

International Workshop on
Adaptation and Personalization for Web 2.0
in connection with
UMAP 2009, June 22-26, 2009, Trento, Italy



Balanced Recommenders: A hybrid approach to improve and extend the functionality of traditional Recommenders

Javier G. Recuenco, David Bueno

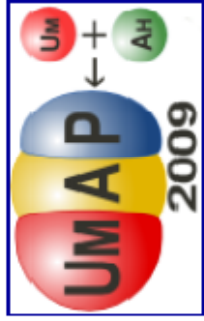


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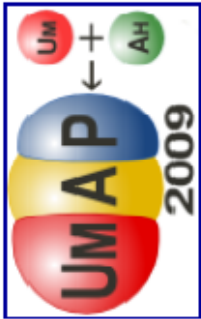
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Plan

- Introduction.
- Personalization: A Framework.
 - Hybrid Recommender
 - Top Relevance Algorithm
 - Product Profile Matching (PPM)
 - Self Fulfilling Capabilities
- Mirotele: A Balanced Recommender at Work.
- Conclusions and Future Work



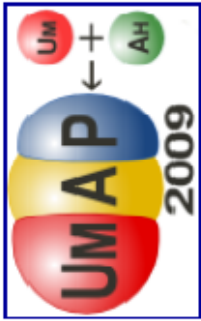
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Introduction

- Our view of “The Perfect Recommendation”:

“The result of ascertaining the exact desires of the individual using a recommender system, taking into account not only the knowledge of the whole network, but the particularities of the user AND the items available, which are relevant to the recommendation process”.



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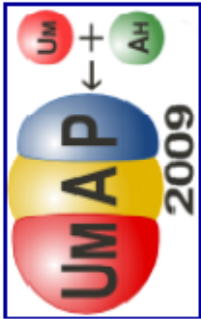


Introducción



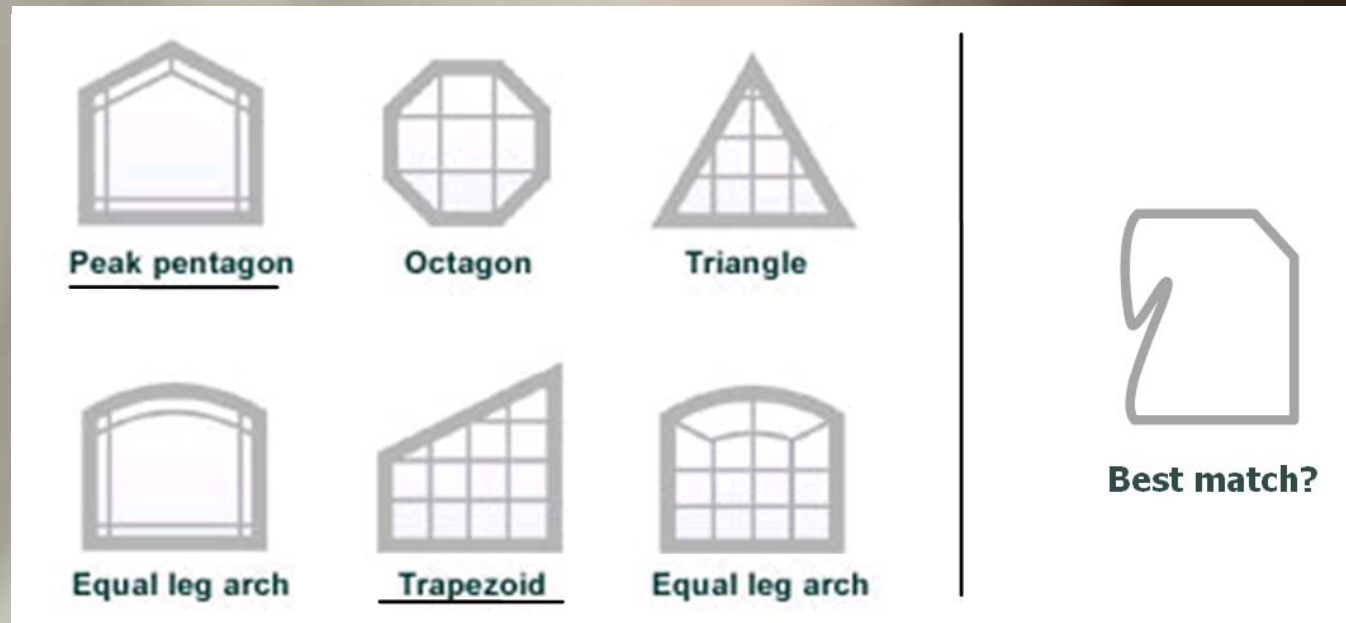
- Cold Start Problem.
 - There is no real way for a recommender to provide useful recommendations from the start without an initial recommendation from other users.
 - Alternatively the user should answer some questions in order to have an initial coarse grained user model.

