Programma Operativo Nazionale "Ricerca e Competitività 2007-2013"
Regioni Convergenza
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Progetto PON01_02136

TITAN

Il Sistema di Moneta Elettronica e Servizi a Valore Aggiunto Multi-canale

Incontro con Esperto Prof. Vespri

Pubblicazioni scientifiche

Soccavo, 10 Aprile 2015 ***versione1.0***

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1. G. D'Aniello, M. Gaeta, V. Loia, F. Orciuoli. "An AmI-Based Software Architecture Enabling Evolutionary Computation in Blended Commerce: The Shopping Plan Application" Mobile Information Systems 03/2015
2. G. D'Aniello, M. Gaeta, V. Loia, F. Orciuoli, S. Tomasiello. "A Dialogue-based Approach Enhanced with Situation Awareness and Reinforcement Learning for Ubiquitous Access to Linked Data" INCOS 2014 6-th INTERNATIONAL CONFERENCE ON INTELLIGENT NETWORKING AND COLLABORATIVE SYSTEMS SALERNO, ITALY SEPTEMBER 10 - 12, 2014
3. G. D'Aniello, F. Orciuoli, A. Vitiello, M. Parente. "Enhancing a Framework for U-commerce by applying Memetic Algorithms to Plan Shopping" INCOS 2014 6-th International Conference on Intelligent Networking and Collaborative Systems. Salerno, Italy, September 10 - 12, 2014
4. G. D'Aniello, A. De Vivo A.C. De Rosa, A. Donatiello, D. Greco, F. Pettinati, V. Viserta, C. Bologna, A. de Donato, G. Di Santo "A Semantic-based Architecture for Electronic Money System and Multi-channel Value-Added Services" INCOS 2014 6-th International Conference on Intelligent Networking and Collaborative Systems. Salerno, Italy, September 10 - 12, 2014
5. F. Orciuoli, M. Parente, A. Vitiello. "Solving the Shopping Plan Problem through Bio-inspired Approaches". In *Soft Computing*, *ISSN*: 1432-7643 (print version) ISSN: 1433-7479 (electronic version), Springer Press, 2015
6. G. D'Aniello, A. Granito, G.R. Mangione, S. Miranda, F. Orciuoli, P. Ritrovato, P.G. Rossi. "A City-scale Situation-aware Adaptive Learning System". 2014 IEEE 14th International Conference on Advanced Learning Technologies - ICALT2014

Pubblicazioni scientifiche

7. A. Cutolo, G. D'Aniello, F. Orciuoli, F. Pettinati, G. Sansonetti, C. Vitagliano. "An Ontology-Based Recommender System in E-Commerce". In Proceedings of SeRSy - 2nd International Workshop on Recommender Systems meet Big Data & Semantic Technologies (co-located with ACM RecSys 2013, Hong Kong Oct 12-16, 2013)
8. M. Gaeta, F. Orciuoli, P. Ritrovato, G. D'Aniello and A. De Vivo. "A Collective Knowledge System for Business Partner Co-operation". In Proceedings of IWCBS2013 - International Workshop for Collaborative e-Business Systems. (In conjunction with: The 5th International Conference on Intelligent Networking and Collaborative Systems, INCoS 2013 XI'AN, China, September 9 - 11, 2013). doi 10.1109/INCoS.2013.145
9. C. Bologna, A. C. De Rosa, A. De Vivo, M. Gaeta, G. Sansonetti, V. Viserta "Personality-BasedRecommendation in E-Commerce". In proceeding of: EMPIRE 2013 workshop, 1st Workshop on "Emotions and Personality in Personalized Services" (June, 10, 2013)
10. M. Gaeta, V. Loia, F. Orciuoli, M. Parmentola "A genetic approach to plan shopping in the AmI-based Blended Commerce". Industrial Electronics (ISIE), 2013 IEEE International Symposium on , vol., no., pp.1,6, 28-31 May 2013. doi: 10.1109/ISIE.2013.6563733
11. A. Bracaglia, G. Monetta, W. Vanobberghen "Public Research supports an Innovative Model of Service Delivery integrated with Payment", Under Review for *Entrepreneurship Research Journal* (ERJ), Special Issue focused on Entrepreneurship, Innovation and Risk
12. A. Bracaglia, G. Monetta, W. Vanobberghen "Innovative Model of Service Delivery to improve Standardization and Market Integration. Extension framework for ISO 20022 card payments". In *Journal of Payments Strategy & Systems*, Vol.8, n.2, May, 2015.

