ISTI NEWS

Smart Area

The CNR Smart Area as a part of the Smart City project

Most of the large cities of today have to face immense problems in terms of development, traffic, social services, security, pollution, climate, health, and much more. Consequently, many European cities are currently developing strategies aimed at becoming "smart cities"; such strategies are based on an assessment of the future needs of these cities, an innovative usage of ICT technologies, the development of new applications, and a multidisciplinary approach to the solution of problems. An important aspect of this innovation process is the high level of active involvement of the citizens in the process itself, as they are the final users of the complex ecosystem in which the smart cities are evolving.
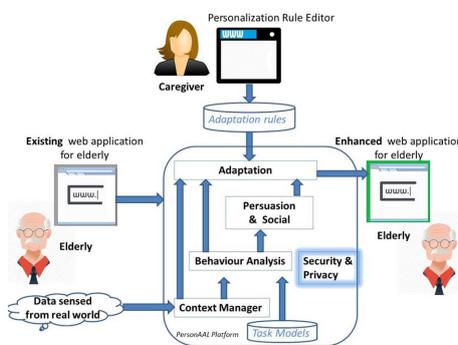
Neptune Restoration

Technologies for 3D digitization are becoming mature resources. Technological progress is offering us a wide range of sensing devices, which can be easily deployed in the real world and produce streams of sampled data with increased density and easier iteration of the sampling process.

PersonAAL

Active and Assisted Living program

The goals of the project are to extend the time elderly people can live in their home environment by providing intelligent and intuitive Web applications enabling users to receive personalized and context-dependent assistance.

Editorial

To Our Readers

ISTI News is a new initiative of the Institute of Information Science and Technologies "A. Faedo" of the Italian National Research Council (CNR).

Our aim is to be able to communicate easily with the national and international scientific communities and, more generally, with the communities of reference in our area, wherever they may be located. Our intention is to provide information on our activities and to divulge our most important results and achievements.

National Research Council of Italy

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To Our Readers

[Continued]

ISTI wants to reach as wide an audience as possible. Many people, mostly professionals, visit our website looking for specific topics or contacts. Through this newsletter we hope to reach an even larger number of people, from many different areas, providing them with a summary of recent activities in our Institute, new scientific results, collaborations and agreements, …

ISTI News is organized into sections:

- An editorial, usually from the Director, highlighting a selected "topic", an activity which has recently characterized or is currently characterizing the life of the Institute. The editorial in this first number is easy: it merely illustrates the underlying motivations and the content of our newsletter. However, in general, the editorial will cover a hot topic in ICT (e.g., big data, deep learning, digital fabrication, …) and the position of experts of our Institute on it.
- A cover story containing a description of current activities in one of the Institute's flagship projects. For the initial number of ISTI News, we decided to dedicate the cover story to our Smart Campus project, which is focused on renewable energy sources and energy sustainability. The project involves not only a number of research laboratories of the Institute but also several other Institutes of the CNR Research Campus in Pisa (http://www.smart-applications.area.pi.cnr.it/).
- A brief description of newest research projects, a selection of recently published scientific papers, a description of open source software tools we have developed and made available.
- Information on our technology transfer activities, internal initiatives for young researchers, cooperation agreements, awards, new employees, ….

ISTI News wants to be both lightweight and divulgative. Further information on topics of interest can be obtained from the web of the Institute via the many links scattered throughout the texts or directly from the ISTI staff, whose contact details are provided at the bottom of their contributions. The number of sections and number of pages will vary from issue to issue and, at times, we will include editorials from external contributors.

All of us at ISTI sincerely hope that the "News" will help towards a better and wider knowledge of our activities, both in Europe and beyond. And if this knowledge should lead to new collaborations, new research activities, new projects, then "ISTI News" will have centred its objective.

Happy reading!

Claudio Montani, ISTI Director

Smart Area

The CNR Smart Area as a part of the Smart City project

[continued]

Since the end of the 1990s, many cities have initiated smart initiatives. In the Digital Agenda of the European Commission, cities are considered as innovation drivers in areas such as environment, inclusion, health and business.

The deployment of digital solutions relies on a series of information, communication, and programming technologies, most of them becoming available in the last two decades. The evolution of these technologies (which has been extremely rapid), together with the explosion of the Internet for global information dissemination has driven the creation of smart cities. Most of these changes fall into four categories: 1) the diffusion of the World Wide Web and the related technologies, 2) the increase in communication bandwidth, 3) the development of embedded systems and wireless networks, and 4) the diffusion of smart phones.

In the smart cities context, in the second half of 2013, CNR launched a project entitled Renewable Energy and ICT for Energy Sustainability (Energia da Fonti Rinnovabili e ICT per la Sostenibilità Energetica). The project was based on the widespread use of renewable energy sources (and related storage technologies and management of

energy flow) and the extensive use of ICT technologies for an enhanced management of the energy flows, thus making energy services more efficient by adapting them to demand (and, therefore, encouraging the energy saving and rational use), with the informed involvement of citizens. One group of researchers in the CNR area of Pisa was involved in a part of this large project, and on October 31, 2014, they presented a preliminary experimentation in the area. However, a smart energy diffusion and management is only one aspect, of a smart city. The CNR Area in Pisa (the largest CNR campus in Italy) can be seen as a small city where smart technologies and applications can be tested before being applied in a real world environment.

The Area experiences every day many problems related to parking, transportation, surveillance, maintenance, energy, localization, and so on... thus, why not develop smart applications to transform the Area into a Smart Area. These applications are useful to the people working in or visiting the Area but they also are of interest for the public administration of the city of Pisa.

Therefore, we are using the CNR Area as a laboratory in which to redesign some infrastructures and to test some applications related to parking, transportation and navi-

gation within the Area, energy management and access authorization to the Area.

The added value of this large effort, sustained by a consistent group of researchers and technicians, is twofold: on one side, all the developed applications are CNR-marked, which means that we can "put our hands" in the applications as we like (no commercial solutions have been chosen); on the other side, each application is autonomous while sharing its data with the data of all the other applications, putting them in a common database on a cloud. The data collected are open to any smart application of the area that wants to access them; each application can access the data of the other applications thus enabling cross-information that allows the enhancement of the application itself and the development of new applications.

New applications are now under development, and they will be briefly described in the next number of this ISTI news.

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ArchAIDE

Archaeological Automatic Interpretation and Documentation of cEramics
Co-funded by Horizon 2020 - Reflective 6

This project aims at providing an innovative approach and infrastructure to support the archaeological documentation and interpretation process (during both fieldwork and post-excavation analysis). Our idea is to support the classification and interpretation work of the archaeologist with innovative computer-based tools.

ArchAIDE will take up the challenge of building a scalable and easy-to-use technology for documenting ceramic findings of archaeological excavations directly on the field, for supporting archaeologists in the subsequent interpretation phase (providing the user with features for the semi-automatic characterization and matching of each discovered potsherd over the huge existing catalogues), for the archival of all the data on a remote repository and, finally, providing easy access to the data for the professional and non-professional community. This platform (based on an app for mobile devices and a remote archive) will contribute to de-centre cultural heritage away from institutional structures towards the individual. The system will be designed to provide easy-to-use interfaces (e.g. touch-based definition of the potsherd profile from a photograph acquired with the mobile device) and will support efficient and powerful algorithms for characterization, search and retrieval of possible visual/geometrical correspondences over a complex database built from the data provided by classical 2D printed repositories.

The project consortium includes nine partners: Dipartimento di Civiltà e Forme del Sapere - University of Pisa (Italy), ISTI-CNR (Italy), Blavatnik School of Computer Science (Israel), ADS Archeology Data Service - University of York (UK), Material Culture and Archaeometry - University of Barcelona (Spain), University of Cologne (Germany), BARAKA Arqeologos s.l. (Spain), ELEMENTS Centre de Gestió i Difusió de Patrimoni Cultural (Spain), INERA s.r.l. (Italy).

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BASMATI

Cloud Brokerage Across Borders for Mobile Users and Applications
Co-funded by the Horizon 2020

Clouds and mobile applications have been two key drivers for innovation in the last decade, strengthening industrial competitiveness and economic growth. The current technological and social landscape calls for a shift towards the introduction of a hybrid computing paradigm, following the rise and limitations of mobile applications. BASMATI aims at providing a complete ecosystem that integrates cloud federation with mobile devices, while addressing challenges related to resource heterogeneity, ultra-scalable provisioning, offloading, context and situation identification, quality of service and security guarantees, targeting (crowds of) users accessing their data and applications across borders. BASMATI will provide an integrated brokerage platform targeting federated clouds with heterogeneous resources and supporting efficient, cost-effective mobile cloud applications in a transparent and ubiquitous manner. Runtime-adaptable federation considering business aspects, dynamic and runtime-optimized brokerage and offloading decisions will enable fully automated resource exploitation: cloud to cloud, device to federation and device to device. Modelling and prediction of applications and users in terms of mobility patterns, behavior and interactions will provide insight with respect to these decisions, while runtime reconfiguration of mobile services will foster the achievement of ultra-scalability. The envisioned hybrid infrastructure management will allow abstracting heterogeneous resources and enabling dynamic service networks based on evolving situations. BASMATI will be evaluated against three real-world use cases: Large Events management (including audio-streaming in dynamic and crowded scenarios), TripBuilding in dynamic environments and Virtual Mobile Desktop for highly nomadic users, which will be provided by the BASMATI platform and validated during a 2018 international large event (Das Fest) counting 250,000 participants over a week.