Image from <http://www.flickr.com/photos/maradentro/>



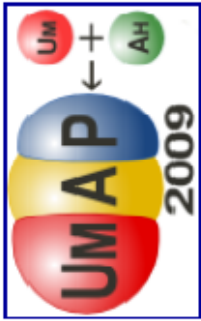
Introduction

- Classical approaches tries to fit users into stereotypes, clusters or user segments that try to classify users in a group in order to give them recommendations.



- Without the user help we hardly can model him. Why existing systems doesn't engage users to participate?

Personalization: A Framework



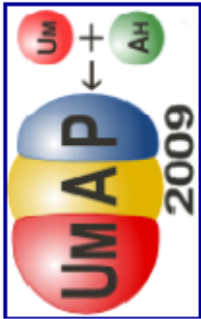
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A balanced recommender system is an approach which combines a recommender algorithm based on implicit, collective and behavioural data with a user's, explicit, user-centric and specific user model. The system uses additional tools and techniques provided to manipulate, enrich and fine tune the final recommendation.”

image from <http://www.flickr.com/photos/maradentro/>

Personalization: A Framework

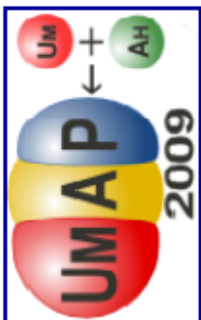


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Also the overall degree of involvement of the user in the creation of his/her profile has a significant impact on the quality of the final recommendation.

Image from <http://www.flickr.com/photos/maradentro/>



Hybrid Recommender

Collaborative Recommender

- Slope one

Content Based Recommender

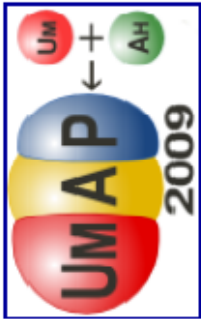
- Short/Long Term Model (WNBM,
- PPM (Fingerprinting)

Social Recommender

- Tags

we compute a weighted sum, where $\alpha + \beta + \varphi + \delta + \omega = 1$

$$R(\text{user}, \text{item}) = (\alpha R_{u,i}^{\text{short}} \beta R_{u,i}^{\text{long}}) \varphi R_{u,i}^{\text{collab.}} \delta R_{u,i}^{\text{tags}} \omega R_{u,i}^{\text{PPM}}$$



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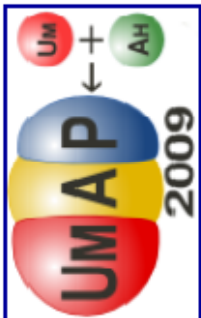


Top Relevance Algorithm

- Rankings are very common in many Web 2.0
Compare Products, Sort Blog Entries, Sort Products by different criteria Popularity
- But in many times the algorithms are very simple and can confuse the user
I.e. Using only the average of the user votes



Image from <http://marketingreview.web-log.nl/>



Top Relevance Algorithm

The first one in the ranking have only one vote!!