Research Article

An AmI-Based Software Architecture Enabling Evolutionary Computation in Blended Commerce: The Shopping Plan Application

Giuseppe D'Aniello,[1,2] Matteo Gaeta,[1] Vincenzo Loia,[2,3] and Francesco Orciuoli[3]

This work describes an approach to synergistically exploit ambient intelligence technologies, mobile devices, and evolutionary computation in order to support blended commerce or ubiquitous commerce scenarios. The work proposes a software architecture consisting of three main components: linked data for e-commerce, cloud-based services, and mobile apps. The three components implement a scenario where a shopping mall is presented as an intelligent environment in which customers use NFC capabilities of their smartphones in order to handle e-coupons produced, suggested, and consumed by the abovesaid environment. The main function of the intelligent environment is to help customers define shopping plans, which minimize the overall shopping cost by looking for best prices, discounts, and coupons. The paper proposes a genetic algorithm to find suboptimal solutions for the shopping plan problem in a highly dynamic context, where the final cost of a product for an individual customer is dependent on his previous purchases. In particular, the work provides details on the Shopping Plan software prototype and some experimentation results showing the overall performance of the genetic algorithm.

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Mobile Information System

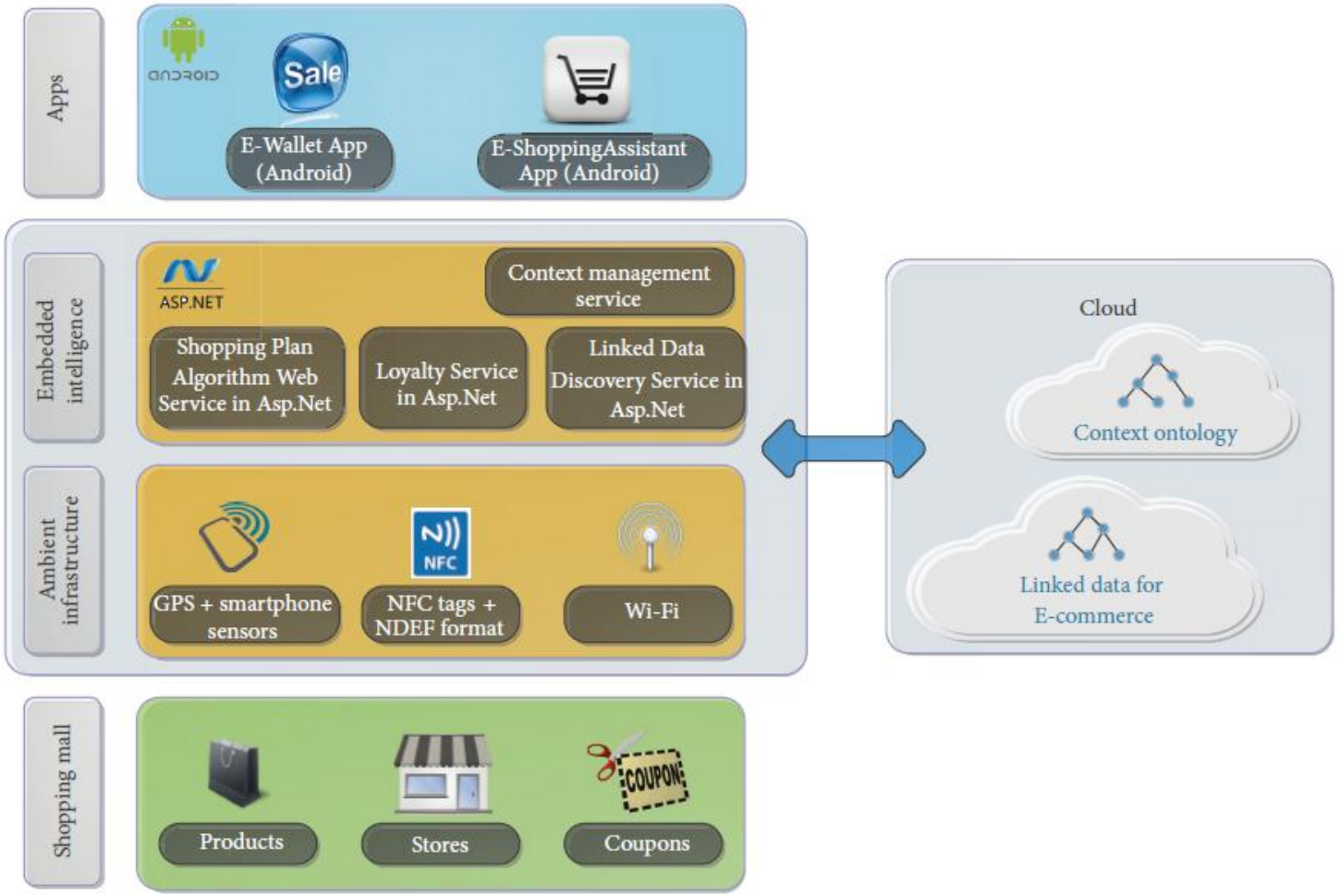

FIGURE 16: AmI-based architecture for the shopping mall scenario.

