Towards Portable Shopping Histories:

Using GoodRelations to expose ownership information to e-commerce sites

Laszlo Török and Martin Hepp

#eswc2014Torok

Motivation

- Recommender systems' performance depends on accuracy and completeness of user preference profiles
- Users lack tools to capture, manage and share their preferences with e-commerce websites

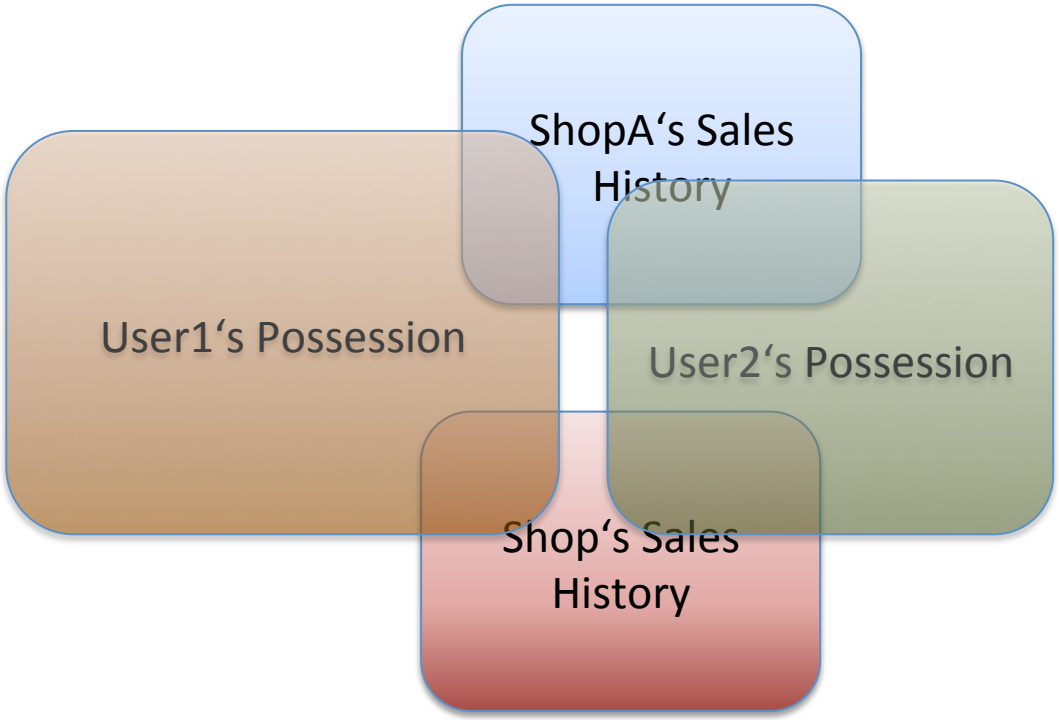
Assumption

*Granular **item ownership information** (IO) is a good indicator of a user's product preferences.*

But:

- Purchase records are not exposed as structured data to the users
- There is no standard way of representing item ownership information
- There is no protocol for communicating item ownership information to e-commerce sites

