

# Towards User Psychological Profile

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## ABSTRACT

Recent studies have demonstrated how useful and fundamental psychological aspects such as people Personality Traits and Emotions are during human decision-making process. Some research towards the identification and model of user's Emotions have been done by Affective Computing researchers, however Personality Traits have been quite neglected. The World Wide Web is an enormous source of products and services available for people. There is a huge effort done by scientists towards the creation of effective strategies to personalize those products/services for each people interested in using them. By storing Personality Traits in User Profiles we intend to enable Recommender Systems in order to deduce more interesting recommendations for users acting proactively to offer them products/services as a consequence of a prediction of their future needs and behaviors. To fill this gap, in this work, we propose the interpretation, modeling, formalization, storing and application of Personality Traits in User Profile, followed by an experimentation developed in the context of Recommender Systems.

## Author Keywords

User Psychological Profile, Personality Traits, Recommendation, Reputation

## ACM Classification Keywords

H.1.2 [User/Machine Systems]: Human factors; H.3.4 [Systems and Software]: User profiles; I.2 [Artificial Intelligence]: Decision support

## INTRODUCTION

The World Wide Web is an infinite source of products and services available to be provided by computers for people. There is a huge effort done by scientists in order to create effective strategies to personalize those products/services for each people interested in using them. Nowadays, WWW

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IHC 2008 – VIII Simpósio Sobre Fatores Humanos em Sistemas Computacionais. October 21-24, 2008, Porto Alegre, RS, Brazil.  
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can also be source of services provided by a person. When a person is a service provider, normally he/she tries to personalize<sup>1</sup> services according to needs and features of someone who is asking for the service. Those aspects and features include also the subjective and psychological human aspects. Many scientists from different research areas as Psychology, Neurology, Philosophy and Affective Computing agree that human reasoning and decision-making use human psychological aspects [5], [6], [33], [9], [25], [27], [28], [29], [37], [36]. Therefore, when humans try to personalize services to other humans, psychological aspects like Personality Traits are taken into account. Thus, to maintain the same level of personalized service provided by humans, computers also should "reason" taking into account the user psychological aspects in order to offer a more personalized product/service. Nevertheless, unfortunately, the psychological aspects are neglected by most of the models of User Profiles. By consequence, Recommender Systems do not use the psychological aspects during their decision-making process.

The originality of this work is the use of Personality Traits as a psychological skill in User Profile in order to build more robust Recommender Systems. Some preliminary work using Emotional Intelligence as a psychological skill have been developed by Gonzalez et al [10]. Towards the use of Personality Traits in User Psychological Profile, we propose the modeling, formalization and validation of this work.

This paper is organized as follow. In first section, we describe Identity, User Profile Reputation. In the second section we briefly present Recommender Systems. In the third section we describe the User Psychological Profile, proposed originally by this work. Then we present an experimentation where the User Psychological Profile has been applied. Finally, we present the results followed by conclusions.

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<sup>1</sup> The personalization is a mass customization provided by Recommender Systems able to match people's preferences and characteristics.

**IDENTITY, USER PROFILE AND REPUTATION****Identity**

In this paper we define User Psychological aspects by using the theory of Personality. Personality does not have a common definition yet. Burger [2], for instance, defines personality a “consistent behavior patterns and intrapersonal processes originating within the individual”. Personality is more than just superficial and physical appearances, it is relatively stable and predictable, however it is not rigid and unchanging (normally it remains stable over-45 years period beginning in young adulthood [34]). In this work, we decided to use Personality theory based on the Traits approach because it can differentiate people psychologically by using a conceptualization and measurable traits, called Personality Traits.

According to researchers of Personality theory, the Identity development receive an important influence of person’s personality. Boyd [1] describes two different aspects of the individual Identity: the internalized notion of the self (Internal Identity) and the projected version of one’s internalized self (Social Identity). Giddens [8] affirms that without social experiences the self cannot internalize evaluation and the Identity is not static, it can be presented as a “particular narrative going” mainly because the social component is always changing.