Mobile Information System

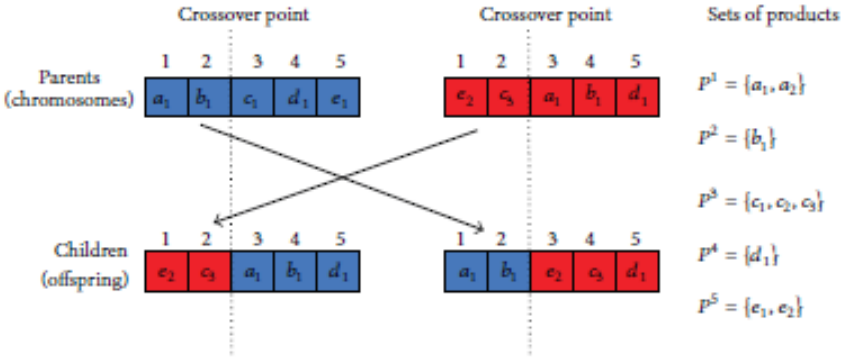

FIGURE 9: Example of crossover.

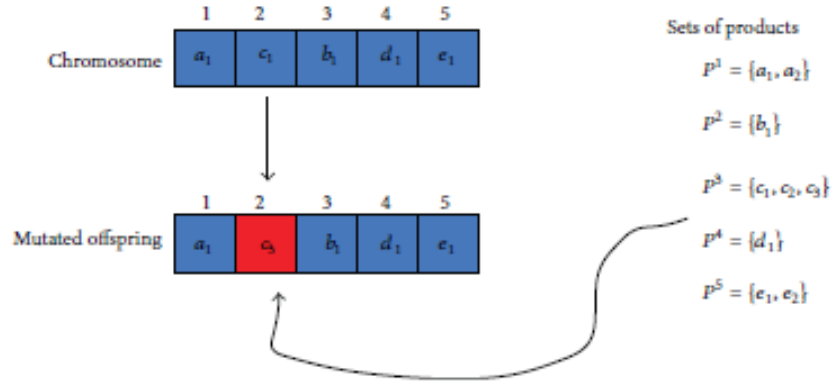

FIGURE 10: Example of mutation.

2014 International Conference on Intelligent Networking and Collaborative Systems

A Semantic-based Architecture for Electronic Money System and Multi-channel Value-Added Services

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Abstract **— The evolution of microchips and embedded technologies and those related to the mobile world has led to the growth and proliferation of devices and systems for electronic payment used by end users to buy products or services. Over the last few years there has been a tendency to use these devices and systems to provide users a way to benefit of services that are accessories to the payment (e.g. Value Added Services - VAS) and can be used before or after a transaction takes place. The heterogeneity of users' devices and instruments, linked to the heterogeneity of acceptance devices and service platforms, also makes life harder to new service providers and to users (e.g. merchants). This paper describes the solution defined in the context of TITAN project which objective is to create an integrated and innovative system for managing Electronic Money and Value Added Services offering an integrated, multichannel and customer-centric view through the integration of perspectives of Business Partners, Customers and Service Providers by defining a business partner network (modeled semantically) and supporting marketing policies (facilitated by exploiting users' profiles). This paper is focused on the architecture of TITAN platform and on the models used to represent semantic services and the user profiling.**

Keywords - e-payment, Semantic modeling, VAS, service delivery, recommender systems, user profiling, user modeling