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Personalized web applications to improve quality of life and remote care for older adults

## Co-funded by the Active and Assisted Living program (AAL-2014)

The goals of the project are to extend the time elderly people can live in their home environment by providing intelligent and intuitive Web applications enabling users to receive personalized and context-dependent assistance. Personalization technology is incorporated to enable the matching of the solution with the user capabilities and needs, and to improve quality of life and decrease healthcare delivery cost.

PersonAAL will provide an authoring environment that incorporates accessibility concerns and design-for-all principles during the Web application development, and run-time support able to adapt and customize previously authored care applications to elderly users, their changing abilities, their environment and device characteristics. The selection of the most suitable user interfaces will be performed by an intelligent platform on the basis of the current context of use (which considers various aspects such as the characteristics of the user, the surrounding physical/social environment, the current available devices) and with the support of adaptation rules provided by formal and informal care givers.

The expected results are: an authoring environment for personalization rules to apply to the Web applications; run-time support to adapt previously authored care applications to elderly users; evaluation of the personalization technologies on three existing support applications.

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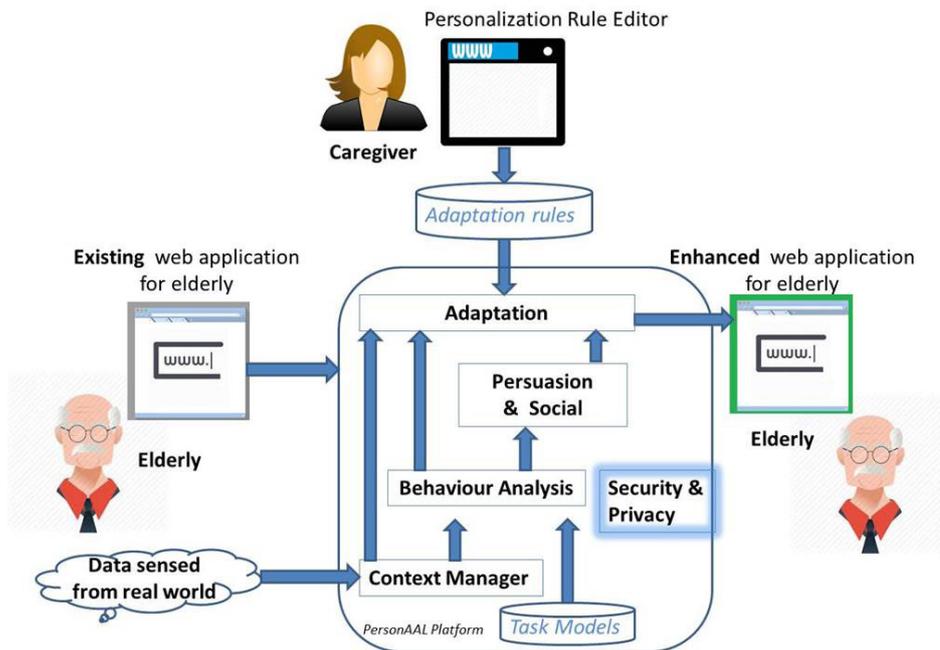
OPENing UP new methods, indicators and tools for peer review, dissemination of research results, and impact measurement

Co-funded by Horizon 2020 - Reflective 6

Open Access and Open Scholarship have revolutionized the way scholarly artefacts are evaluated and published, while the introduction of new technologies and media in scientific workflows has changed "how and to whom" science is communicated, and how stakeholders interact with the scientific community. OpenUP addresses key aspects and challenges of the currently transforming science landscape and aspires to come up with a cohesive framework for the review, disseminate and assess phases of the research life cycle that is fit to support and promote Open Science. The main objectives are to a) identify and determine ground-breaking mechanisms, processes and tools for peer-review for all types of research results (publications, data, software), b) explore, identify and classify innovative dissemination mechanisms with an outreach aim towards business and industry, education, and society as a whole, and c) analyze a set of novel indicators that assess the impact of research results and correlate them with channels of dissemination. It will do so by following a user-centered, evidence-based approach, engaging all stakeholders (researchers, publishers, funders, institutions, industry, public) in an open dialogue through a series of workshops, conferences and training, and validating all interim results via a set of seven pilots involving communities from four research disciplines: life sciences, social sciences, arts & humanities, energy. It will finally produce a set of concrete, practical, validated policy recommendations & guidelines for national and European stakeholders, including EU institutions. This will prove a valuable tool in advancing a more open and gender-sensitive science system. OpenUP partners bring expertise and capacity for evaluating and promoting new approaches in support of open science with decade-long experiences in establishing OA e-Infrastructures, excellent skills and innovative approaches for dissemination, impact indicators and policy design and implementation.

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MOSCARDO

Co-funded by the Tuscany Region under the FAR-FAS 2014 program

The structural health monitoring of ancient masonry constructions is a key issue in the field of cultural heritage maintenance. In this context, a very important approach is the use of totally non-destructive techniques, such as the measurement of the environmental vibrations of the structure. The potentially disastrous effects of severe seismic events are an additional factor underscoring the importance of prevention.

While great efforts have been made to monitor the surfaces of ancient monuments, the level of the technology applied to control their structural health is still generally quite low. A typical program of structural monitoring involves technicians periodically carrying out a series of measurements. More recently, procedures have been developed to test the structural health of ancient buildings by analyzing their dynamic response to natural or artificial vibrations. Such procedures are recognized as a good way to test the state of conservation of a building, and are also important aids in identifying when interventions are necessary. They consist in taking regular measurements via wired acceleration and displacement sensors, which are removed after usage. These techniques generally involve high maintenance costs and thus make the continuous acquisition of the large amounts of data necessary for effective monitoring impossible.

The MOSCARDO project was set up to develop an integrated set of technologies aimed at assessing the conservation status of masonry constructions and monitoring their behavior over time. Its three technological pillars are: 1) a flexible platform for data acquisition through different types of sensors installed on buildings; 2) software able to monitor and model the mechanical behavior of the structure under study; 3) an augmented reality application that combines the video coming from a drone and the collected data. By exploiting the gathered data the software will enable numerical modelling of a building in order to assess its structural safety thresholds. The tools to be developed must be inexpensive, easy to deploy and capable of providing information suitable to the goal of defining intervention priorities. The project is conducted by the "Wireless Networks", "Mechanics of Materials and Structures" and "Signal and Images" laboratories.

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SELFIE

Co-funded by the Tuscany region under the FAR-FAS 2014 program

Selfie aims at designing, developing and realizing innovative and high performance components and systems for buildings. The purpose is to promote cooperation among involved companies with research centers available in Tuscany, in order to design innovative components. These components will be characterized by an innovative technical-scientific content and will fulfill regulation requirements (energy saving, indoor comfort, structural safety, accessibility), while, respecting the environment. Selfie will also include the realization of an original procedural methodology, to be exploited by the company partners, to develop and realize the prototypal components.

Selfie will use innovative materials and engineering solutions aiming at developing and realizing combined wall components, composed by transparent and opaque modules where integrate multilayer panel system. The panel system is composed by nano-

structured materials and surfaces and can be integrated with energy production systems such as new generation solar panels. An innovative casing component aims at guaranteeing:

- Energetic consumption and CO_2 emission reduction;
- Wellness and health;
- Indoor and outdoor pollution reduction;
- Energy production;
- Integrated performance control system.

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Smart News: Social Sensing For Breaking News

Co-funded by the Tuscany Region under the FAR-FAS 2014 program

Exploiting the huge amount of information provided by social media users, Smart News develops tools for breaking news management, helping journalists in the process of discovering and collecting information, and writing news. Smart News applies the paradigm of social sensing in which users serve as sensors.

The exploitation of social media data in the management of breaking news poses several challenges: the timely detection of upcoming events, the acquisition of a higher level of situational awareness, the trustworthiness of the gathered data, and the quality and reliability of the content.

Smart News will be able to detect events in near real time starting from social media data. When a new event is detected, it will

provide additional information about the event, exploiting data mining, text mining and image analysis, in order to increase situational awareness. To keep users involved in the process, trustworthy eyewitnesses, identified automatically, are asked to provide additional details about what is happening.

The project consortium includes 4 partners: Hyperborea, the Institute of Informatics and Telematics (IIT), the Institute of Information Science and Technologies (ISTI), the

Institute for Computational Linguistics "A. Zampolli" (ILC) of the National Research Council (CNR).

In the context of the project, ISTI is responsible for automatic social media analysis through the use of Deep Learning technologies.