Considering Identity as an important channel where people personality appears, their Personality Traits (Individual and/or Social) should give cues about their needs in a community. In Computer Science, the technical and persistent way to formalize Identity in a Virtual Community (or Social Network) is using User Profile and User Reputation.

**USER PROFILE**

Donath [7] affirms that one’s own Identity (Internal) and one’s reputation (Social) is fundamental to the formation of a community. In a Virtual Community, the Virtual Identity of user is defined by him/herself similarly he/she does in the real world. The Identity is stored in User Profiles.

User Profiles are approximate concepts, they reflect the interest of users towards several subjects at one particular moment. Each term a User Profile expresses is, in a certain degree, features of a particular user [30] including all information directly requested from him/her and implicitly learned from web activity [4]. Physically, the User Profile can be seen as a database where the user information, interests and preferences are stored [32].

In the WWW we found many types of User Profiles with different degrees of complexity. They are developed in the context of e-commerce, e-learning and e-communities, for instance. Kobsa in [20], [21] creates a Generic User Modeling to be used as a shell to develop user information for web site personalization. It is one of the most reputed User Model shell developed. Paiva [26] also developed a

User model shell called TAGUS, it have been designed to be used for the learning experience.

In terms of User Model definitions, Heckmann [14], [13], [12] proposes an Ontology<sup>2</sup> of General User Model (GUMO) which is a conceptual overview of a ubiquitous User Model including many basic aspects of user, coming from contact information, demographics, abilities to the psychological and physiological human features like personality, emotional state, mental state and nutrition. Heckmann’s ontology is very rich and can be implemented following the interest of the designer who implements an user profile shell.

Even if Personality Traits have ever been defined, by Heckmann, for example, unfortunately they have not yet been implemented in a current User Profiles/Models and effectively used in Recommender Systems. That happens mainly because: (1) human psychological aspects are really hard to extract intentionally from user; and (2) the conventional profile’s data of products and services are not prepared nor to receive neither to interpret those psychological aspects.

In order to define user Identity, together with User Profiles (Internal Identity), User Reputations (Social Identity) is also very relevant and, consequently, should also been presented, as you see next.

**REPUTATION**

Reputation can be defined as social feedback about someone’s personality. The Reputation may be compatible or not with the description done in the User Profile. Josang et al in [19] describe Reputation as “the information generally said or believed about a person’s or thing’s character or standing”.

In this work we define Reputation as an extension of a User Profile. It uses the same type of information stored in the User Profile but the cluster of information is filled by someone else (a friend or a client, for instance). In this case the Identity is determined by the Personality Traits of user filled by him/herself physically in User Profile and filled by his/her friends physically in User Reputation.

User Profiles and/or User Reputations are very important in order to define the user’s Identity. That means, User Profile can provide the prediction of user behaviors and needs in a community while Reputation allows the creation of relation of trustworthiness among community members. The user’s Identity is very useful during social interaction inside a Community.

Even if human psychological aspects are hard to extract intentionally from user, their relevance is quite significant in decision making process to be ignored by Recommender Systems, as we see next.

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<sup>2</sup>“An ontology is a specification of a conceptualization” [11].

**RECOMMENDATIONS**

Recommendation is a deliberative social process done by ordinary people when they want to describe their degree of appreciation about someone or something. In computers, Recommender Systems start to appear in 90’s. They are applications that provide personalized advice for users about products or services they might be interested in [31]. They are mainly used to recommend products or services. In the context of services, we consider people not only as service consumers but also as service providers [18], [22].

According to Resnick [31], in ordinary life, normally people trust in recommendations done by others. Those recommendations appear to them as word of mouth reputation, recommendation letters, movie and book reviews printed in newspapers and magazines. In digital life, Recommender Systems start to be used as a trustful information of people opinions (Reputation) about other people, services and products used by them.

Recommender System is a rich problem research area because it has abundant practical applications as recommending books at Amazon.com, recommending movies at Movie- Lens, recommending music at MyStrands, recommending training courses at emagister.com, recommending vendors at eBay, among others. According to [3] all recommendation techniques have strengths and weaknesses, we should be attentive to the type of information we would like to treat and recommend. Burke presents 5 different techniques of Recommender Systems: (1)content-based; (2)collaborative filtering;(3)demographic; (4)utility-based; (5)knowledge-based.

