e.g. in Google groups)
 - Digital cameras

Projects in IDSE

❑ **Food recommender for a family**

- Design the conversational user interface that enables users to tell what they have eaten, what they like to cook and eat, what they have in the fridge and recommends new recipes to cook now.

❑ **Points of interest push recommendation**

- Design a solution for using preferences and activity data coming from sensors (GPS, accelerometer) to build a user profile and push points of interest recommendations in a novel city.

❑ **Lifelogging for recommendations**

- Design a recommender system that may use lifelog data for profiling you and suggesting activities (music, bars, ecc.) that suit your lifestyle.

Tech issues

- These are technical features that are important, still difficult to tackle, and have received some attention in the scientific literature
 - Context-awareness
 - Personalization
 - Novelty
 - Diversity
 - Sequencing
 - Groups of users
 - Cold-start problem
 - Conversational
 - Preference elicitation
 - Implicit feedback

Group Recommendations

- ❑ People often listen to music, watch movies, or eat in groups
- ❑ A group recommendation must be adapted simultaneously to all the users in the group
- ❑ How to build an optimal recommendation? What is the meaning of optimality?
 - A. Jameson and B. Smyth. Recommendation to groups. In *The Adaptive Web*, 596–627, Springer, 2007.
 - J. Masthoff: Group Recommender Systems: Combining Individual Models. *Recommender Systems Handbook 2011*: 677-702. 2011
 - M. O'Connor, D. Cosley, J. A. Konstan, J. Riedl: PolyLens: A recommender system for groups of user. *ECSCW 2001*: 199-218, 2001
 - L. Baltrunas, T. Makcinskas, and F. Ricci. Group recommendations with rank aggregation and collaborative filtering. In *RecSys '10: Proceedings of the 2010 ACM conference on Recommender Systems*, 119–126, 2010.

Context-Awareness

- The relevance of an item (information) may depend on the search context: user location, time, previous searches, etc.
- Modelling context and effectively exploiting it in a system is still an unsolved problem
- Literature
 - G. Adomavicius and, A. Tuzhilin. Context-Aware Recommender Systems. In *Recommender Systems Handbook*, 217–256. Springer Verlag, 2011.
 - L. Baltrunas, B. Ludwig, S. Peer, and F. Ricci. Context relevance assessment and exploitation in mobile recommender systems. *Personal and Ubiquitous Computing*. 2011.
 - M. Gorgoglione, U. Panniello, A. Tuzhilin: The effect of context-aware recommendations on customer purchasing behavior and trust. *RecSys 2011*: 85-92. 2011.
 - R. W. White, P. N. Bennett, S. T. Dumais: Predicting short-term interests using activity-based search context. *CIKM 2010*: 1009-1018, 2010.

Novelty and Diversity

- ❑ Results produced by an information retrieval system can be optimized in term of their novelty and diversity
- ❑ What is a correct model for these concepts?
- ❑ How one can achieve both novelty, diversity and maximize relevance?
- ❑ Literature
 - S. Vargas, P. Castells: Rank and relevance in novelty and diversity metrics for recommender systems. RecSys 2011: 109-116. 2011
 - C-N. Ziegler, S. M. McNee, J. A. Konstan, G. Lausen: Improving recommendation lists through topic diversification. WWW 2005, Chiba, Japan, 22-32. 2005.
 - Gediminas Adomavicius, YoungOk Kwon: Improving Aggregate Recommendation Diversity Using Ranking-Based Techniques. IEEE Trans. Knowl. Data Eng. 24(5): 896-911 (2012)

Bootstrap – Cold Start

- ❑ A personalized information search system initially may have no information about user preferences
- ❑ How explicit evaluations (ratings) can be effectively acquired?
- ❑ Literature
 - N. Rubens, D. Kaplan, M. Sugiyama: Active Learning in Recommender Systems. Recommender Systems Handbook 2011: 735-767. 2011
 - M. Elahi, V. Repsys, F. Ricci: Rating Elicitation Strategies for Collaborative Filtering. EC-Web 2011: 160-171. 2011
 - Shuo Chang, F. Maxwell Harper, Loren G. Terveen: Using Groups of Items to Bootstrap New Users in Recommender Systems. CSCW 2015: 1258-1269
 - Benedikt Loepp, Tim Hussein, Jürgen Ziegler: Choice-based preference elicitation for collaborative filtering recommender systems. CHI 2014: 3085-3094

Implicit Feedback

- ❑ A system may derive an implicit feedback on the items shown by observing user actions: clicking, reading, listening
- ❑ Can a better prediction of item relevance be based on implicit signs?
- ❑ Literature
 - T. Joachims, F. Radlinski: Search Engines that Learn from Implicit Feedback. IEEE Computer 40(8): 34-40 (2007)
 - D. Parra, X. Amatriain: Walk the Talk - Analyzing the Relation between Implicit and Explicit Feedback for Preference Elicitation. UMAP 2011: 255-268. 2011.
 - G. Jawaheer, M. Szomszor, Patty Kostkova: Characterisation of explicit feedback in an online music recommendation service. RecSys 2010: 317-320. 2010.
 - J. Teevan, S. T. Dumais, E. Horvitz: Potential for personalization. ACM Trans. Comput.-Hum. Interact. 17(1): 2010.

Conversational preference elicitation

- ❑ Rarely users can express their preferences in one shot
- ❑ Preferences are built while interacting with the system – available items may suggest new preferences
- ❑ Literature
 - L. McGinty, J. Reilly: On the Evolution of Critiquing Recommenders. Recommender Systems Handbook 2011: 419-453. 2011.
 - T. Mahmood, F. Ricci: Improving recommender systems with adaptive conversational strategies. Hypertext 2009: 73-82. 2009.
 - C. A. Thompson, M. H. Göker, P. Langley: A Personalized System for Conversational Recommendations. J. Artif. Intell. Res. (JAIR) 21: 393-428 (2004)

Sequence of Recommendations

- ❑ Recommendations often are produced as a sequence of suggestions – e.g., a music compilation or a study plan
- ❑ How to optimize the full sequence, i.e., how to determine the best recommendations, given the previous history, or to build an optimal compilation?
- ❑ Literature
 - G. Shani, D. Heckerman, R. I. Brafman: An MDP-Based Recommender System. *Journal of Machine Learning Research* 6: 1265-1295 (2005).
 - C. Baccigalupo, E. Plaza: A Case-Based Song Scheduler for Group Customised Radio. *ICCBR 2007*: 433-448. 2007.
 - E. Pampalk, T. Pohle, G. Widmer: Dynamic Playlist Generation Based on Skipping Behavior. *ISMIR 2005*: 634-637. 2005.
 - Omar Moling, Linas Baltrunas, Francesco Ricci: Optimal radio channel recommendations with explicit and implicit feedback. *Sixth ACM Conference on Recommender Systems, RecSys '12*, Dublin, Ireland, September 9-13, 2012: 75-82.

Instructions

- ❑ Compose a group of 2 students
- ❑ Select an application domain, a couple of core functionalities where one of the mentioned tech issues is relevant
- ❑ Report to me your ideas and schedule a meeting
- ❑ Download the quoted papers
- ❑ Read the suggested papers (or others that I will suggest in the meeting) for the selected specific tech issue
- ❑ Search for more:
 - Systems on that domain
 - Articles on that tech issue (and possibly on your selected app. domain)
- ❑ Prepare a 2 pages abstract and a short presentation
 - To be presented in 2 weeks (after Easter)