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Human activity recognition using multisensor data fusion based on reservoir computing

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Journal of Ambient Intelligence and Smart Environments, vol. 8 (2). IOS Press, 2016.

Activity recognition plays a key role in providing activity assistance and care for users in smart homes. In this work, we present an activity recognition system that classifies in near real-time a set of common daily activities exploiting both the data sampled by sensors embedded in a smartphone carried by the user and the reciprocal Received Signal Strength (RSS) values coming from wireless sensor devices worn by the user and from sensors deployed in the environment. In order to achieve an effective and responsive classification, a decision tree based on multisensor data-stream is applied fusing data coming from the embedded sensors on the smartphone and the environmental sensors before processing the RSS stream. To this end, we model the RSS stream, obtained from a Wireless Sensor Network (WSN), using Recurrent Neural Networks (RNNs) implemented as efficient Echo State Networks (ESNs), within the Reservoir Computing (RC) paradigm. We targeted the system for the EvAAL scenario, an international competition that aims at establishing benchmarks and evaluation metrics for comparing Ambient Assisted Living (AAL) solutions. In this paper, the perfor-

mance of the proposed activity recognition system is assessed on a purposely collected real-world dataset, taking also into account a competitive neural network approach for performance comparison. Our results show that, with an appropriate configuration of the information fusion chain, the proposed system reaches a very good accuracy with a low deployment cost.
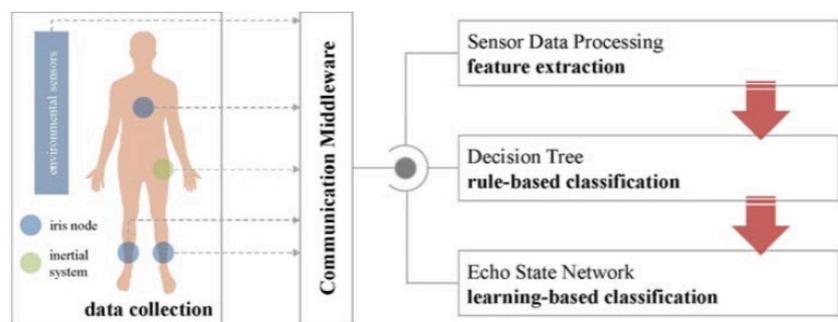
Modelling and analysing variability in product families: model checking of modal transition systems with variability constraints

M.H. Ter Beek, A. Fantechi, S. Gnesi, F. Mazzanti
Journal of Logical and Algebraic Methods in Programming, vol. 85 (2). Elsevier, 2016.

We present the formal underpinnings of a modelling and analysis framework for the specification and verification of variability in product families. We address variability at the behavioral level by modelling the family behavior by means of a Modal Transition System (MTS) with an associated set of variability constraints expressed over action labels. An MTS is a Labelled Transition System (LTS) which distinguishes between optional and mandatory transitions. Steered by the variability constraints, the inclusion or exclusion of labelled transitions in an LTS refining the MTS determines the family's possible product behavior. We formalize this as a special-purpose refinement relation for MTSs, which differs fundamentally from the classical one, and show how to use it for the definition and derivation of valid product behavior starting from product family behavior. We also present a variability-aware action-based branching-time modal temporal logic to express properties over MTSs, and demonstrate a number of results regarding the preservation of logical properties from family to product behavior. These results pave the way for the more efficient family-based analyses of MTSs, limiting the need for product-by-product analyses of LTSs.

Finally, we define a high-level modal process algebra for the specification of MTSs. The complete framework is implemented in a model-checking tool: given the behavior of a product family modelled as an MTS with an additional set of variability constraints, it allows the explicit generation of valid product behavior as well as the efficient on-the-fly verification of logical properties over family and product behaviour alike.

Achieving functional and nonfunctional interoperability through synthesized connectors

N. Nostro, R. Spalazzese, F. Di Giandomenico, P. Inverardi
Journal of Systems and Software, vol. 111. Elsevier, 2016.

Our everyday life is pervaded by the use of a number of heterogeneous systems that are continuously and dynamically available in the networked environment and must interoperate to achieve some goal. Goals may include both functional and nonfunctional aspects and the evolving nature of the environment requires automated solutions as means to reach the needed level of flexibility. Achieving interoperability in such environments is a challenging problem. Even though some systems may in principle interact since they have compatible functionalities and similar interaction protocols, mismatches in their protocols and *non* functional issues arising from the environment may undermine their seamless interoperability. In this paper, we propose an approach for the automated synthesis of application layer connectors between heterogeneous
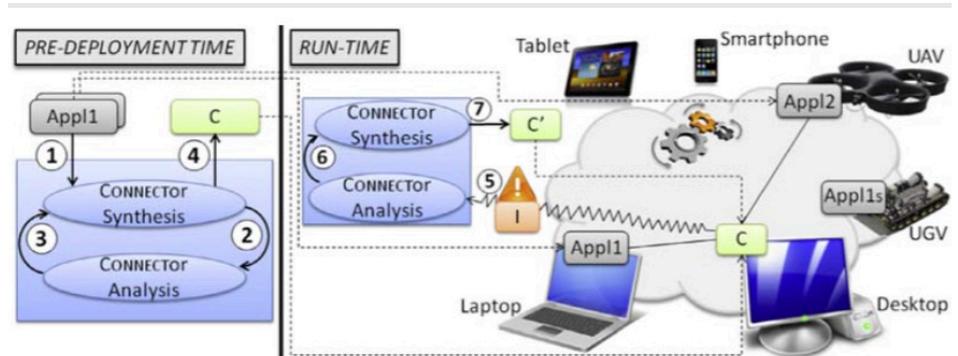
networked systems (NSs) addressing both functional and some non functional interoperability.

Our contributions are:(i) an automated connectors synthesis approach for NSs interoperability taking into account functional, performance and dependability aspects

spanning pre-deployment time and run-time; (ii) a connector adaptation process, related to performance and dependability aspects; and (iii) a stochastic model-based implementation of the performance and dependability analysis. In addition, we implemented, analysed, and critically discussed a case study.

An experience on applying process mining techniques to the Tuscan port community system

G.O. Spagnolo, E. Marchetti, A. Coco, P. Scarpellini, A. Querci, F. Fabbrini, S. Gnesi
SWQD 2016 - Software Quality. The Future of Systems and Software Development. (Lecture Notes in Business Information Processing, vol. 238). Springer, 2016.

Business Process Management is an important and widespread adopted methodology for modelling process specifications and developing an executable framework for the management of the process itself. In particular the monitoring facilities associated with the on-line process execution provide an important means for the control of process evolution and quality. This paper documents a test case of the application of business

process modelling techniques and process mining techniques to the TPCS, Tuscan Port Community System.

This is a web-services based platform with multilevel access control and data recovery facilities, developed for supporting and strengthening the Motorways of the Sea and Italian regulations.

The paper describes a storytelling approach applied to derive the TPCS business process model and the conformance checking techniques used to validate it and improve overall TPCS software quality.

An environment for end-user development of Web mashups

G. Ghiani, F. Paternò, L.D. Spano, G. Pintori
International Journal of Human-Computer Studies, vol. 87. Elsevier, 2016.

End-User Development aims to find novel ways that are suitable and intuitive for end users to create their own applications. We present a graphical environment in which users create new mashups by directly selecting interaction elements, content and functionalities from existing Web applications without requiring the intervention of expert developers. Users just need to exploit a copy-paste metaphor to indicate how to compose the selected interactive content and functionalities in the new mashup. The environment is enabled by a Web-based platform accessible from any browser, and is suitable for users without particular programming skills.
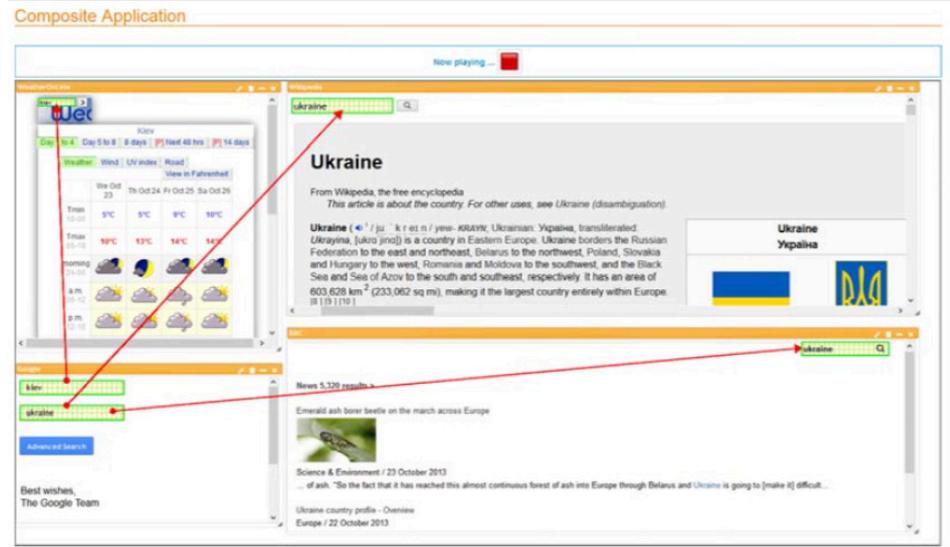
We describe the architecture of our platform and how it works, including its intelligent support. We also show example applications, and results of first user studies.