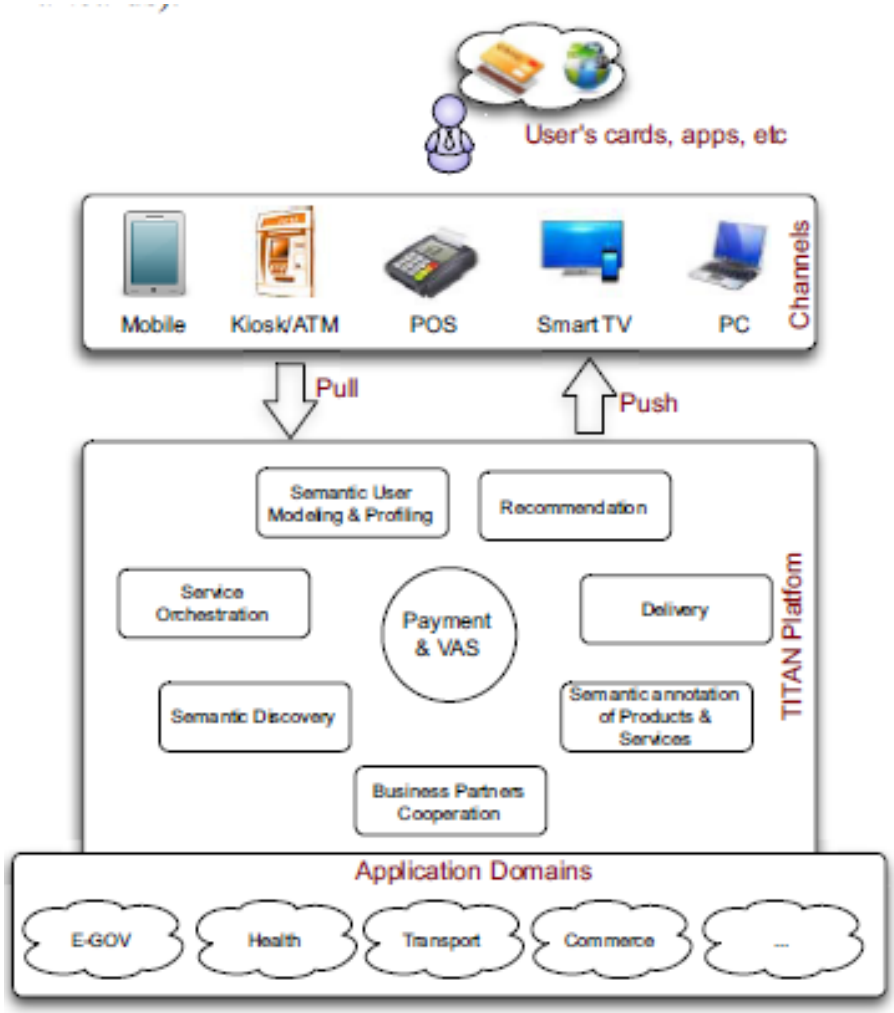

Figure 1. TITAN Overview

2014 International Conference on Intelligent Networking and Collaborative Systems

A Dialogue-based Approach Enhanced with Situation Awareness and Reinforcement Learning for Ubiquitous Access to Linked Data

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***Abstract*—The main barrier to a mainstream adoption of Semantic Web and Linked Data is the difficulty for users to search and retrieve the required information in this huge network of data. This work proposes a novel approach for Ubiquitous Browsing and Searching Linked Data. The proposed approach lays on a conceptual communication model, namely Interactive Alignment, for disambiguating both users' intentions and requests in the context of an information-seeking dialogue among humans and machines. More in details, the alignment between humans' intentions and machine comprehension is improved by identifying situations the users are involved in and considering users' situated preferences. Situation Awareness techniques are employed to identify and handle perceptions about occurring situations and Reinforcement Learning algorithms are exploited in order to elicit and acquire part of the user's mental model regarding her situated preferences. An ISU-based Dialogue System Architecture has been chosen to handle human-computer interaction and allow interactive alignment. Furthermore, the paper proposes a case study in which users are customers in U-commerce scenarios and they are looking for products or services to purchase.**

***Keywords*-Dialogue Systems; Human-Computer Interaction; Semantic Web; Reinforcement Learning; Context and Situation Identification.**

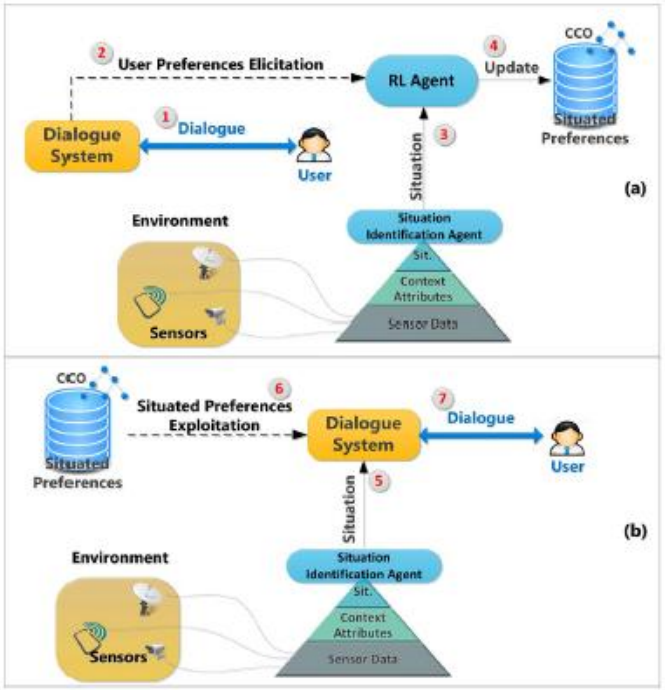

Figure 3. Mental Models alignment approach.

