

Personalization and User Modeling

User Modeling with Stereotypes

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1 User Modeling with Stereotypes

A news portal is used to deliver personalized news and advertisements. The user modeling is performed by means of stereotypes.

1. Characterize the following stereotypes:
 - “*Businessman*”
 - “*Sportsman*”
 - “*Culture interested*”
2. In certain situations, certain stereotypes are activated. Define practical Triggers for the following situations:
 - Situation A: User reads an article from the category “politics”.
 - Situation B: User subscribes to an RSS feed from the category “sports”.
 - Situation C: User comments on an article in the “literature” section.
3. Define how triggers and stereotypes should be used to build up the user profile. What does a user profile look like after the occurrence of situation C and B.

1.1 Solution for 1.1

We decide to define the Stereotypes as follows. The definitions are based on the Grundy example, with Values ranging from -5 to 5 and Ratings from 0 to 1000

Stereotype: Businessman

Attribute	Value	Rating
Facet:		
Business	5	900
Politics	3	600
Culture	-3	500
Sport	0	600
Interested in Advertisements:	-4	600

Interpretation: The triple *Politics, 3, 600*) indicates that a businessman has a relatively high interest in politics (of course, his interest in Business is higher). With a relatively low confidence of 500, the businessman is not interested in culture. He is also probably not interested in advertisements.

Stereotype: Sportsman

Attribute	Value	Rating
Facet:		
Business	-4	800
Politics	0	700
Culture	1	800
Sport	5	900
Interested in Advertisements:	4	800

Interpretation: The triple *(Culture, 1, 800)*, related to the stereotype Sportsman indicates that a Sportsman has relative low interest (Value 1) in culture. The degree of certainty for this is relative high (Rating 800). It is likely that he is interested in advertisements.

Stereotype: Culture interested

Attribute	Value	Rating
Facet:		
Business	-2	700
Politics	3	800
Culture	5	900
Sport	0	800
Interested in Advertisements:	-1	700

1.2 Solution for 1.2

A trigger is related to a certain situation and consists of

- Attributes (facets): characteristics or events that activate the trigger
- Rating: degree of certainty (correlation) that the trigger is valid
- Values: the score (-5 . . . +5) that the facet should have for activating the trigger

A trigger can also activate multiple stereotypes. The value of a stereotype is optional. It allows a trigger to activate different Stereotypes based on certain attributes of the activation. For example a trigger is related to the situation *rate a news article* based on the rating the user gives different Stereotype might be activated.

Trigger for situation A

Stereotype	Rating
Businessman	400
Culture interested	500

Both businessmen and culturally interested people are mildly interested in politics. However, the certainty level is not very high and reading an article is not a very strong indication of interest.

Trigger for situation B

Stereotype	Rating
Sportsman	900

Subscribing to “sports” is a strong indication that the stereotype ‘Sportsman’ holds.

Trigger for situation C

Stereotype	Rating
Culture interested	900

Commenting on a literature article is a strong indication that the stereotype ‘Culture interested’ holds.

1.3 Solution for 1.3

Each user profile is related to a certain user and consists of the following components:

- Attributes (facets): user characteristics derived from the activated stereotypes
- Values: the score associated with the characteristics (weighted average from stereotypes)
- Rating: degree of certainty (correlation) that the facet holds (stereotypes with similar values reinforce one another)
- Justification: the stereotypes that contributed to this attribute

The Format is (attribute, value, rating, justification).

Example: (Politics, 0, 700, Sportsman)

Interpretation: With a certainty of *700* the user is interested in *politics* with a value of *0*. This estimation is based on the activation of the stereotype *sportsman*.

The way how to calculate the *values* and the *ratings* depends on the actual implementation of the system. When updating a user profile it is useful to use the values of the activated stereotype as well as the current values of the updated user profile.

Example: Occurrence of situation B → Trigger for Situation B is activated (Trigger B) → Trigger B activates the Stereotype Sportsman with a rating of 900 for the current user profile.

One idea for the update of the user profile...

$$\text{value } value_{new} = \frac{value_{Stereotype} + value_{Userprofile}}{2}$$

$$\text{rating } rating_{new} = \frac{rating_{Trigger} + rating_{Stereotype} + rating_{Userprofile}}{3}$$

We start with an empty user profile (all values for the facets are set to 0).

After the activation of trigger C the following changes are applied to the user profile:

For the attribute *Business*:

$$\text{value } value_{new} = \frac{-2+0}{2} = -1$$

$$\text{rating } rating_{new} = \frac{900+700+0}{3} = 533$$

For the attribute *Politics*:

$$\text{value } value_{new} = \frac{3+0}{2} = 1.5$$

$$\text{rating } rating_{new} = \frac{900+800+0}{3} = 567$$

For the attribute *Culture*:

$$\text{value } value_{new} = \frac{5+0}{2} = 2.5$$

$$\text{rating } rating_{new} = \frac{900+900+0}{3} = 600$$

For the attribute *Sport*:

$$\text{value } value_{new} = \frac{0+0}{2} = 0$$

$$\text{rating } rating_{new} = \frac{900+800+0}{3} = 567$$

The complete user profile looks like this:

Attribute	Value	Rating	Justification
Facet:			
Business	-1	533	Culture interested
Politics	1.5	567	Culture interested
Culture	2.5	600	Culture interested
Sport	0	567	Culture interested
Interested in Advertisements:	-0.5	533	Culture interested

Now situation B occurs and activates trigger B

This leads to the following values for the attribute *Business*:

$$\text{value } value_{new} = \frac{-4+1}{2} = -2.5$$

$$\text{rating } rating_{new} = \frac{900+800+533}{3} = 744$$

For the attribute *Politics*:

$$\text{value } value_{new} = \frac{0+1.5}{2} = 0.75$$

$$\text{rating } rating_{new} = \frac{900+700+567}{3} = 722$$

For the attribute *Culture*:

$$\text{value } value_{new} = \frac{1+2.5}{2} = 1.75$$

$$\text{rating } rating_{new} = \frac{900+800+600}{3} = 767$$

For the attribute *Sport*:

$$\text{value } value_{new} = \frac{5+0}{2} = 2.5$$

$$\text{rating } rating_{new} = \frac{900+900+567}{3} = 789$$

The complete user profile looks like this:

Attribute	Value	Rating	Justification
Facet:			
Business	-2.5	744	Culture interested, sportsman
Politics	0.75	722	Culture interested., sportsman
Culture	1.75	767	Culture interested., sportsman
Sport	2.5	789	Culture interested., sportsman
Interested in Advertisements:	1.75	744	Culture interested., sportsman