Going beyond GDP to nowcast well-being using retail market data

R. Guidotti, M. Coscia, D. Pedreschi, D. Pennacchioli
NetSci-X - Advances in Network Science. (Lecture Notes in Computer Science, vol. 9564). Springer, 2016.

One of the most used measures of the economic health of a nation is the Gross Domestic Product (GDP): the market value of all officially recognized goods and services produced within a country in a given period of time. GDP, prosperity and well-being of the citizens of a country have been shown to be highly correlated. However, GDP is an imperfect measure in many respects. GDP usually takes a lot of time to be estimated and arguably the well-being of society is not quantifiable simply by the market value of the products available.

In this paper we use a quantification of the average sophistication of satisfied needs of a population as an alternative to GDP. We show that this quantification can be calculated more easily than GDP and is a very promising predictor of the GDP value, anticipating its estimation by six months. The measure is arguably a more multifaceted evaluation of the well-being of a population, as it tells us more about how people are satisfying their needs.
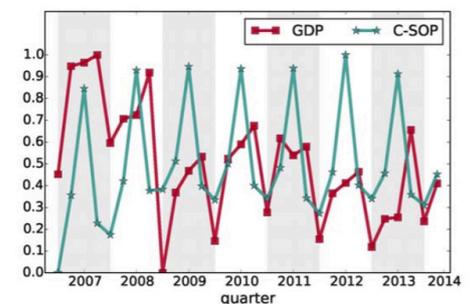
Our study is based on a large dataset of retail micro transactions across the Italian territory.

Distributional correspondence indexing for cross-lingual and cross-domain sentiment classification

A. Moreo Fernandez, A. Esuli, F. Sebastiani
Journal of Artificial Intelligence Research, vol. 55. AAAI Press, 2016.

Domain Adaptation (DA) techniques aim at enabling machine learning methods to learn effective classifiers for a "target" domain when the only available training data belongs to a different "source" domain. In this paper we present the Distributional Correspondence Indexing (DCI) method for domain adaptation in sentiment classification. DCI derives term representations in a vector space common to both domains where each dimension reflects its distributional correspondence to a pivot, i.e., to a highly predictive term that behaves similarly across domains. Term correspondence is quantified by means of a distributional correspondence function (DCF). We propose a number of efficient DCFs that are motivated by the distributional hypothesis, i.e., the hypothesis according to which terms with similar meaning tend to have similar distributions in text. Experiments show that DCI obtains better performance than current state-of-the-art techniques for cross-lingual and cross-domain sentiment classification. DCI also brings about a significantly reduced computational cost, and requires a smaller amount of human intervention.

As a final contribution, we discuss a more challenging formulation of the domain adaptation problem, in which both the cross-domain and cross-lingual dimensions are tackled simultaneously.

Are scientific data repositories coping with research data publishing?
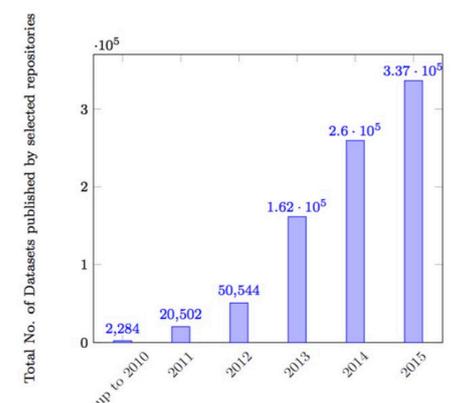
M. Assante, L. Candela, D. Castelli, A. Tani
Data Science Journal, vol. 15 article n. 6. Ubiquity Press, 2016.

Research data publishing is intended as the release of research data to make it possible for practitioners to (re)use them according to "open science" dynamics. There are three main actors involved in research data publishing practices: researchers, publishers, and data repositories.

This study analyses the solutions offered by generalist scientific data repositories, i.e., repositories supporting the deposition of any type of research data. These repositories cannot make any assumption on the application domain. They are actually called to face the almost open ended typologies of data used in science. The current practices promoted by such repositories are analysed with respect to eight key aspects of data publishing, i.e., dataset formatting, documentation, licensing, publication costs, validation, availability, discovery and access, and citation.

From this analysis it emerges that these repositories implement well consolidated practices and pragmatic solutions for literature repositories. These practices and solutions cannot totally meet the needs of management and the use of datasets resources, especially in a context where rapid techno-
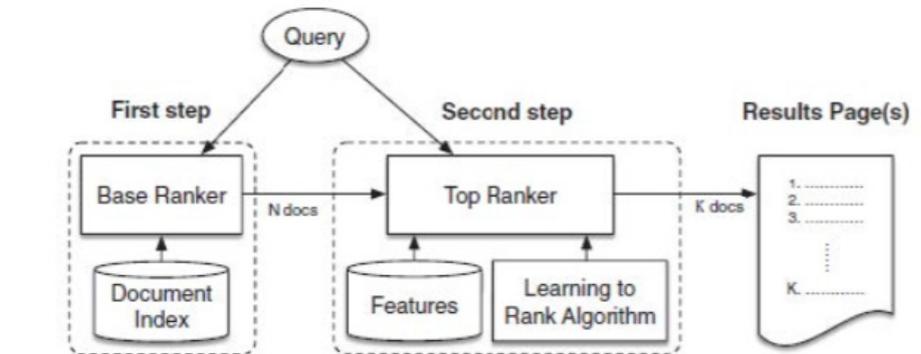

logical changes continuously open new exploitation prospects.

Quality versus efficiency in document scoring with learning-to-rank models

C. Lucchese, F.M. Nardini, S. Orlando, R. Perego, N. Tonellotto, G. Capannini
Information Processing & Management. Elsevier (in press).

Learning-to-Rank (LtR) techniques leverage machine learning algorithms and large amounts of training data to induce high-quality ranking functions. Given a set of documents and a user query, these functions are able to precisely predict a score for each of the documents, which is then exploited to effectively rank them. Although the scoring efficiency of LtR models is critical in several applications – e.g., it directly impacts on response time and throughput of Web query processing – it has received relatively little attention so far.

The goal of this work is to experimentally investigate the scoring efficiency of LtR models along with their ranking quality. Specifically, we show that machine-learned ranking models exhibit a quality versus efficiency trade-off. For example, each family of LtR algorithms has tuning parameters that can influence both effectiveness and efficiency, where higher ranking quality is generally obtained with more complex and expensive models. Moreover, LtR algorithms that learn complex models, such as those based on forests of regression trees, are gener-

ally more expensive and more effective than other algorithms that induce simpler models like linear combination of features.

We extensively analyze the quality versus efficiency trade-off of a wide spectrum of state-of-the-art LtR, and we propose a sound methodology to devise the most effective ranker given a time budget. To guarantee reproducibility, we used publicly available datasets and we contribute an open source C++ framework providing optimized, multi-threaded implementations of the most effective tree-based learners: Gradient Boosted Regression Trees (GBRT), Lambda-

Mart (λ-MART), and the first public-domain implementation of Oblivious Lambda-Mart (Ω_λ-MART), an algorithm that induces forests of oblivious regression trees.

We investigate how the different training parameters impact on the quality versus efficiency trade-off, and provide a thorough comparison of several algorithms in the quality-cost space. The experiments conducted show that there is not an overall best algorithm, but the optimal choice depends on the time budget.

A proactive system for maritime environment monitoring

G. Pieri, D. Moroni, M. Tampucci, O. Salvetti
Marine Pollution Bulletin, vol. 102 (2). Elsevier, 2016.

The ability to remotely detect and monitor oil spills is becoming increasingly important due to the high demand of oil-based products. As shipping routes become very crowded, the likelihood of oil slick occurrence is increasing. In this framework, a fully integrated remote sensing system can be a valuable monitoring tool.

We propose an integrated and interoperable system able to monitor ship traffic and marine operators, using sensing capabilities from a variety of electronic sensors, along with geo-positioning tools, and through a communication infrastructure.
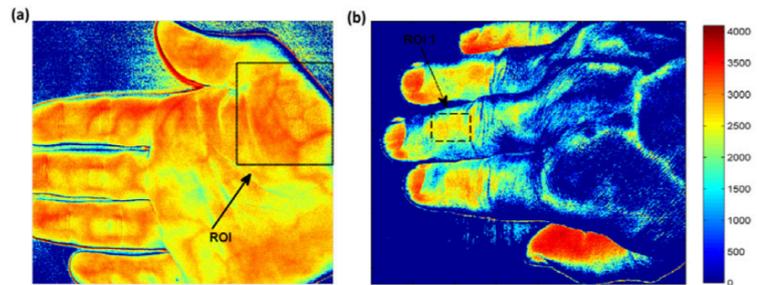
Our system is capable of transferring heterogeneous data, freely and seamlessly,

between different elements of the information system (and their users) in a consistent and usable form. The system also integrates a collection of decision support services providing proactive functionalities. Such services demonstrate the potentiality of the system in facilitating dynamic links among different data, models and actors, as indicated by the performed field tests.