Propietario	Puntos	Comentarios	Guardados
ActivoBank	5.0	1	0
Uno-e	5.0	1	0
Caja Laboral	4.0	1	0
Bankinter	4.0	1	0
Caja Madrid	3.0	1	
Caja Duero	3.0	1	
Caja de Ahorros el Monte	3.0	1	
Uno-e	3.0	1	
Deutsche Bank	3.0	1	
Deutsche Bank	3.0	1	
IBANESTO	3.0	7	
Ing Direct	2.9	21	
Uno-E	2.8	5	
Bancopopular-e.com	2.7	3	
Banco Santander Central Hispano	2.5	2	
Banco Pastor	2.4	5	
Bancaja	2.3	3	

Media: 1	Media: 4
Web: 1	Web: 4
Interés: 1	Interés: 4
Gastos: 1	Gastos: 4

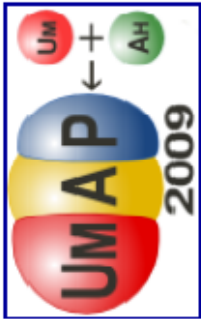
Propietario: Banco Santander Central Hispano
 Tipo: Interés variable (referenciado a un índice)
 Pago de intereses: Euribor a un año

Valoración Media: 2.5
 Información en la web: 2.5
 Tipo de interés: 2.5
 Gastos y comisiones: 2.5

$$ranking_i = Av(O_i)$$

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Top Relevance Algorithm

The first one in the ranking
have only two votes, and is
sorted by popularity!!

344 OFERTAS A 26 TIENDAS | presentación | ordenar por Popularidad

 zoom	iPhone 3G 8 Gb Negro artículo de segunda mano. Encabezamiento / Fabricante : Apple Disponibilidad: En stock Compara precios »	PRICEMINISTER 403,60€ (Inc. gastos de envío: 4,60€) Ir a la tienda
 zoom	iPhone 3G 8Gb Negro 8Gb memoria interna; Pantalla táctil 3.5"; Reproductor iPod Disponibilidad: En stock Compara precios »	DIGITAL COMPRING 577,62€ (Inc. gastos de envío: 8,62€) Ir a la tienda
 zoom	iPhone 3G 8GB Teléfono, iPod, Internet y mucho más... Las principales novedades de esta nueva versión del iPhone son:... Disponibilidad: En stock Compara precios »	ActivaGPS 635,95€ (Inc. gastos de envío: 8,95€) Ir a la tienda

Inicio > Tiendas > P > Ofertas populares, valoraciones e informaciones sobre Priceminister

PRICEMINISTER

El leader europeo de compra y venta garantizada con más de 10 millones de productos

PRICEMINISTER


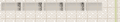



PUNTUACIÓN MEDIA DE LA TIENDA


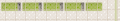



Puntuación global 
50% de los usuarios recomiendan esta tienda
Facilidad en el pedido: 
Disponibilidad: 
Entrega a tiempo: 
Atención al cliente: 
[Leer 2 Valoraciones »](#)
[Sobre las valoraciones »](#)

Información de la tienda

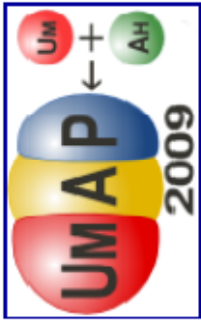
piensan los otros usuarios sobre Priceminister antes de realizar tu compra online.

La más reciente | Mostrar 10 por página

Puntuación general: 
Facilidad en el pedido: 
Disponibilidad: 
Entrega a tiempo: 
Atención al cliente: 
Tienda Recomendada: No

Puntuación general: 
Facilidad en el pedido: 
Disponibilidad: 
Entrega a tiempo: 
Atención al cliente: 
Tienda Recomendada: Sí

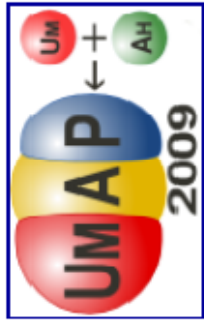
Web: <http://shopping.kelkoo.es/ctl/do/search?siteSearchQuery=iphone&fromform=true>



Top Relevance Algorithm

- We propose a ranking algorithm (justification on how we got to it in the paper)
- For information retrieval people, it's inspired on the IDF modifications proposed by Joachim
- Goals: **We wish to reflect an appropriate value for well evaluated newcomers but also respect those items evaluated many times.**
- It must take into account:
 - Number of evaluations of the item to rank: FO_i
 - The average of its evaluations: $Av(O_i)$
 - The total number of evaluations: $|evO| = \text{Sum}(FO_i)$

$$ranking_i = \frac{\sqrt{\frac{|evO|}{FO_i}}}{|evO| + 1} \times FO_i \times Av(O_i)^2$$