Item ownership information vs. purchase history



Shortcomings of purchase histories

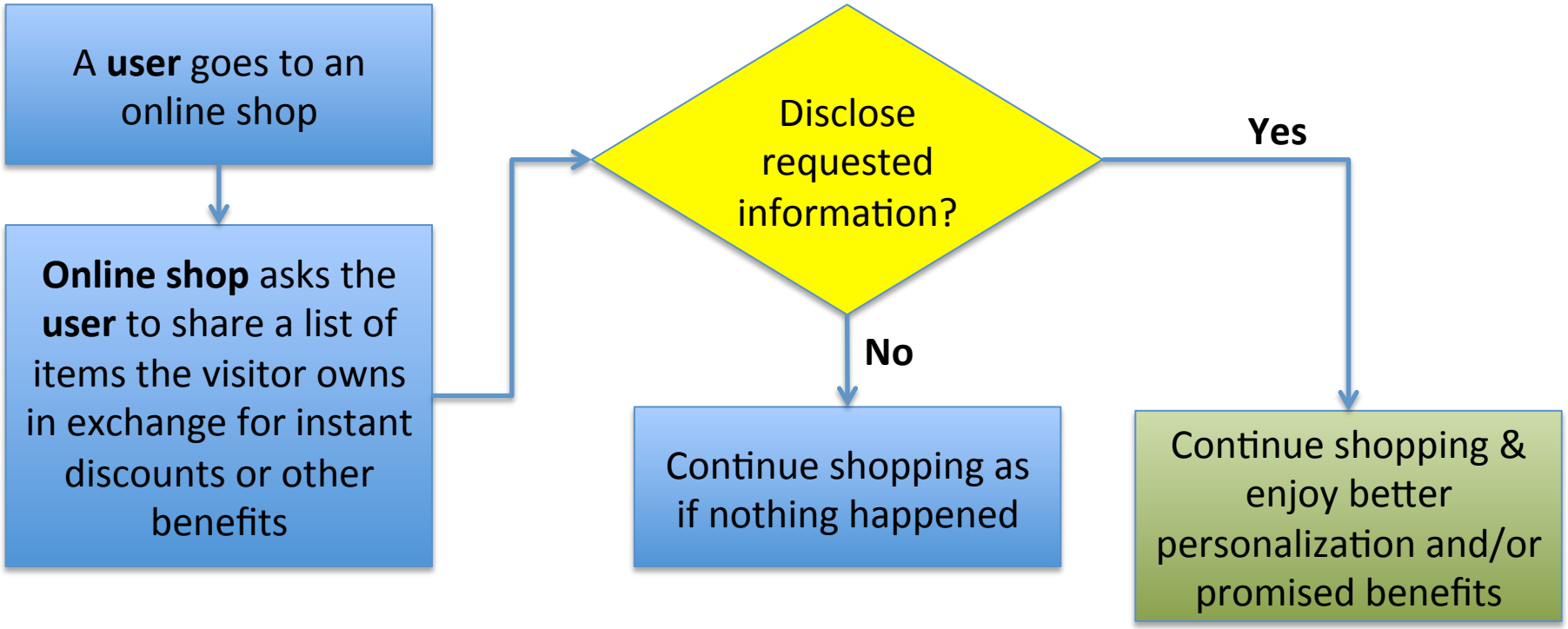
- Intent of purchase is not captured (e.g. personal use vs. gift)
- Most shops only have small subset of a user’s (online) purchase history

Our contribution

We provide

- A **model** based on GoodRelations and Schema.org to capture item ownership information
- A **protocol** to expose this information to web shops
- (Some) early indication of viability and relevance of our approach