Near infrared image processing to quantitate and visualize oxygen saturation during vascular occlusion

B. Jalil, O. Salvetti, L. Potì, V. Hartwig, M. Marinelli, A. L'Abbate
Computer Methods and Programs in Biomedicine, vol. 126. Elsevier, 2016.

The assessment of microcirculation spatial heterogeneity on the hand skin is the main objective of this work. Near-Infrared Spectroscopic based on 2D imaging is a non-invasive technique for the assessment of tissue oxygenation. The haemoglobin oxygen saturation images were acquired by a dedicated camera (Kent Imaging) during baseline, ischemia (brachial artery cuff occlusion) and reperfusion. Acquired images underwent a preliminary restoration process aimed at removing degradations occurring during signal capturing. Then, wavelet transform based multiscale analysis was applied to identify edges by detecting local maxima and minima across successive scales. Seg-

mentation of test areas during different conditions was obtained by thresholding-based region growing approach.

The method identifies differences in microcirculatory control of blood flow in different regions of the hand skin.

The obtained results demonstrate the potential use of NIRS images for the clinical evaluation of skin disease and microcirculatory dysfunction.

Detection of geometric temporal changes in point clouds

G. Palma, P. Cignoni, T. Boubekeur, R. Scopigno
Computer Graphics Forum. Elsevier (in press).

Technologies for 3D digitization are becoming mature resources. Technological progress is offering us a wide range of sensing devices, which can be easily deployed in the real world and produce streams of sampled data with increased density and easier iteration of the sampling process.

All these data need to be processed and displayed in a new way. An important issue is how to detect geometric changes between

different samplings of the same scene, performed by multiple acquisitions occurring at different times. This is a critical operation for all applications or systems requiring a precise segmentation between the change and no-change regions in the sampled environment. Unfortunately, typical 3D scanning setups cannot provide any one-to-one mapping between measured samples in static regions: in particular, both extrinsic and intrinsic sensor parameters may vary over time while sensor noise and outliers additionally corrupt the data. A multi-scale approach was adopted in a recent paper to robustly tackle these issues. Starting from two point clouds, first outliers are removed using a probabilistic op-

erator. Then, the actual change is detected using the implicit surface defined by the point clouds under a Growing Least Square reconstruction that, compared to the classical proximity measure, offers a more robust change/no-change characterization near the temporal intersection of the scans and in the areas exhibiting different sampling density and direction. The resulting classification is enhanced with a spatial reasoning step to solve critical geometric configurations (small rigid movements of objects, occluded regions) that are common in man-made environments.

This result has been produced in the framework of the EC FET project "HARVEST4D" (2013-2016).
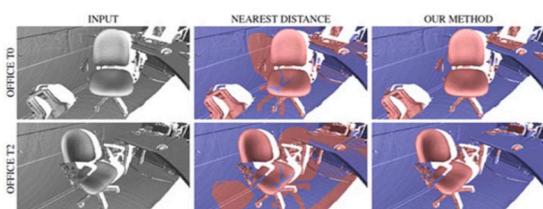
Propagation of waves in masonry-like solids

M. Girardi, C. Padovani, D. Pellegrini
Journal of Mechanics of Materials and Structures. Mathematical Sciences Publishers (to appear).

This paper deals with the propagation of progressive elastic waves in masonry-like solids. The constitutive equation of masonry-like materials models the mechanical behaviour of materials, such as masonry, rocks and stones, that do not withstand tensile stresses. The stress function delivering the Cauchy stress T corresponding to an infinitesimal strain tensor E is nonlinear and differentiable on an open subset W of the set of all strains. We consider the propagation of small amplitude elastic waves in a masonry-like body subjected to a homogenous strain field E belonging to W.

We obtain the propagation condition, which involves the acoustic tensor A(E; n) depending on both E and the direction of propagation n, and prove that, due to the presence of cracks, the wave propagation velocities in masonry are lower than in a linear elastic material.

# Characterization of abandoned rocket body families for active removal

C. Pardini, L. Anselmo
Acta Astronautica, vol. 126 (September-October 2016). Elsevier, 2016.

A new ranking index was developed and applied to a wide set of rocket body families, characterized by stage dry masses greater than 500 kg and by the presence of at least 5 stages abandoned in Low Earth Orbit (LEO). The upper stages selected accounted for more than 80% of the unclassified rocket bodies in LEO and nearly 95% of the associated dry mass. The results obtained for 657 objects clearly identified the most critical altitude-inclination bands and stage models, to be targeted first if and when a debris remediation strategy including the active removal of intact abandoned objects were deemed necessary. Apart from the evaluation of the criticality regarding the long-term evolution of the debris environment, resulting in a priority listing for optimal active removal, the application of the new ranking index is not limited to debris remediation. In fact, if applied before launch to spacecraft and rocket bodies to be disposed in orbit, at the end of the mission, it would provide an additional debris mitigation analysis tool for evaluating competing disposal options.

Concerning the rocket bodies abandoned in LEO, 274 resulted to have a criticality equal or larger than the average intact object abandoned in an 800 km sun-synchronous orbit. Among them, 243 belonged to the Russian Federation and Ukraine, 25 to China, 5 to Europe and 1 to Japan. In addition to being concentrated in relatively few and narrow altitude-inclinations bands, the most numerous rocket body families often present a quite uniform distribution in right ascension of the ascending node, which is especially convenient for multiple target removal missions.
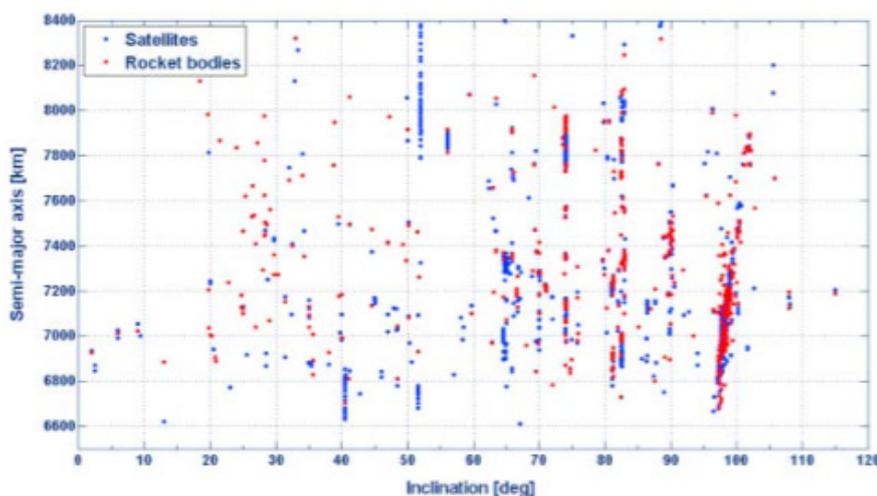
X-CREATE

XaCml REquests derivAtion for TEsting
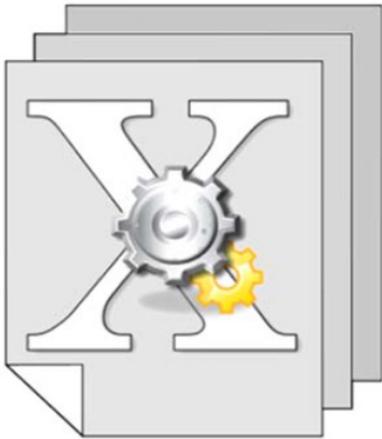
X-CREATE (XaCml REquests derivAtion for TEsting) is a tool for the automatic generation of test inputs from an XACML (eXtensible Access Control Markup Language) policy.

The tool allows the user to select the XACML policy and the testing strategy to be applied. The XACML requests generation is based on combinatorial analysis of the values specified in the XACML policy. X-CREATE also derives a test suite, covering the XACML Context Schema that describes the overall structure of the XACML input requests.

