

AVATAR: AdVAnced Telematic search of Audiovisual contents by semantic Reasoning

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Motivation of TV Recommender Systems

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- Main contributions
- Reasoning Framework: Ontology and Query Language
- Reasoning Framework: The User Profiles
- Reasoning Framework: Semantic Inference
- Main design decisions
- The architecture
- Final reflexions

- Migration from analogue to digital TV.
- Implications:
 - ◆ More channels in the same bandwidth.
 - ◆ Software applications mixed with audiovisual contents.
- Disoriented users among large amount of irrelevant information.
 - ◆ User cannot use this new type of TV efficiently.
 - ◆ Necessary tools to find interesting TV programs



Main contributions

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- Existing TV recommenders use different inference knowledge strategies:
 - ◆ Bayesian techniques
 - ◆ Decision trees
 - ◆ Content-based methods
 - ◆ Collaborative filtering
 - ◆ ...
- A common drawback related to reasoning capabilities.
- Main novelty of AVATAR is a reasoning process on the user preferences and TV contents.
- Our approach is based on the experience gained in the Semantic Web → a reasoning framework



Reasoning Framework: Ontology and Query

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- OWL ontology for representing the knowledge of the TV domain.
 - ◆ Population by means of databases that store abundant information about TV scheduling (*www.imdb.com*)
 - ◆ Specific instances over which our semantic reasoning process is applied.
- A language for browsing the hierarchical structure defined in the ontology → LIKO:
 - ◆ To extract properties with constraints related to their range or domain.
 - ◆ Superclasses (superproperties) referred to an given class (property)



Reasoning Framework: The User Profiles

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- User profiles store TV viewer's preferences and his personal data
- User modeling by ontologies → ontology-profiles
- OWL ontologies built incrementally as AVATAR receives information about the user's viewing behavior.
- Focus on a semantic matching process applied over the *ontology-profiles*
 - ◆ The goal is to reuse recommendations previously elaborated for user with similar preferences.
 - ◆ To use the knowledge of the TV ontology, beyond a syntactic comparison → *semantic similarity*



Reasoning Framework: Semantic Inference

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- A classification of semantic relations among instances contained in our ontology
- Implicit relations are inferred from the properties declared explicitly → *inference algorithms*
 - ◆ Input: instances stored in the user *ontology-profile*
 - ◆ Output: set of implicit semantic relations ranked according to the data known about the user
 - Such ranking process extracts the most significant relations is required → personalized recommendations



Main design decisions: Used Standards

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- Standardization promotes an extended use of the proposed system:
 - ◆ *TV-Anytime*: A recent ETSI standard that normalizes descriptions of TV contents and instances
 - ◆ *Multimedia Home Platform* (MHP): A generic interface between interactive digital applications and the user terminals