Recommender Systems was also defined as systems which promote recommendation of people as well promote recommendation of products/services. However, in 2005 Terveen [35] redefined those specific Recommender Systems, called Social Matching Systems.

Unfortunately, Recommender Systems do not use psychological aspects in its recommendations as we described before. However, psychological aspects are a powerful features that improve significantly the recommendations. From 2005, Gonzalez [10] propose a first model based on psychological aspects, he uses Emotional Intelligence to improve on-line course recommendations. Here, in this work we propose a model based on Personality Traits to improve recommendations. Next, we present our proposed model of User Psychological Profile based on User’s Personality Traits followed by the description of the Recommender System used in the experimentation.

**USER PSYCHOLOGICAL PROFILE**

Based on psychological studies [24], we propose a User Pro-file which we believe quite interesting to reflect user’s Personality following the concepts of Traits approach. We call that profile of User Psychological Profile - UPP.

In the UPP user’s Personality Traits will be stored. It represents the user’s psychological Identity. In order to better represent the UPP, it is partitioned in 3 levels of abstraction, they are:

1. *Logical Level*: based on the designer vision;
2. *Gross Knowledge Level*: based on the programmer vision;
3. *Neat Knowledge Level*: based on the user vision.

Below, each level is presented in details:

**UPP Logical Level**

We mean by logical level, a logical-mathematical representation of UPP.

Let us define UPP composed of a set of attributes, denoted  $A_{UPP}$ , related to user psychological information. Each attribute is denoted  $a_{UPP i}$ .

We have:

$$A_{user-i}^{UPP} = \{a_1^{UPP}, a_2^{UPP}, \dots, a_n^{UPP}\} \tag{1}$$

Each attribute contained into  $A_{UPP}$  should have a value, denoted as:  $v_{UPP i}$ . It is the value given to the attribute  $a_{UPP}$ .

It means:

$$v_i^{UPP} = value(a_i^{UPP}) \tag{2}$$

We define a user Psychological Identity by the set of characteristics based on (attributes + value) denoted as  $C_{UPP}$ . It is the set of user’s characteristics based on the above description, denoted as User Psychological Profile information:

$$C_{user-i}^{UPP} = [(a_1^{UPP}, v_1^{UPP}), (a_2^{UPP}, v_2^{UPP}), \dots, (a_n^{UPP}, v_n^{UPP})] \tag{3}$$

So we denote as  $C_{UPP user-i} \_ UPP$ . That means, the Personality Trait of user-i is a slice of UPP.

Thus :

$$\langle C_{user-i}^{PT} \rangle \subset C_{user-i}^{UPP} \tag{4}$$

The  $C_{PTuser-i}$  is the set of (attributes + value) in the Personality Traits Domain (PTD). We extend the model denoted in equation 3.

**PT Attributes.** We decompose the attribute in 3 sub-attributes:

1. NEO-IPIP<sup>3</sup> items (i);

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<sup>3</sup> NEO-IPIP is a computer based Personality Inventory, able to measure people Personality Traits. It was created by John Johnson [16], [17]. The NEO-IPIP is a 300 items based on Big Five factor structure [15]

2. BigFive dimensions (d);
3. BigFive facets (f).

Thus,  $a_{PTi} = (i, d, f)_{PTi}$ . That means, Personality Trait attribute of user-i is composed by a set of NEO-IPIP item, BigFive dimension (D), and facet (F).