The aim of the derived XACML requests is twofold: testing of policy evaluation engines and testing of access control policies. X-CREATE also targets robustness and negative testing by including random values in the subject, resource, action and environment of an XACML request. To reduce the number of generated test cases the tool lets the user to choose the number of desired requests.

http://labsedc.isti.cnr.it/tools/xcreate
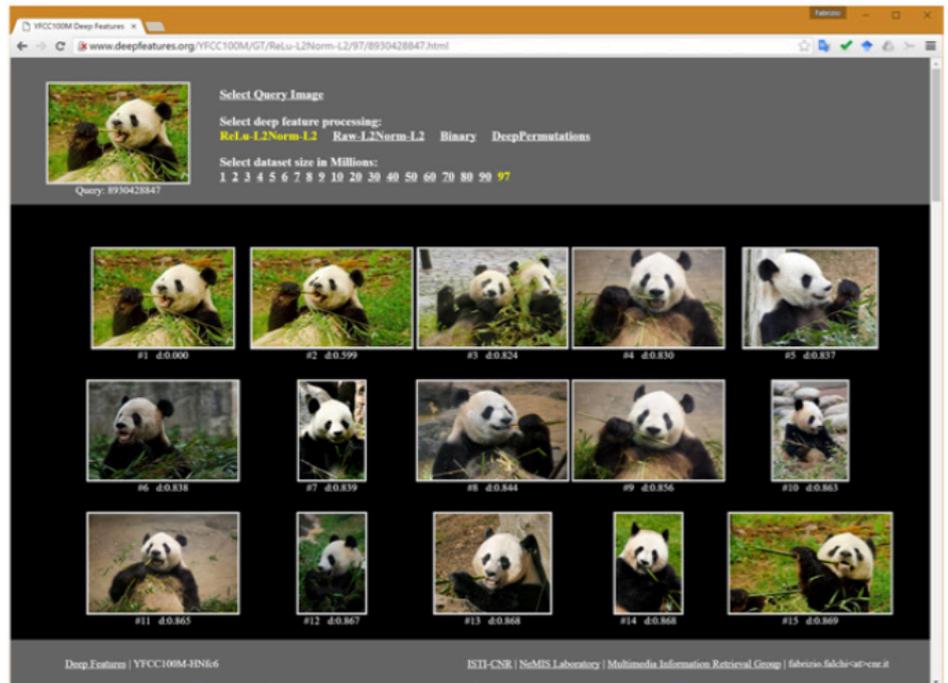**Contact: Said Daoudagh, SEDC Lab**
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YFCC100M-HNfc6

A deep features data benchmark for similarity search

The Yahoo Flickr Creative Commons 100M (YFCC100M) dataset was created in 2014 as part of the Webscope. The dataset consists of approximately 99.2 million photos and 0.8 million videos, all uploaded to Flickr between 2004 and 2014 and published under a Commons or non commercial license.

The Multimedia Information Group of ISTI-CNR has extracted deep features using the Caffe framework. In particular we took the activation of the neurons in the fc6 layer of the Hybrid-CNN whose model and weights are public available in the Caffe Model Zoo. The Hybrid-CNN was trained on 1,183 categories (205 scene categories from Places Database and 978 object categories from the train data of ILSVRC2012 (ImageNet) with ~3.6 million images. The architecture is the same as the Caffe reference network. More information can be found on the CNN model webpage at MIT.

The deep features have been integrated in the corpus maintained by the Commons initiative in an effort to develop and share sets of computed features and ground-

truth annotations for the Yahoo Flickr Creative Commons 100 Million dataset (YFCC100M), which contains around 99.2 million images and nearly 800,000 videos from Flickr, all shared under Commons. We also give Content-Based Image Retrievalvarious approaches and for various subsets of the

datasets. While on the web page you can only see 100 results, 10,001 results for each query are available for download.

http://www.deepfeatures.org
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MAUVE

Multiguideline Accessibility and Usability Validation Environment

During the last decade, Web site accessibility and usability has become increasingly important. Consequently, many tools have been developed for automatic or semi-automatic evaluation of Web site accessibility. Unfortunately, most of them have not been updated over time to keep up with the evolution of accessibility standards and guidelines, thus soon becoming obsolete. Furthermore, the increasing importance of CSS in the definition of modern Web page layout, and the increasing use of scripting technologies in dynamic and interactive Web sites, has led to new challenges in automatic accessibility evaluation that few of the existing tools are able to face. MAUVE is a software environment for Web site accessibility and usability evaluation.

The tool is characterized by the possibili to specify and update the guidelines that should be validated without requiring changes in the tool implementation. It is based on an XML-based language for Web Guidelines Definition. It allows checking both HTML and CSS to detect accessibility issues and is able to validate dynamic sites as well, based on the use of a set of plugins for the most popular browsers.

http://hiis.isti.cnr.it:8080/MauveWeb/
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CHROSTRU

Multiresolution Chromosome Structure

By *Chromosome Conformation Capture*, the genome of a homogeneous population of cells can be split into high-resolution fragments, and the number of times any fragment is found in contact with any other fragment can be counted. The resulting data records are very large. In human cells, more than 280-billion fragment pairs can be produced. These data, map the 3D chromosome structure, and understanding how DNA is structured spatially is a step towards understanding how DNA works. The computational effort needed is thus worthwhile, even though extremely efficient procedures are strictly needed.

We devised a strategy and a Python code, CHROMSTRUCT, to estimate the 3D structure of a (segment of) chromosome, from this kind of data. To face the complexity of this problem, we rely on a multiresolution strategy, by which relatively isolated chromosome segments are estimated independently, and passed recursively to coarser resolution models until no such segment can be detected anymore. The full genomic resolution is then recovered by another recursive procedure. The structure of each segment is reconstructed by sampling (through simulated annealing) the solution space generated by a specially designed score function containing a data-fit term and a constraint term where our prior knowledge on the chromosome geometry can easily be encoded implicitly and flexibly, thus avoiding the classical drawbacks arising when rigid constraints are enforced. Moreover, to build the data fit term, we do not follow the popular choice of translating the original contact frequencies into Euclidean distances, since this entails some not well founded assumptions and topological inconsistencies.

Our code has now been tested on real data, part of chromosome 1 from the human genome. It has proved to produce internally coherent and repeatable solutions, and some geometrical features of the results correlate positively with known functional features of the cells considered. The figure shows the structure of a 100 kbp-resolution data matrix (whose i,j-th entry counts the contacts of the i-th with the j-th fragments) with the detected isolated domains highlighted, and the 3D plots of a result at successive genomic resolutions.

http://www1.isti.cnr.it/~salerno/chrom-struct_folder.zip
Contact: Emanuele Salerno, SI Lab
emanuele.salerno@isti.cnr.it
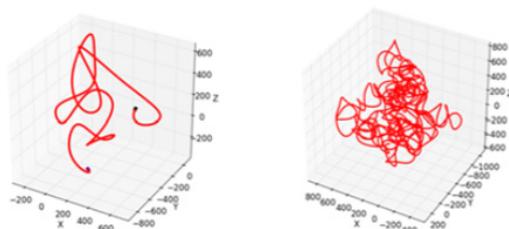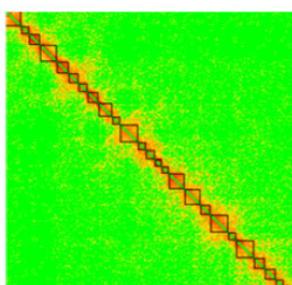
Avionics Communications

WNLAB is involved in the design, testing, and analysis of digital satellite communication protocols, ranging from transport down to medium access layers. Communication satellites play a major role in telephone transmissions, television and radio distribution, computer communications, maritime navigation, and military command and control. Satellite communications differ both from wired and other wireless communications in some peculiar aspects, such as coverage width, signal attenuation pattern, transmission delay. One critical aspect of satellite transmissions is the need for suitable countermeasures to overcome signal degradation due to adverse weather conditions.

In addition to satellites, unmanned aerial vehicle (UAV) communications are a new emerging research topic addressed at WN-LAB.

The use of UAVs is rapidly increasing in many sectors of industry nowadays, since a drone is a perfect candidate for a very large number of scenarios. Currently, a UAV is a cheaper and more flexible communication platform than a satellite, offering a fast deployment of a recognition mission and also being able to operate under cloud-cover conditions, unlike earth observation satellites. However, a UAV can be quickly upgraded, by changing the payload required for the planned mission.

WNLAB is investigating the communication paradigms to be implemented on UAVs, in order to operate as a flying sensing node(drone) in the context of wireless sensor networks. Relevant applications may be in agriculture, for monitoring critical infrastructures, for 3D-reconstruction of historical buildings and structures, for sensing hostile and/or remote sites, where humans can

be substituted by an autonomous system. The research challenges include: Machine to Machine protocols, Information Centric Networking for the Internet of Things, UAVs Swarm Control, line-of-sight and beyond-line-of-sight communication protocols.

Contact: Alberto Gotta, WNLab
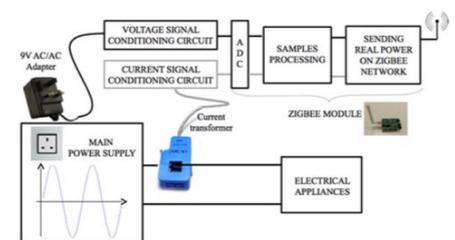**alberto.gotta@isti.cnr.it**

Smart Building

The Smart Building application intends: (i) to provide long-term energy consumption monitoring, (ii) to enable energy saving through automated control and configurable policies, (iii) to provide end-users with access to tools and data, thus fostering energy awareness. To achieve these goals, we developed a wireless sensor network (WSN), where each node is equipped with transducers able to measure the power consumption; the nodes are installed in selected offices of the ISTI-CNR and IIT-CNR Institutes, in the CNR Area. The requirements of the system were low cost sensors, versatility and easy extendibility, non-invasiveness of the installations, and integration with other existing equipment. We chose the ZigBee technology since it is a standard-based wireless technology designed to address the low-power requirement, and it also has a rich model for the representation of the device capabili-

ties. Each node of the WSN is connected to a Zigbee sink, which provides connectivity to the Internet of Things (IoT) through the IPv6 addressing.