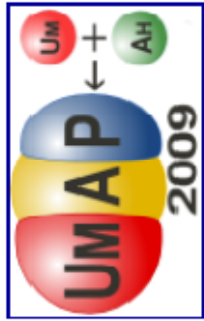


Top Relevance Algorithm

- Ranking using our algorithm

<u>Av(O_i)</u>	<u>FO_i</u>	<u>Square(eq.(4))</u>
5	40	10,5408205
5	20	7,45348565
4	40	6,74612512
4	10	3,37306256
5	3	2,88672258
2	100	2,66664009
2	10	0,84326564

- It can be used to:
 - Create top list (favorites, popular items...)
 - To tackle cold start problem
 - To have initial estimations if the Personal and Explicit Profile has no yet been Created



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AP
WEB 2.0
2009

Product Profile Matching

We understand PPM as a continuous process that involves the following elements:

- A detailed **User Explicit Profile** (usually considered the user model), regarding the specific domain that in each system is being covered.
- A **Product Item**, (which we can associate to something called the item model). This would involve the characteristics of the item relevant to the decision making process
- A complete detailed **Model of the Application** of both group A and B, which could predict individual affinity between the specific user profile and the item model, not on a cluster basis but on an individual basis.



image from <http://blogs.voices.com/voxdaily/>

Mirotele.com

A Balanced Recommender at Work



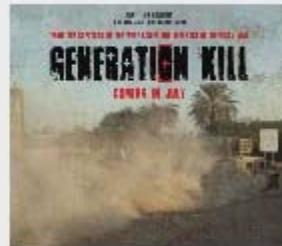
mirotele.com
Versión β ¡tienes el mando

BUSCADOR TV



Teletatrulla:
Emisión 33

[Leer más...](#)



Generation Kill:

Una bomba en el jardín
La Compañía Bravo alcanza la ciudad de Bagdad.

Mientras, el Comando First Recon empieza a realizar

[Leer más...](#)

Usuario:

Contraseña:

[¿Olvidaste tu contraseña?](#)



Iniciar sesión

[¿No eres miembro? crea tu cuenta](#)

1

DESCUBRE MIROTELE

2

REGÍSTRATE



martes 5 de mayo de 2009

martes 05

Todo el día

TDT

Código postal:



FOCICLISMO: ENTRENAMIENTOS

15:00 TELEDIARIO 1

16:00 CINE: PETER PAN, LA GRAN AVENTURA

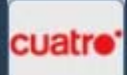


14:00 LOS SIMPSON

15:00 ANTENA 3 NOTICIAS
1 (FIN DE SEMANA)

15:50
PREVI
DE

16:00 EL SECUETRO DE MADELINE



PERVIVIENTE:
UNDO

14:25 NOTICIAS CUATRO

15:42 HOME CINEMA: ME GUSTAN LOS LÍOS



15:00 INFORMATIVOS
TELECINCO FIN DE SEMANA

16:00 CINE ON: UN AMOR POR DESCUBRIR



6 TÚ
14:15 LA SEXTA/
NOTICIAS

14:55 PADRE DE FAMILIA

15:55 FUTURAMA

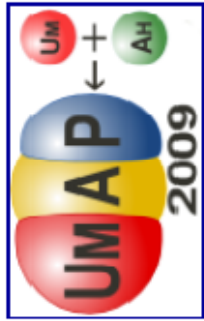
17:00

[¿QUÉ ES MIROTELE?](#)

[CONDICIONES LEGALES](#)

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[POLÍTICA DE PRIVACIDAD](#)



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Conclusions and Future Work

- Although our Balanced Recommenders incorporate a hybrid approach, they are not the same as hybrid recommenders that only mix different recommender techniques:
 - We are mixing human personalization techniques and classic recommender techniques, where the user has an important active role. In our recommenders, the knowledge domains are quite different and the result is much more intuitive than in the hybrid approach.
- We are currently working on the implementations of our schemas and algorithms and plan to continue researching the area of balanced recommenders, in particular dealing with the less documented and structured aspects of personalization techniques.