Therefore, we substitute  $a_{PTi}$  in the generic equation 3 presented before:

$$C_{user-i}^{PT} = [((i, d, f)_1^{PT}, v_1^{PT}), \dots, ((i, d, f)_n^{PT}, v_n^{PT})] \quad (5)$$

**PT Values.** As we said i, d, and f are PT attributes. Their potential values (described in 3.1) are further specified by a so called "valence", that identifies a modality for the classification of the subject. Values admitted for this valence are:

$$v_i^{PT} = \left\{ \begin{array}{l} \text{very - inaccurate(1)} \vee \\ \text{moderately - inaccurate(2)} \vee \\ \text{neither - accurate - nor - inaccurate(3)} \vee \\ \text{moderately - accurate(4)} \vee \\ \text{very - accurate(5)} \end{array} \right\} \quad (6)$$

**UPP Gross Knowledge Level**

The UPP Gross Knowledge is composed by all literal possibilities used to define a User Psychological Profile (UPP). The UPP Gross Knowledge Level is destined to the UPP programmer, that's why here we describe all physical values to variables defined in the Logical Level.

Originally, the Personality Traits physical value is composed of 300 items categorized according to 5 Big Five dimensions and more 6 facets.

In figure 1 we present an extract of 9 items of Personality Traits physical value.

BIG FIVE dimension	Facet	Item
Neuroticism	Anxiety	Worry about things.
Extraversion	Friendliness	Make friends easily.
Openness	Imagination	Have a vivid imagination.
Agreeableness	Trust	Trust others.
Conscientiousness	Self-Efficacy	Complete tasks successfully.
Neuroticism	Anger	Get angry easily.
Extraversion	Gregariousness	Love large parties.
Openness	Artistic Interests	Believe in the importance of art.
Agreeableness	Morality	Would never cheat on my taxes.

Figure 1: Personality Traits physical value

In the equation 7 we denote a physical value of user-i based

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categorized in 30 facets (6 facets for each factor). The psychological foundation of how and why NEO-IPIP was chosen by us is described in [24]. The description about the composition of NEO-IPIP is described in [23].

on the logical value (denoted at equation 5). The physical information are extracted from the gray line of figure 1.

$$C_{user-i}^{PT} = [(w - a - t^5, neuroticism, anxiety), m - a^6] \quad (7)$$

by paraphrase, the equation 7 may be expressed as

- "subject user-i has personality traits attributes:i: NEO-IPIP item = worry-about-things (w-at); d: Big Five dimension = neuroticism; f: facet = anxiety; v: value = moderately-accurate (m-a)." That means, the user "i" worry about things, that's why he is classified as X% anxious andY% neurotic

**UPP Neat Knowledge Level**

The UPP Neat Knowledge Level is the highest level of the UPP abstraction. In that level users can themselves define their Psychological Identity by using an UPP online tool ([23] or [http://www.lirmm.fr/\\_nunes/big0.1/](http://www.lirmm.fr/_nunes/big0.1/)). The UPP online tool is a set of questionnaire which derives from the definitions done in the UPP Gross Knowledge Level + the UPP Logical Level. In order to define their Psychological Identity users should answer questions proposed by the UPP Personality Traits Inventory.

**NEO-IPIP Test :: Personal Personality Measure**

**Part 1 : Questions 1 to 60**

**I (nunes):**

1.	Worry about things	very inaccurate <input type="radio"/>	moderately inaccurate <input type="radio"/>	neither accurate nor inaccurate <input type="radio"/>	moderately accurate <input type="radio"/>	very accurate <input type="radio"/>
2.	Make friends easily.	very inaccurate <input type="radio"/>	moderately inaccurate <input type="radio"/>	neither accurate nor inaccurate <input type="radio"/>	moderately accurate <input type="radio"/>	very accurate <input type="radio"/>
3.	Have a vivid imagination.	very inaccurate <input type="radio"/>	moderately inaccurate <input type="radio"/>	neither accurate nor inaccurate <input type="radio"/>	moderately accurate <input type="radio"/>	very accurate <input type="radio"/>
4.	Trust others.	very inaccurate <input type="radio"/>	moderately inaccurate <input type="radio"/>	neither accurate nor inaccurate <input type="radio"/>	moderately accurate <input type="radio"/>	very accurate <input type="radio"/>

Figure 2: First questions of PT questionnaire

In figure 2, we present an extract of the Personality Traits Inventory. We present 4 questions based on PT items (presented in figure 1) and their possible values (valences). As we presented in equation 6. The NEO-IPIP items are scored on a five-point scale, scores are numerical values of 1, 2, 3, 4 and 5 associated with user respective answers.