Measured power values are then made available to applications through a middleware platform and data query services. The platform provides a solid starting point for the development of location-based services, as it delivers an information service for device power consumption data (appliances, lights). Each in-building sensor is characterized by a physical location (e.g.: office rooms, corridors, common areas, or GPS coordinates).

Activity classification algorithms have been developed by exploiting the in-building sensors, allowing the identification of the in-office activities or habits. Moreover, applications that allow office workers to man-

age their in-office energy consumption by means of mobile devices can be delivered once power-switch actuators are put in place and made available on the communication platform for the automated remote control. Noise, presence and temperature sensors have been also installed to get additional data and develop new applications.

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Preservation of database concepts

Algorithms of *graph partitioning*, exploited in conceptual database design were reused to define a methodology of database concept preservation. Differently from the formal concept analysis, a method of data analysis and knowledge discoveries, where the existence of a concept presupposes the object's existence, in modelling concepts through the graph partitioning algorithms, this constraint is not required. A concept, moreover, can be thought as a labelled box that can be empty at one time, and not empty at a different time.

Concept theory distinguishes *extensionality* from *intensionality*. In extensionality, a collection of objects is determined by its elements, whereas in intensionality, the interest is focused on concepts, properties, etc. It is possible to go from concepts to objects, not vice-versa. Although a formal background is available in concept theory, only recently, an algorithm, *the concept construction algorithm* was introduced. The world of concepts is large and yet unexplored; on the contrary, the world of database classes is well known. A relationship holds between an algorithm of graph partitioning, and the *concept construction algorithm*. The former results in disjoint classes that can be composed in a logical database model; the latter in a concept structure, called *Ontology for database preservation*. It encloses:

- All and only the concepts related to an initial concept structure
- All and only the logical relationships among the determined concepts
- Results in leaves that can be mapped to a logical database model.

The nodes of ontology for database preservation can be *located on a network*, whereas, the existence of a general concept and the logical relationships among concepts favor the *contextual analysis*. Ontology for database preservation represents a concept structure difficult to be implemented, since it cannot enjoy the useful properties of the *is-a relationship*, exploited in modeling database conceptual graphs; however, a characterization of this concept structure, defined at the boundary between concept theory and computer science, has recently been proposed to enhance the implementation.

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The hunt for Asian Predatory Wasp

Asian predatory wasp (*vespa velutina*) is a species of hornet typical of South East Asia, which has recently started invading Europe. It is believed that the first Asian wasps arrived in France in 2004 travelling inside some pottery boxes. In about 10 years, almost all the French countryside has been invaded by this alien species, which is now entering Italy moving along the coastline of Liguria.

Not only does the Asian predatory wasp represent a concern for public safety (since its stings may produce severe anaphylactic shocks), but it is actually a serious threat to the production of honey. In fact, when Asian wasps find a bee colony, they are known to lurk and wait for the preys to exit from the hive. This prevents the scared honeybees from leaving the hive and harvesting for the production of honey.

Answering the concerns of beekeepers, the Italian Ministry of Agricultural, Food and Forestry Policies (MIPAAFF) has initiated plans to counter this imminent invasion. In collaboration with the Centro di Ricerche Agro-Ambientali "Enrico Avanzi" of the University of Pisa, the researchers of the Signals and Images Lab of ISTI-CNR have been called to make their contribution by devising new technologies to better combat Asian predatory wasp. The main goal is to track wasps to discover how they move around in the environment and where their hive is. To this end, researchers at ISTI have designed a miniaturized active radio tag, weighing just a fraction of gram, which can be glued to the back of the wasp. Using a specially-designed receiver, constituted by an antenna and a mobile computer, it is possible to detect the signal emitted by the tag in an electro-magnetic spectrum and follow the specimen through its movements and, eventually, to its nest. The tag can be detected at a distance greater than 2 km and, as the receiver is very compact, it is easy for operators to carry it even in inaccessible places. In this way, it is feasible to detect the presence of primary hives early on with a small number of wasps, before they transform into giant secondary hives, with thousands of insects inside. Work is being carried out to adapt the receiver for use on drones, thus permitting remote tracking of wasps. Our drone has already shown its usefulness in a field test in Liguria in which infrared and visible light cameras were used to analyse wasp behaviour. (Web: http://www.stopvelutina.it/)

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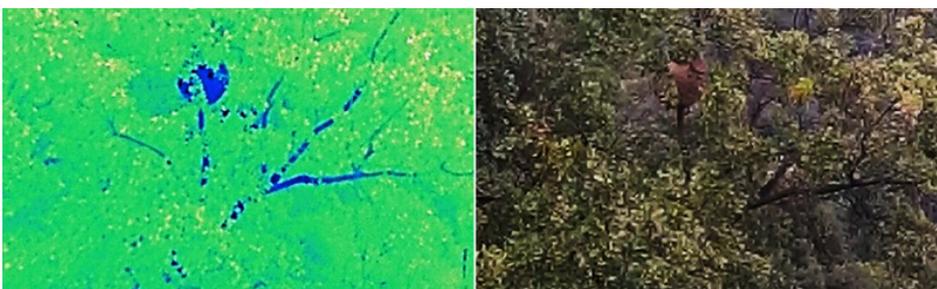
The quest for personal wellbeing: the Wize Mirror in action

SILab is proud to announce that the validation of the WIZE MIRROR in clinical settings started at the beginning of July.

The Wize Mirror is a smart mirror for the self-assessment of personal wellbeing and for the improvement of lifestyle, with particular focus on the prevention of cardio-metabolic diseases. It detects and monitors over time facial signs related to cardio-metabolic risk, by automatically extracting and processing facial descriptors from videos, multispectral images, 3D scans, and the exhaled breath. All these signs are integrated with personal data to estimate a user's wellness index and provide a personalized guidance towards healthy lifestyles.

The Wize Mirror has been developed in the framework of the SEMEOTICONS project, funded by the EU within the FP7 program, and coordinated by CNR (ISTI and IFC).

SEMEOTICONS started on November 2013, and it is now nearing the end, scheduled for this autumn. The Consortium, consisting of ten partners (CNR, UCLAN, FORTH, LIU, CRNH, NTNU, INTECS, DRACO, FORTH-NET, COSMED), worked hard to implement this innovative smart mirror, from the clinical and technological requirements' definition, through its complex design, till its production and refinement from both the hardware and software viewpoint, including the user centric functionalities, and today, its validation.

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Embedded wireless sensors network for the early warning of natural risks

In the framework of a collaboration between ISTI and the "Sapienza" University of Rome, and in particular with the Department of Earth Sciences and Research Centre for Geological Risks (CERI), a research activity has been carried out aimed at the development of methodologies for real-time monitoring of railway tracks. The main goal is to detect events such as fast failures from natural risks, which might threaten the transit of trains.

Among various technologies, it has been decided to experiment and validate the use of Smart Camera Networks (SCN) for early warning of these endangering events.

The experimental activity consisted in monitoring the railway and the surrounding area, in order to infer a real-time report of obstacles hazardous for train transit. Such experiments are conducted on a railway where the SCN has been installed. Each node in the SCN is constituted by a smart camera prototype designed at the Signals and Images Lab (ISTI-CNR). Special computer vision algorithms are deployed on board each camera and are intended to detect morphological anomalies, such as rocky slopes prone to falls, and the presence of unexpected objects along the railway track. Consistently, the SCN is connected via 3G communication and is able to transmit real-time data, thus providing an early warning system.

A case study on a known test site and experimentation with various scenarios have been performed, aiming at the development of algorithms capable of spotting, localising, and consequently managing fast failure events. Preliminary results demonstrate a good performance of the network in monitoring investigated events and providing real-time reports (via email or text messages) of obstacles endangering train transit.

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davide.moroni@isti.cnr.it

Restoration of the Neptune fountain, Bologna, Italy

Technologies for 3D digitization are becoming mature resources. Technological progress is offering us a wide range of sensing devices, which can be easily deployed in the real world and produce streams of sampled data with increased density and easier iteration of the sampling process.

All these data need to be processed and displayed in a new way. An important issue is how to detect geometric changes between different sampling of the same scene, performed by multiple acquisitions occurring at different times. This is a critical operation for all applications or systems requiring a precise segmentation between the change and no-change regions in the sampled environment. Unfortunately, typical 3D scanning setups cannot provide any one-to-one mapping between measured samples in static regions: in particular, both extrinsic and intrinsic sensor parameters may vary over time while sensor noise and outliers additionally corrupt the data.