Situation	Preferences	Q_val
SituationA	Italian_Cuisine	0
	Japanese_Cuisine	0
	French_Cuisine	0
	...	0
SituationB	Italian_Cuisine	0
	Japanese_Cuisine	0
	...	0

(a)

Situation	Preferences	Q_val
SituationA	Italian_Cuisine	0,5
	Japanese_Cuisine	- 0,3
	French_Cuisine	- 0,2
	...	0
SituationB	Italian_Cuisine	-0.3
	Japanese_Cuisine	0.7
	...	0

(b)

Figure 6. Q-values for preference *kind of cuisine*. (a) t=0 (b) t>0.

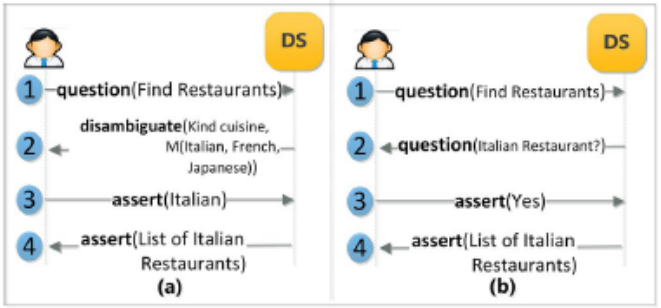

Figure 7. Example of a dialogue. (a) the preference for the *kind of cuisine* is unknown (b) the preference for the *kind of cuisine* is "*Italian*".

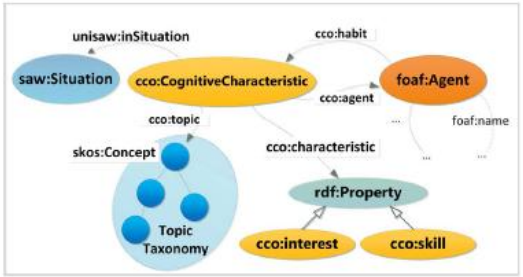

Figure 4. Semantic model for situated preferences.

2014 International Conference on Intelligent Networking and Collaborative Systems

Enhancing an AmI-based Framework for U-commerce by applying Memetic Algorithms to Plan Shopping

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***Abstract*—Thanks to the phenomenal proliferation of the electronic commerce, the number of Internet shops increases more and more each year. This increasing forces strong competition on the market by leading to low prices for customers, but, at the same time, it represents a problem for customers since it makes difficult to manually compare all the product offers and decide a shopping plan. This scenario is furthermore made complex by a recent business strategy adopted in e-commerce scenario: the loyalty program such as point systems and coupons. In order to face the shopping plan problem in these new loyalty program scenarios, a recently proposed AmI-based framework for u-commerce introduces the exploitation of evolutionary algorithms, and, in particular, genetic ones. However, in spite of their successfully application to several complex problems, genetic algorithms are inherently characterized by premature convergence. Therefore, this paper proposes to replace the exploited evolutionary approach with the application of memetic algorithms for solving the shopping plan problem. As shown by a statistical test, our approach significantly improves the above AmI-based framework for u-commerce.**

Journal Soft Computing

Soft Comput
DOI 10.1007/s00500-015-1625-5

METHODOLOGIES AND APPLICATION

Solving the shopping plan problem through bio-inspired approaches

Francesco Orciuoli · Mimmo Parente · Autilia Vitiello

Abstract *Blended commerce* involves all commerce experiences in which customers make use of different channels (online, offline and mobile) for their purchases to take advantages with respect to their needs and attitudes. This new e-commerce trend is typically characterized by so-called loyalty programmes such as coupons and system points. These mechanisms can be extremely useful for the companies to achieve customer retention and for the customers to obtain discounts. However, loyalty programmes can complicate for customers the evaluation of all offers and the selection of optimal providers (shopping plan) for buying the desired set of products. To face this problem, referred as *Shopping Plan Problem*, optimization algorithms are emerging as a suitable methodology. This paper is aimed at performing a systematic comparison amongst three bio-inspired optimization approaches, genetic algorithms, memetic ones and ant colony optimization, to detect the best performer for solving the shopping plan problem in a blended shopping scenario.