The algorithm to treat user answers was developed based on the algorithm and the NEO-IPIP Norms developed by Johnson [16].

**Scoring users answers.** We should process the user answers to obtain the user scores in each Big Five dimension and facets, to after generate the Prognostic Report. First we score each Big Five facet by summing the user answers in each facet and applying their correspondent MEAN and SD extracted from [16]. The equation 8 is denoted as:

$$score_{user-i}^{BigFive-F} = 50 + (10 * (score_{user-i}^F - mean_f) / SD_F) \quad (8)$$

After we score each Big Five dimension, as presented in equation 9, by summing the scores registered in their correspondent facets and applying their correspondent MEAN and SD extracted from [16].

$$score_{user-i}^{BigFive-D} = 50 + (10 * (score_{user-i}^D - mean_D) / SD_D) \quad (9)$$

Finally, we apply a cubic approximation for percentiles.

**Prognostic Report.** The Prognostic Report generated is a detailed description of each User's personality dimension from the Big Five (Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness).

Included in these descriptions we present people's related high or low scores on each of the five factors. It is presented as:

- "Your score on [name of factor] is [high, average, low], indicating that [brief summary of what research has revealed about persons with the score]."

We also propose (based on Johnson's report) a detailed description of the six facets of each Big Five dimension. For example, short descriptions of Anxiety, Anger, Depression, Self-Consciousness, Immoderation, and Vulnerability appear under the description of Neuroticism. It is presented as:

- "Your level of [name of facet] is [high, average, low]."

In order to illustrate the Prognostic Report extracted from UPP questionnaire, we present, in figure 3, a part Pedro's<sup>4</sup> Prognostic Report. It shows a part of a prognostic illustrating by the paraphrase of equation 7 presented above.

It describes:

- Pedro is 91% neurotic<sup>5</sup> that means:
  - a. He is emotionally reactive. He responds emotionally to events that would not affect most people, and his reactions tend to be more intense than normal. He is more likely to interpret ordinary situations as threatening and minor frustrations as hopelessly difficult. His

negative emotional reactions tend to persist for unusually long periods of time, which means they are often in a bad mood. His score in Neuroticism is high, indicating that he is easily upset, even by what most people consider the normal demands of living. People consider him to be sensitive and emotional.

- Pedro is 73% anxious. He is considered HIGH in anxiety if he is compared with others. He often feels like something dangerous is about to happen. He may be afraid of specific situations or be just generally fearful. He feels tense, jittery, and nervous.

In that section we presented a model, formalization and storage of a User Psychological Profile proposed by this work. The UPP is a useful resource that may be used by user to get his/her profile and Personality Traits prognostic generating his/her Internal Identity. His/her Social Identity also should be provided. In order to do that, friend's of this user, Pedro, could fulfill the UPP questionnaire. Thus the prognostic about Pedro's reputation will be generated.

In order to present UPP in a real world useful experience, we propose to use UPP to improve recommendations in a illustrative example of Recommender Systems, which is presented next.

## EXPERIMENTATION

This experimentation addresses a part of a research in order to prove that Recommender Systems (or Social Matching Systems) can be more efficient if they use a User Psychological Profile (UPP) of people than just conventional ones (demographic information and competence, for instance) in order to recommend more adequate products, services or people.

This experimentation contemplates the Recommender System showing its ability to recommend people, in this case, considerate as a product to be delivered according to a product view<sup>6</sup>.

<sup>4</sup> Pedro is a fantastic name used for representing a real person who fulfill UPP questionnaire.

<sup>5</sup> Considering him in a population of about 20000 already measured people according studies done by Johnson.