Overview of the interaction flow

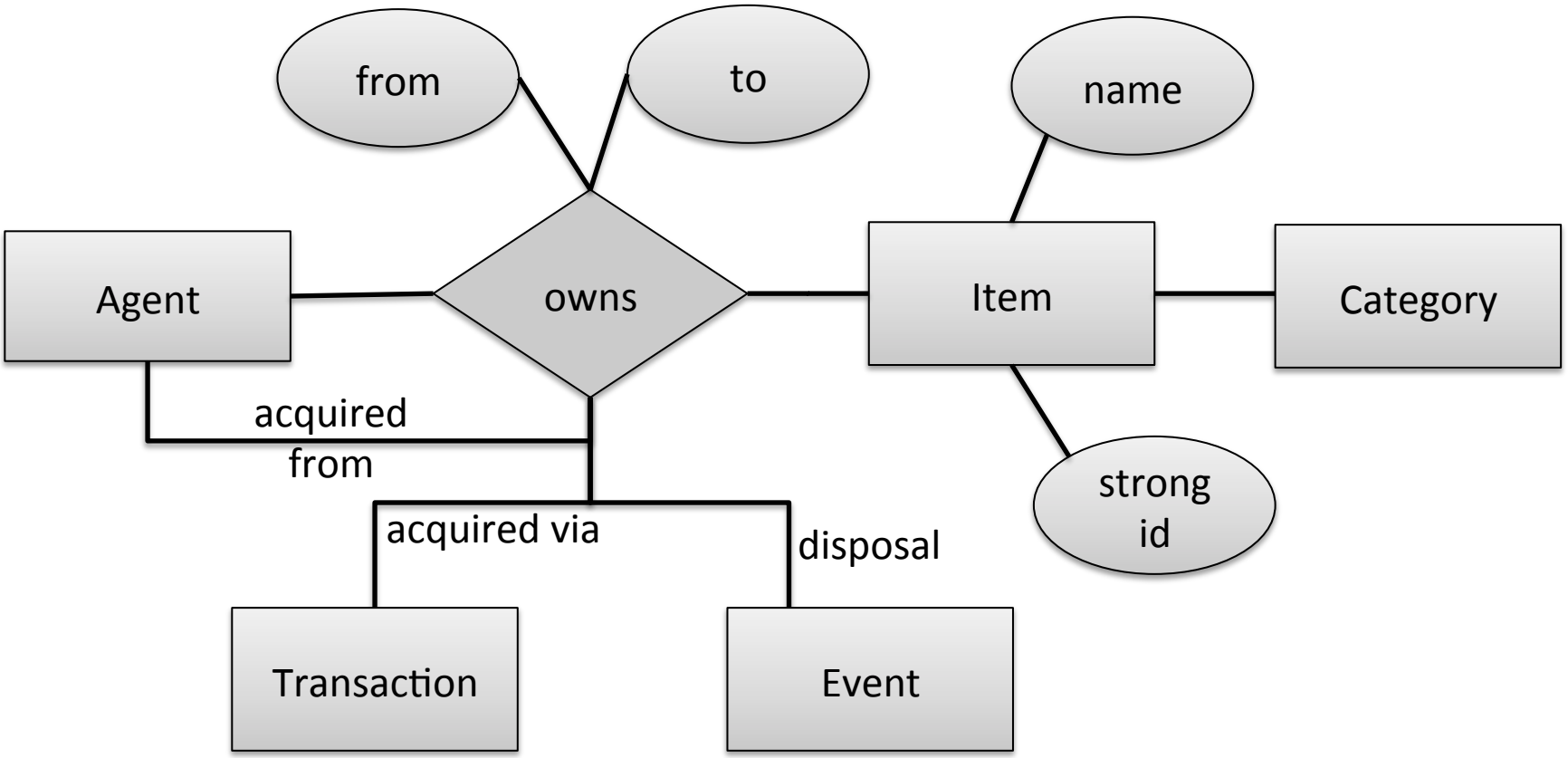


Data model - Competency questions

Our proposed data model is driven by a set of competency questions.

Q1: Which items does the user currently own?
Q2: Which items did the user ever own in the past?
Q3: During which period of time has a certain user owned a certain item?
Q4: Why has a user ceased to own a certain item? (e.g. sold, broken, superseded)
Q5: From whom did a user acquire a certain item?
Q6: How/for how much was the item acquired?
Q7: What class/category does the item belong to?

Data Model (ER)



Data model – Example in RDF/Turtle syntax

```
@prefix s: <http://schema.org>.
<http://alice.me/#i> s:owns [
    a s:OwnershipInfo;
       s:typeOfGood <http://alice.com/mylaptop>;
       s:acquiredFrom <http://amazon.com/#company>;
       s:ownedFrom "2011-11-09T00:00:00";
       s:ownedThrough "2013-10-01T00:00:00”].
```

Managing Item Ownership Information (IOI)