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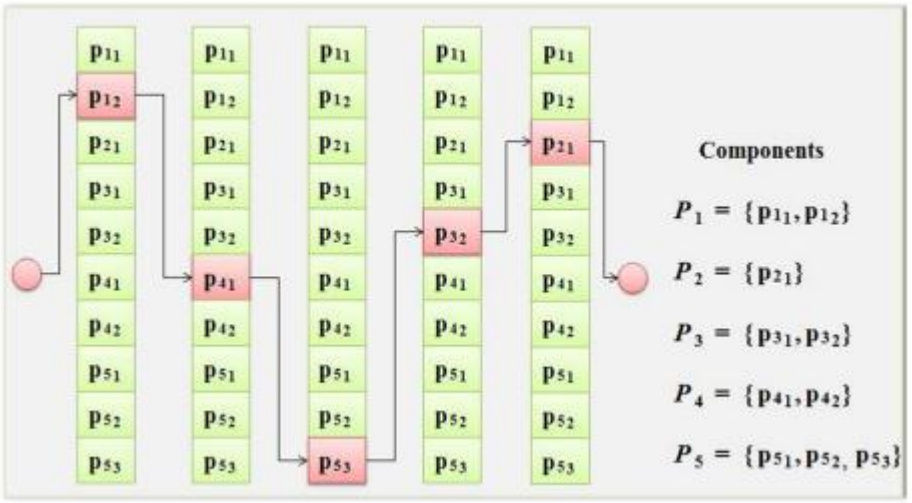
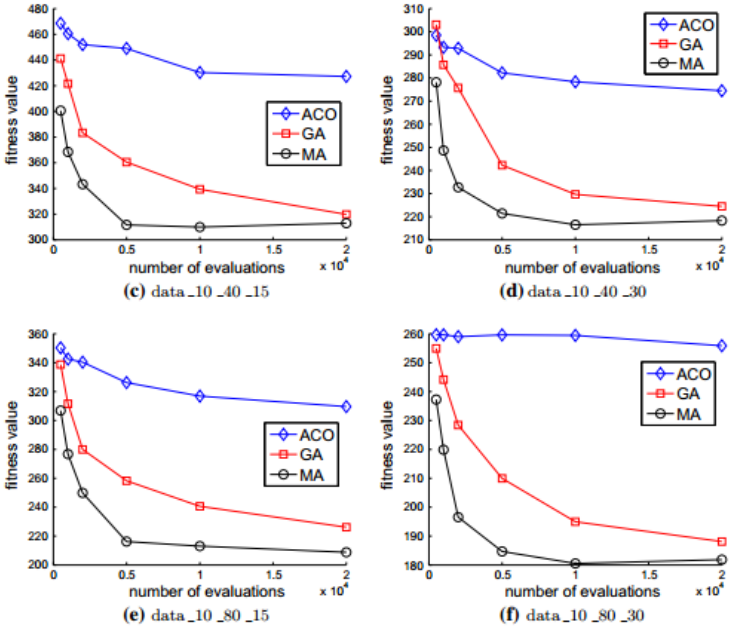
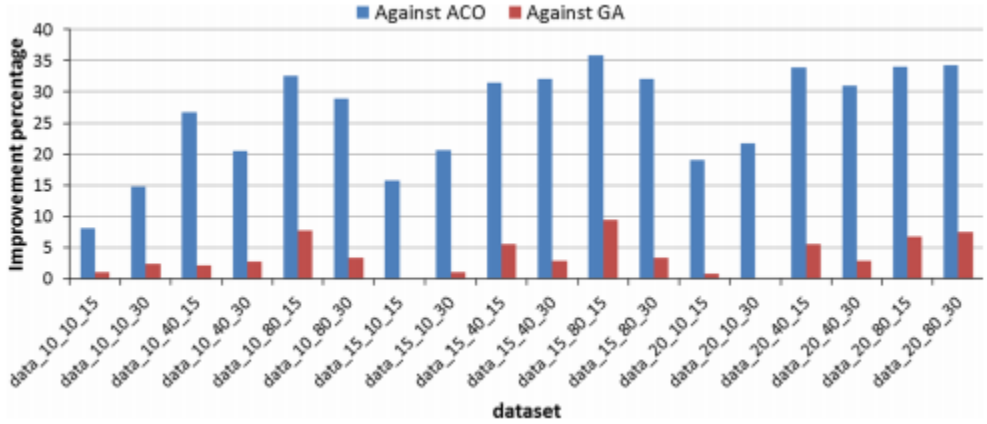




(c) data_10_40_15 (d) data_10_40_30

(e) data_10_80_15 (f) data_10_80_30

considered bio-inspired approaches for datasets with $M = 10$



2014 IEEE 14th International Conference on Advanced Learning Technologies

A City-scale Situation-aware Adaptive Learning System

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***Abstract*—The concept of Seamless Learning is becoming more and more effective because the newer technologies are able to meet the personal needs of the people and really support them in their learning processes. Thus, the learning experience is a moment in the everyday life strongly related with the situation each person is dealing with. The main idea of this work is to define a flexible seamless learning environment able to identify the context where a learner is deepened in and to apply an adaptation by respecting her learning goals. The proposed approach leverages on three main aspects: situation awareness, adaptive learning and semantic technologies.**