<sup>6</sup> The Recommender System generate a person as a product because, in this case, a person is considered as a packet closed, a person's name, for instance. In this case, the person is not considered as a service provider, as normally s/he is. The product view means, a person receives a recommendation of someone as a name to be taken into account as a support in his/her decision making process, instead of in a service view. In a service view, people receive a name to be used as a service provider, who will execute some service in posteriori. In a product view, the Recommender System gives a passive answer, different from a service view where the answer is going to generate a dynamic interaction in order to generate a service.

Our experiment aim to demonstrate how people, considering a product view, might be rightly recommended if the Recommender System use just Psychological Profile based on Personality Traits. To get there we are going to use the UPP model proposed before in this paper.

### Scenario

An illustrative scenario was presented by the "Elections for President in France" carried through april 2007. In this case a Recommender System was used to give a private recommendation considering a better choice of a president's candidate for a person to vote. This experimentation started to be applied in december 2006 and finished in july 2007.

This experimentation focus on User Psychological Reputation (User Psychological Profile according friends view) based on people's feedback of candidates on a specific case of the French presidential.

### Method

In order to create a User Psychological Profile/Reputation we used the NEO-IPIP<sup>7</sup> Inventory based on 300 items

About 100 people were invited to participate

Each people who participated the experimentation was instructed to answer the NEO-IPIP(900 questions)<sup>8</sup>: thus, 300 (NEO-IPIP) for "The Ideal President", 300 for "Ségolène Royal" and 300 for "Nicolas Sarkozy". They are:

1. "The Ideal President" questionnaires. Questionnaires's answers reflects how each person thinks an Ideal President should be;
2. " Ségolène Royal" (one of the president's candidate) questionnaires. Questionnaires's answers reflects how each person feels and thinks about " Ségolène Royal"'s psychological traits.
3. "Nicolas Sarkozy" (one of the president's candidate). Questionnaires's answers reflects how each person feels and thinks about "Nicolas Sarkozy"'s psychological traits.

Through answers we were able to model psychological aspects of two French presidential candidates, Ségolène Royal, Nicolas Sarkozy and a imaginary "Ideal President". The recommendation done was based on those

<sup>7</sup> NEO-IPIP's 300 questions are items scored on a five-point scale. Scores are numerical values of 1, 2, 3, 4 and 5 associated with user respective answers. Each factor of Big Five is represented by a set of 60 questions, thus NEO-IPIP 300 questions are equal to 5 factors multiplied by 60 questions from each factor. Those 60 questions from each factor represent 10 question of each facet, so Each Big Five factor (60 questions) is equal to 6 facets multiplied by 10 questions of each facet

<sup>8</sup> 11The tool used to extract Reputations of "The Ideal President", " Ségolène Royal" and "Nicolas Sarkozy" is partly described in [23] and can be found at [http://www.lirmm.fr/\\_nunes/big0.1/](http://www.lirmm.fr/_nunes/big0.1/).

psychological aspects (reputation) of President's candidates and an imaginary personage who was his/her dreamed "Ideal President". In order to assess the validity of the questionnaire and the precision of our Recommender System, each person who answered seriously and completely the three questionnaires should confirm that the President's candidate recommended for him/her actually was the President who s/he, actually, VOTED (that's means, the candidate nearer psychologically of his/her own psychological definition of an imaginary "Ideal President").

Results and conclusions of the experimentation are presented next.

### Results

10% of People answered the complete Personality Traits inventory (NEO-IPIP) in order to get the recommendation of a better candidate to vote in a French Presidential.

We did two different types of recommendations. The first one was based on 30 facets and then in 5 factors of Big Five, followed by the second one which was based only on 5 factors of big five, as presented in figure 4.

Results of the recommendations were much more satisfying and representative than what we expected. The first recommendation was more fine-grained than the second one. The results are:

- If we consider the fine-grained answers, that means Personality Traits measurable by 30 facets, the recommendation was 100% correct. That means, 100% of cases recommended by the Recommender System was compatible with the presidential candidate that the user actually VOTED during the Election for President in France;
- If we consider the coarse-grained answers, that means Personality Traits measurable by 5 Big Five factors, the recommendation was 80% well correct. That means, 80% of cases recommended by the Recommender System was compatible with the presidential candidate that the user actually VOTED. However, 20% of cases recommended by the Recommender System was INCOMPATIBLE with the presidential candidate that the user actually VOTED

Even if is difficult and tiring answer a fine-grained questionnaire (30 facets) the final result of a recommendation is 25% better than if we use a coarse-grained questionnaire.