Collect IOI

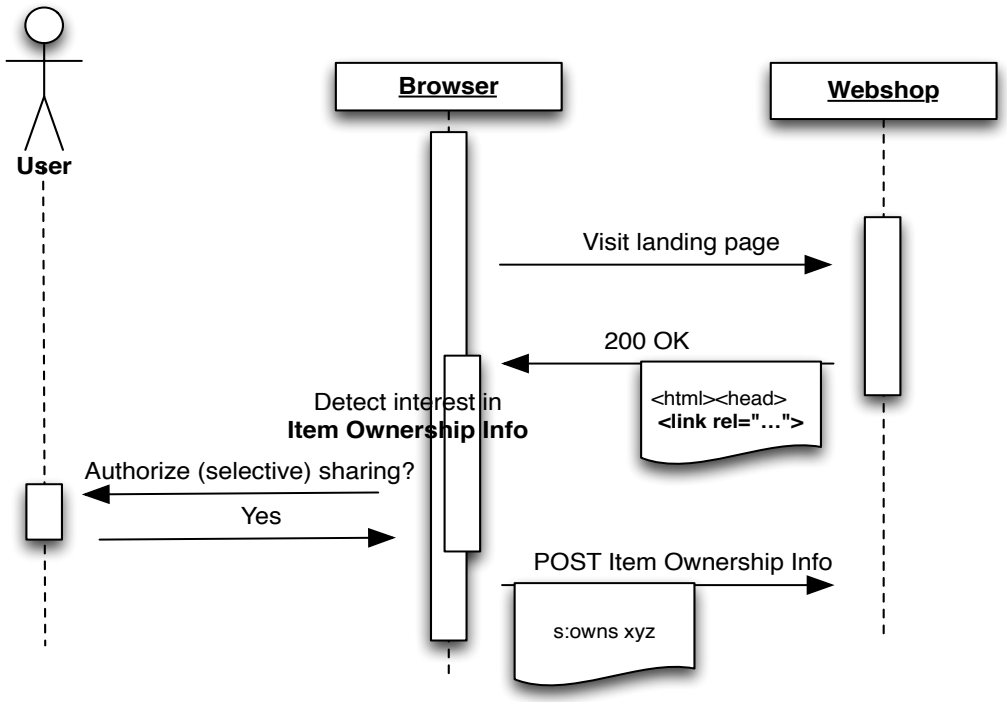
Trivial case: manual form-based entry

Semi-structured sources	Structured sources
scraping popular retailer's transaction history pages	Scan product pages for GoodRelations, Schema.org markup, parse structured purchase receipts

Store IOI

Local filesystem synced to a cloud storage

Sharing Item Ownership Information



Discovery -> Authorization -> Sharing

Product Recommendation Using IOI

IOI can likely improve the performance of popular collaborative filtering approaches.

We choose to implement **a rule-based** demonstration that better represent the enhancement in recommendations.

Prerequisites

Product database with recommendation ruleset

Steps of generating recommendations (our implemenation)

1. Request product ownership information.
2. Add it to the shop's database.
3. Run recommender rules formulated as SPARQL queries over the new, integrated knowledge base.

Successor Product Recommendation Using IOI

Recommend successor product to the product already in the user's possession

Relevant item ownership information sent to the shop

```
:me s:owns [
     s:typeOfGood :uphone3;
      s:ownedFrom "2012-12-24"].

:uphone3 s:gtin13 "0012345698969".
```

Shop's database

```
:uphone3 s:gtin13 "0012345698969".

:uphone4 s:successorOf :uphone3.

:uphone3 :avgProductLTMonths 24.
```

Successor Product Recommendation Using IOI

```
PREFIX gr:<http://purl.org/goodrelations/v1#>
PREFIX s: <http://schema.org/>
PREFIX : <http://myshop.com>
SELECT ?relatedItemName WHERE {
 VALUES ?strongIdProperty { s:gtin8 s:gtin13 s:gtin14 }
# use granular ownership information
 ?customer s:owns ?ownershipInfo.
 ?ownershipInfo s:typeOfGood ?itemOwned.
                s:ownedFrom ?dateOfAcq.
 ?itemOwned s:name ?itemName;
            ?strongIdProperty ?productId.

 ?itemShop ?strongIdProperty ?productId.

 ?relatedItem gr:successorOf ?itemShop;
           s:name ?relatedItemName;
           :rating ?rating.
           :avgProductLTMonths ?avgPLTMonths.
# recommend a successor product if the
# currently owned is "old"
BIND (YEAR(NOW())*12+MONTH(NOW())-
 YEAR(?dateOfAcq)*12 AS ?age)
 FILTER (?avgPLTMonths < ?age) }
 ORDER BY DESC(?rating)
```

Sparql recommender rule for finding successor products for the user

Relevance of item ownership information for improving product recommendations – Expert survey

		Owned items				
		Furniture	*Consumer electronics*	*Apparel*	*Sportswear & gear*	*Cosmetics*
Item to recommend	*Furniture*	4	3	2	1	0
	Consumer electronics	1	4	X	1	0
	Apparel	0	1	4	2	X
	Sportswear & gear	0	1	2	3	0
	Cosmetics	0	0	X	0	4

Likert scale scores used in the study: Helpful (4), Often helpful (3), Some- times helpful (2), Rarely helpful (1), Not helpful (0), No consensus (X)

Feasibility Study – User's Willingness to Share

Simulation-based study[1]

- Users were take to a shop website and were asked to reveal information about their owned items in different categories.
- They were offered different incentives (i.e. instant discount, free shipping) with a 50% probability.