Main design decisions: MHP applications

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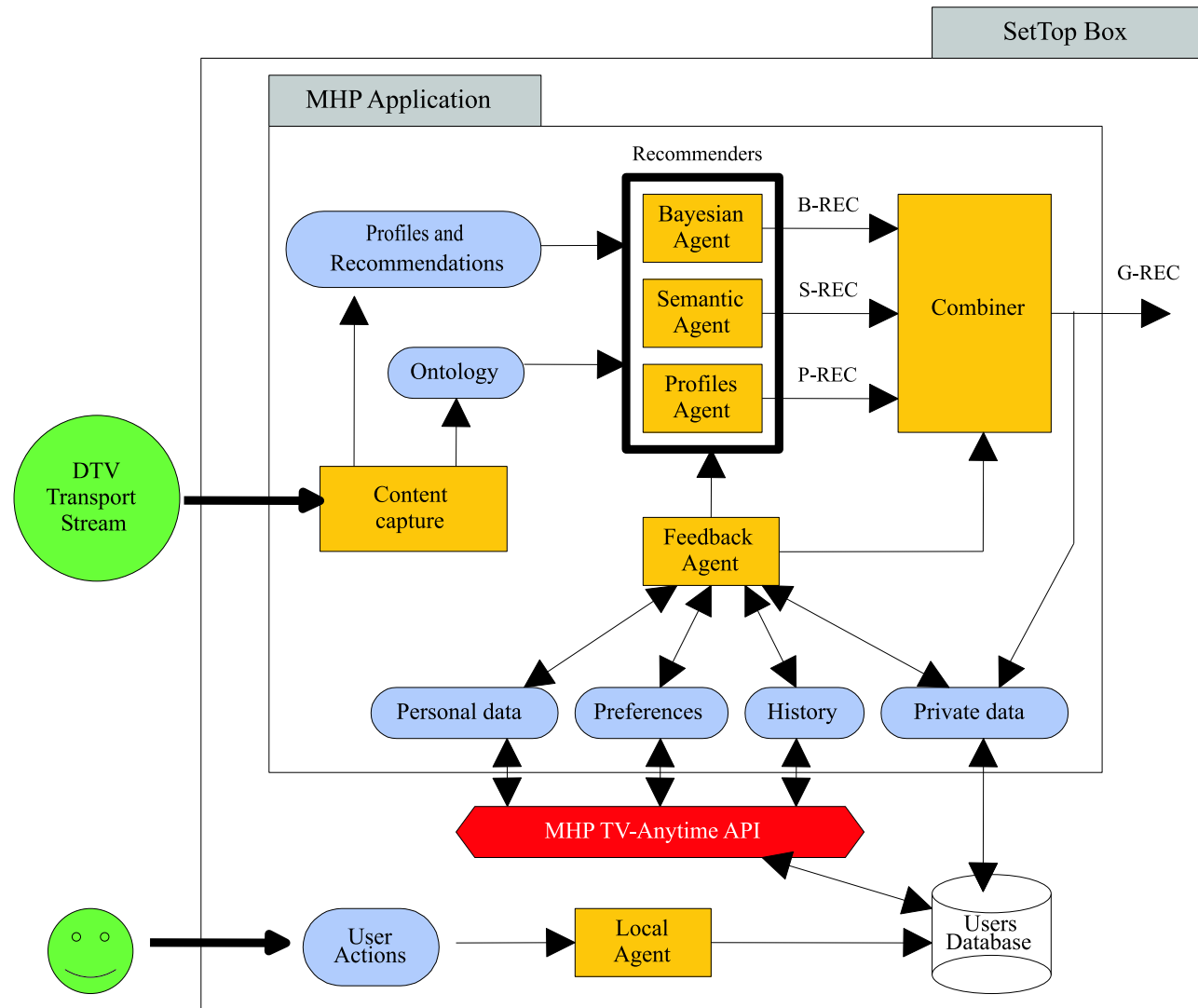
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- AVATAR: a set of MHP applications tuned in the user's receiver (*Set Top-Box* or STB)
- MHP defines applications run in the context of a service or an event
- These applications do not survive when the context finishes. We need:
 - ◆ To record the user's actions all the time → *local agent*
 - ◆ To access the information stored by the local agent → new MHP API called *MHP TV-Anytime API*



The architecture

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Some reflexions about AVATAR (I)

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- AVATAR improves the personalized recommendations by reasoning and diversification processes
 - ◆ *Diversification*:
 - Inference of implicit relations among instances from the explicit properties in the ontology
 - These relations are not detected by conventional recommendation approaches
 - ◆ *Personalization* is ensured:
 - Relations between the user's favorite programs and other instances contained in the system knowledge base
 - Ranking process applied over the inferred relations based on the user *ontology-profile* and the TV ontology



Some reflexions about AVATAR (II)

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- Approach easily generalizable to other Semantic Web applications
 - ◆ It is only necessary to conceptualize the new application domain by an ontology on which our semantic reasoning approach can be applied



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Thank you for your attention