***Keywords*-Seamless learning; situation awareness; adaptive learning; semantic technologies.**

A City-scale Situation-aware Adaptive Learning System

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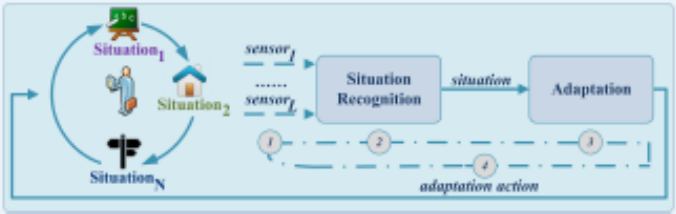
Aim

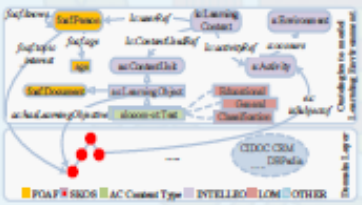
Defining a flexible seamless learning environment able to identify the context where a learner is deepened in and applying an adaptation by respecting fixed learning goals. Three main aspects: situation awareness, adaptive learning and semantic technologies.

Approach



1. Collecting heterogeneous data from sensors on learners' contextual information;
2. Processing the raw data to identify the situation the learner is involved in;
3. Exploiting the recognized situation and the learner's profile to identify what adaptation actions are needed to satisfy learners' goals;
4. Executing queries as adaptation actions in order to find relevant learning resources and build a personalized learning environment.

Semantic Model



Situation Recognition

Adaptation Strategy

A set of rules able to personalize the learning environment:

$$InvolvedIn(s,u) \wedge Has(u,p) \rightarrow env(exec(Q,p),s)$$

(where s = situation; u = user; p = profile; Q = queries)

A sample scenario:

Conclusion

The learning goals are achieved by structuring adaptive actions and paying attention to the situation where the user is involved in. The framework is going to be experimented in order to understand how to improve the effectiveness of the defined actions and how to merge this approach with a real teacher participation.

An Ontology-Based Recommender System in E-Commerce

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ABSTRACT

The growing proliferation of e-services provided by numerous online platforms has contributed to the problem of information overload, which makes it difficult to discover and propose products and services of possible interest to users. In this scenario, user modeling techniques are powerful tools to improve the service discovery, thus making it easier to offer solutions with respect to user interests and needs. The aim of this article is to present a model capable of recommending products and services that users may be interested in by combining semantic discovery methods with user modeling techniques.

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2013 5th International Conference on Intelligent Networking and Collaborative Systems

A Collective Knowledge System for Business Partner Co-operation

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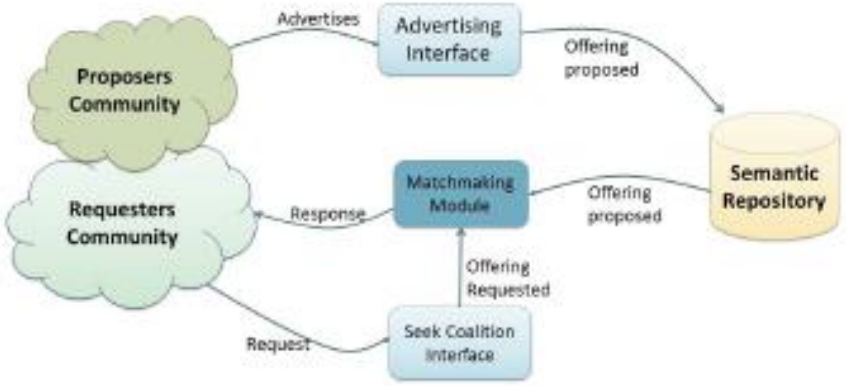
***Abstract*—In recent years, merchants have increased their interest in marketing strategies based on loyalty programs. Coalition loyalty is one of the most profitable among the aforementioned strategies. This work proposes a co-operation model based on the principles of Collective Knowledge Systems and on Semantic Technologies to support the generation and management of dynamic coalitions of merchants. The main benefit of the proposed model is represented by the possibility, for merchants, to match their needs and define coalition programs (based on conditional coupon) without the involvement of mediators. Moreover, the model provides the capability of defining collaboratively and formally the aforementioned coupons that can be handled by means of technologies for payment and value added services. The proposed model is defined in the context of the TITAN Project aiming at defining an integrated service-oriented Software Platform enabling innovative business scenarios for e-money, e-payments and value added services.**