This experiment started to be applied in december 2006. Because we have a non massive participation (only 10% of people asked to answer the questionnaire effectively did it), the recommendation have been generated in july 2007, that means, after the French presidential (april 2007).

Bellow you can see answers based on **bigger** granularity of personality traits including FACETS

In the facet *anxiety* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *friendliness* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *imagination* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *trust* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *selfEfficacy* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *anger* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *gregariousness* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *artisticInterests* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *morality* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *orderliness* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *depression* Sarkozy and Segolene have the same score about what you think is an Ideal president for you  
 In the facet *assertiveness* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *emotionality* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *altruism* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *dutifulness* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *selfConsciousness* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *activityLevel* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *adventurousness* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *cooperation* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *achievementStriving* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *immoderation* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *excitementSeeking* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *intellect* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *modesty* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *selfDiscipline* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *vulnerability* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *cheerfulness* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *liberalism* Sarkozy is nearer from what you think is an Ideal president for you  
 In the facet *sympathy* Segolene is nearer from what you think is an Ideal president for you  
 In the facet *cautiousness* Sarkozy is nearer from what you think is an Ideal president for you

Considering all your answers in the Facets which form Neuroticism domain We can recommend to you to vote for Nicolas Sarkozy

Considering all your answers in the Facets which form Extroversion domain We can recommend to you to vote for Nicolas Sarkozy

Considering all your answers in the Facets which form Open to experience domain We can not recommend someone to you to vote because your score in the facets for Nicolas Sarkozy and Segolene Royal are the same

Considering all your answers in the Facets which form Agreeableness domain We can recommend to you to vote for Segolene Royal

Considering all your answers in the Facets which form Conscientiousness domain We can recommend to you to vote for Nicolas Sarkozy  
 sego1sarko3neuro1

According to **bigger granularity in Personality traits using facets and the BIG FIVE dimensions the president recommended for you is Nicolas Sarkozy**

Figure 4: Recommending a candidate to vote in a French Presidential

Considering this, the recommendation were not useful in order to influence the people's action (their vote). However, the recommendation have been very useful in order to prove that the recommendation generated was actually very relevant because people's effective vote was 100% compatible with the recommendation. That means, if people had received the recommendation before the pools, at least, they would be influenced positively. Otherwise, the recommendation might be used as an instrument for supporting the computer decision-making in order to predict the user behaviors and/or needs towards offering more personalized web products/services.

## CONCLUSIONS

This work contributes to state of the art by using Personality Traits to improve the recommendations in Recommender Systems and consequently for providing this recommendation as a support in a decision making process. We chose the Traits approach because it is the way that psychologists differentiate people from one another,

conceptualizing and measuring their characteristics by using Personality Traits.

Results of this experimentation proved that user Personality Traits stored in User Profile and processed by Recommender Systems can provide, when using a fine-grained questionnaire, actually, optimal recommendations. In the context of our experimentation the recommendation generated was done in order to select some compatible candidate to vote in a French Presidential. However, the experimentation presented here is meant to be significant for a much wider spectrum of cases where the use of Personality Traits may be of importance to Recommender Systems.

## Research follow up Future Work

Even if the fine-grained questionnaire gave optimal recommendation (100% of compatibility), it was very hard to find people with time available to answer NEO-IPIP Personality Traits questionnaire (900 items on that experimentation). Many times in real circumstances researchers have no choice other than to use an extremely brief instrument (or they use no instrument at all). Because

of that, we decided to develop a second experimentation using a coarse-grained questionnaire to verify if we will get better results (more than 80% extracted from the first experimentation). The second experimentation is being applied in order to recommend an efficient work group based on Personality Traits of students from a programming course at "Instituto Superior Técnico" in Lisbon. The results from these experiments are the subject of ongoing reports.

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