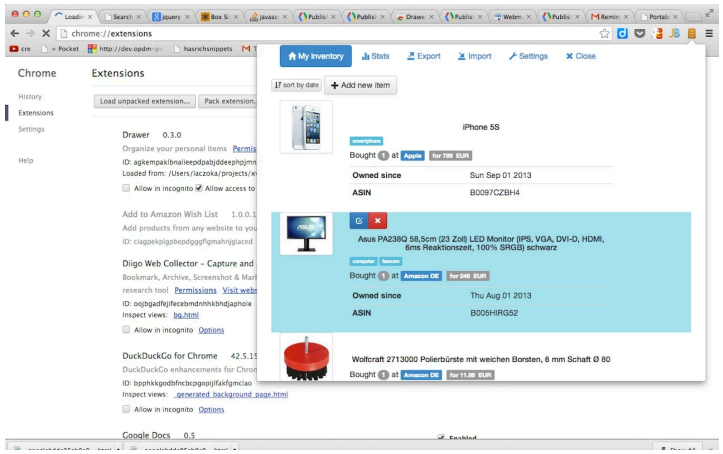
Results

- More 50% of the people were comfortable sharing items in all studied categories
- Subject were less likely to expose information about items that they perceived as more sensitive with regard to their privacy.

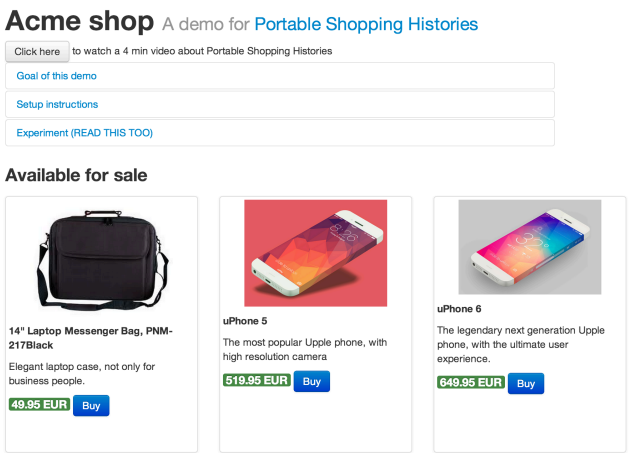
[1] http://help.portable-shopping-histories.info

Implementation

Prototype that demonstrates the basic protocol and the recommendation capability



User facing tool implemented as a Chrome Browser Extension



Demo Web shop

http://demo.portable-shopping-history.info/

And it is READY FOR YOU!

http://schema.org/OwnershipInfo

Thing > Intangible > StructuredValue > OwnershipInfo

A structured value providing information about when a certain organization or person owned a certain product.

Property	Expected Type	Description
Properties from OwnershipInfo		
acquiredFrom	Person or Organization	The organization or person from which the product was acquired.
ownedFrom	DateTime	The date and time of obtaining the product.
ownedThrough	DateTime	The date and time of giving up ownership on the product.
typeOfGood	Product	The product that this structured value is referring to.
Properties from Thing		
additionalType	URL	An additional type for the item, typically used for adding more specific types from external vocabularies in microdata syntax. This is a relationship between something and a class that the thing is in. In RDFa syntax, it is better to use the native RDFa syntax - the 'typeof' attribute - for multiple types. Schema.org tools may have only weaker understanding of extra types, in particular those defined externally.
alternateName	Text	An alias for the item.
description	Text	A short description of the item.
image	URL	URL of an image of the item.
name	Text	The name of the item.
potentialAction	Action	Indicates a potential Action, which describes an idealized action in which this thing would play an 'object' role.
sameAs	URL	URL of a reference Web page that unambiguously indicates the item's identity. E.g. the URL of the item's Wikipedia page, Freebase page, or official website.
url	URL	URL of the item.

Thank you!

#eswc2014Torok

Questions?

Contact
Laszlo Török (laszlo.toeroek@unibw.de)
Martin Hepp (martin.hepp@unibw.de)

Find more information at
http://portable-shopping-history.info/