***Keywords*-Semantic Web; Collective Knowledge Systems; e-Business; Service Oriented Architecture; Linked-Data.**



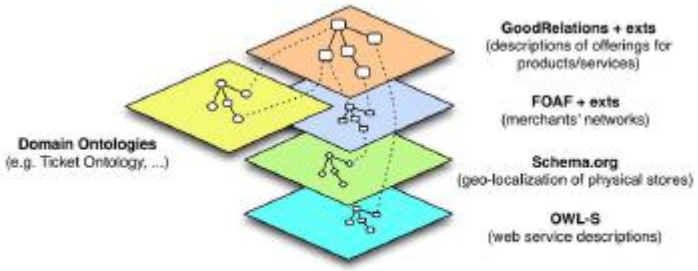


Figure 7: Linked Data for the Semantic Layer

Figure 2: Marketplace Model as Collective Knowledge System

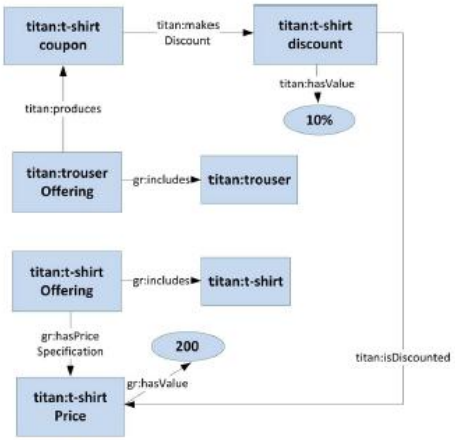


Figure 5: Conditional Coupon Example

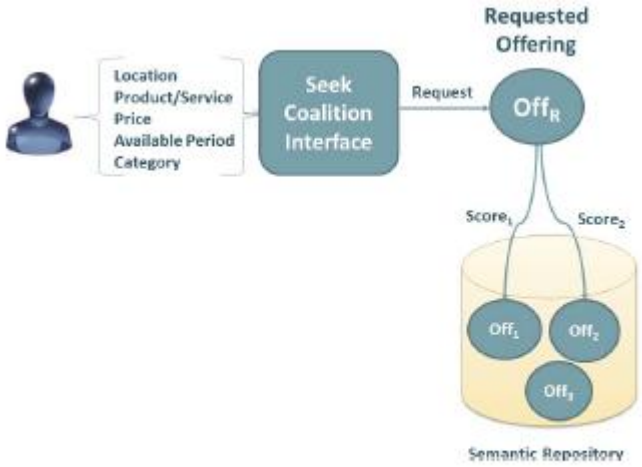


Figure 6: Request Offering

Personality-Based Recommendation in E-Commerce

Ciro Bologna[1], Anna Chiara De Rosa[2], Alfonso De Vivo[3], Matteo Gaeta[4], Giuseppe Sansonetti[4], and Valeria Viserta[2]

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Abstract. In recent years there has been an exponential increase in the number of users each day adopting e-commerce as a purchasing vehicle of products and services. This has led to a growing interest from the scientific community in approaches and models that would improve the customer experience. Specifically, it has been repeatedly pointed out that the definition of a customer experience tailored to the user personality traits would likely increase the probability of purchase. In this article we illustrate a recommender system for e-commerce capable of adapting the product and service offer according to not only the user interests and preferences, and his context of use, but also his personality profile derived from information relating to his professional activities.

Keywords: Personality-based, user model, context-awareness, recommender system, e-commerce

A Genetic Approach to Plan Shopping in the AmI-based Blended Commerce

Matteo Gaeta, *Member, IEEE,* Vincenzo Loia, *Senior Member, IEEE,* Francesco Orciuoli, *Member, IEEE,* and Maurizio Parmentola

***Abstract*—This work describes an approach to sinergistically exploit Ambient Intelligence, Smartphones of last generation and Genetic Computation in order to support innovative Blended Commerce scenarios. The paper proposes both a framework for AmI-based Blended Commerce and an instantiation of this framework to implement a scenario where a Shopping Mall is presented as an intelligent environment in which customers use the NFC capabilities of their smartphones in order to manage e-coupons that are produced, suggested (also in a context-aware way) and consumed by the same environment. In this scenario, the main function of the intelligent environment is supporting customers to define shopping plans that minimize their total costs by looking for best prices and most convenient discounts for the needed products. The paper proposes a genetic approach to find sub-optimal solutions for the shopping plan problem that is not trivial given that the final cost for a single product of a plan is dependent by the previous purchases because, in a coupon world, every purchase could generate a discount for next purchases.**

***Index Terms*—Ambient Intelligence, Blended Commerce, e-Couponing, Genetic Algorithm, Shopping Plan**