A multi-scale approach was adopted in a recent paper to robustly tackle these issues. Starting from two point clouds, first outliers are removed using a probabilistic operator. Then, the actual change is detected using the implicit surface defined by the point clouds under a Growing Least Square reconstruction that, compared to the classical proximity measure, offers a more robust change/no-change characterization near the temporal intersection of the scans and

in the areas exhibiting different sampling density and direction. The resulting classification is enhanced with a spatial reasoning step to solve critical geometric configurations (small rigid movements of objects, occluded regions) that are common in man-made environments.

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ISTI Young Researcher Award

Edition 2016

The "Young Researcher Award" is an initiative by ISTI that aims at rewarding and made visible the work by young researchers of the Institute.

The award (2016 was the fourth edition) selects the three best students in two categories (Young, for PhD students and researchers less than 32 years old, and Young++, PhD students and researchers less than 35 years old). The selection is made on the base of the number and quality of the publications produced in the previous year. The winners receive a small sum to support their research activity, and have the possibility to present their research to their colleagues in the context of a cycle of seminars.

Contact: Matteo Dellepiane, VC Lab
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For the 2016 edition, the winners of the two categories were:

Young

Riccardo Guidotti

Luigi Malomo

Luca Pappalardo

Young++

Michele Girolami

Filippo Palumbo

Maria Antonietta Pascali

Grants for Young Mobility

First Call 2016

The ISTI Grants for Young Mobility (GYM) program enables young researchers (below 34) to carry out research in cooperation with foreign Universities and Research Institutions of clear international standing. It complements similar CNR programs.

The winners for the first call 2016 are:

Alessandro Danielis

Andrea Mannocci

Vinicius Monteiro de Lira

Paolo Cignoni
Eurographics Fellow

P. Cignoni (VC Lab) has been elected as a Fellow of the European Association for Computer Graphics in recognition of:

1. Outstanding research contributions in visualization and geometry processing, many of those being presented at EG events;

2. Leadership of open source projects in CG that help in community building;

3. Service to the Eurographics community as executive board member, PhD awards committee member, Eurographics papers chair, IPC member of EG conferences and symposia, editorial member of CGF.

Sara Colantonio
Top 40 Healthcare
Transformers 2016

S. Colantonio (SI Lab) is one of the Top 40 Healthcare Transformers for 2016.
(Medical Marketing & Media magazine http://www.mmm-online.com/top-40-transformers/section/4586/)

Best Paper Award at
ACM EICS 2016

Marco Manca and Fabio Paternò (HIIS Lab) are the recipients of the best paper award at the ACM Engineering Interactive Computing Systems Conference 2016, Brussels, with the paper titled "Customizable dynamic user interface distribution".

Best Italian Paper
Award at ISCC 2016

During the twenty first IEEE Symposium on Computers and Communications (Messina), the paper "Car Parking Occupancy Detection Using Smart Camera Networks and Deep Learning", by Giuseppe Amato, Fabio Carrara, Fabrizio Falchi, Claudio Gennaro and Claudio Vairo, received the Best Italian Paper Award.
Link: http://iscc2016.unime.it/award

A Tesla K40 GPU donated by NVIDIA

The NVIDIA Corporation supports the research on deep learning conducted by the Networked Multimedia Information Systems laboratory of ISTI-CNR.
On June 2016, the NVIDIA's Academic Programs Team, dedicated to empowering and collaborating with professors and researchers at universities worldwide, accepted the grant request presented by Dr. Fabrizio Falchi.
NVIDIA donated a Tesla K40 GPU that will be used for ongoing research on deep learning, a branch of machine learning that focuses on representation-learning methods composed of multiple levels of non-linear modules.

Two ISTI-CNR Projects win at the DH Awards 2015

Two projects of ISTI were winners at the international initiative DIGITAL HUMANITIES AWARDS 2015.

DanteSources (http://dantesources.org) won in the "Best DH Tool or Suite of Tools" category. DanteSources is a Digital Library, based on an RDF ontology, which allows retrieving information about Dante Alighieri's primary sources, i.e., the works of other authors that Dante cites in his texts. Dante-

Sources is the result of the collaboration between the Digital Libraries group of the NeMIS Lab (Netwroked Multimedia Information Systems Laboratory) of ISTI-CNR and the Department of Philology, Literature and Linguistics of the University of Pisa. First runner up in the same category was 3DHOP: 3D Heritage Online Presenter (http://3dhop.net/), developed by the Visual Computing Lab.

Jackson Pollock: Alchemy in 3D (http://vcg.isti.cnr.it/alchemy/) was the winner in the "Best Use of DH for Public Engagement" category. The Visual Computing Lab, in collaboration with the Opificio delle Pietre Dure and the Peggy Guggenheim Collection, has carried out the three-dimensional diagnostic analysis of the painting "Alchemy" by Jackson Pollock and developed some related multimedia installations for the temporary exposition in Venice (Italy).

Ph.D. Dissertations

Title: Agile Processes and Formal Methods in Railway Systems
Author: Giorgio Oronzo Spagnolo, Dipartimento di Ingegneria dell'Informazione Università di Firenze
Supervisors: Alessandro Fantechi, Stefania Gnesi

This work is based on research conducted within the project "Train Control Enhancement via Information Technology" (TRACE-IT) funded by the Tuscany Region. The thesis discusses the development of a safety-critical railway system, performed (1) with limited knowledge of the railway domain, (2) in a context with multiple competitors, and

(3) according to railway-specific process and product standards. Agile methods were employed and tailored to this complex development context, enabling a successful prototypical implementation of the safety critical system, as well as the set of specification documents required by the railway standards.

ARIADNE TNA "3D Documentation for Archaeology"

The INFRA project "ARIADNE" (http://www.ariadne-infrastructure.eu/) has organized the third edition of the Trans-National Access (TNA) event on "2D/3D Documentation for Archaeology".

This one-week event was organized by ISTI-CNR in Pisa on June 20th-24th, 2016.

The goal of this event is to provide participants with both a structured course on visual media technologies and practical hands-on sessions to test and experiment the technologies being presented. Individual work is a primary component of the experience. Students are asked to suggest research projects or tasks to be accomplished during the school with the help of the expertise and advice contributed by the TNA tutors. Thus the students can practice the use of technologies through the case studies that they have proposed.

In the course, we have introduced: (a) technologies for producing 2D and 3D documentation for archaeological purposes, considering both the small scale (artworks, findings) and large scale (monuments, sites); and (b) methodologies for providing visual access to the data gathered (considering both desktop and web-based visualization).

Participants were selected by a committee of experts after responding to an open call.

9 participants were accepted with fellowships (from EU countries) plus 3 others (from Italy and Cyprus).

Web page: http://www.ariadne-infrastructure.eu/index.php/Transnational-Access/2016-TNA-Call

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High school students and smart mobility research: #mobiwith_it

Ten students from the ITC Pacinotti and Liceo Buonarroti high schools worked together with IIT and ISTI researchers to promote a dissemination and recruitment campaign in the ambit of the European project MobiWallet (http://www.mobiwallet-project.eu).

In the scope of young apprenticeship program, the students had to work for 6 weeks in the CNR offices, to design and carry out the campaign called mobiwith_it. The activity produced logo, slogan, hashtag and various publicity material (such as flyers, poster, t-shirts). The students also managed the related social webpages and analyzed the data collected through a questionnaire. The students promoted the initiative in Pisa and in Florence.

This experience proves how it is possible to involve young students in an international project and give them the opportunity to play an active role.
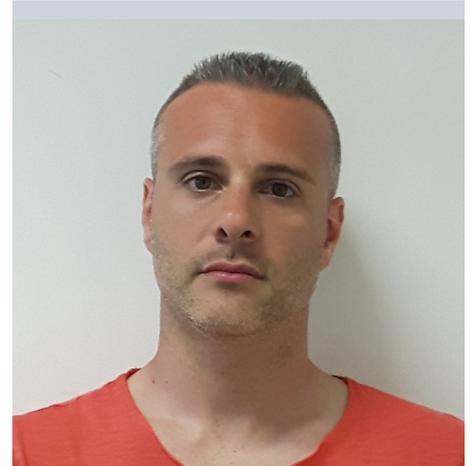

http://www.mobiwallet-project.eu/mobiwithit

Welcome Aboard!

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Research Staff (Tecnologo)

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Conferences - Co-organized by ISTI

ACM SIGIR Conference on Research and Development in Information Retrieval Pisa, July 17-21, 2016

http://sigir.org/sigir2016/

ACM MobileHCI International Conference on Human-Computer Interaction with Mobile Devices and Services Florence, September 6-9, 2016

http://mobilehci.acm.org/2016/

International Workshop on Formal Methods for Industrial Critical Systems and Automated Verification of Critical Systems (FMICS-AVoCS 2016) Pisa, Italy, 26-28 September 2016

http://fmics-avocs.isti.cnr.it/

EvAAL Competition 2016 - IPIN 2016 Indoor Localization Competition, Alcalá de Henares, Madrid, Spain, October 4-7, 2016

http://evaal.aaloa.org/

International workshop on computational intelligence for multimedia understanding. Reggio Calabria, Italy, October 27-28, 2016

http://www.teaprogetti.com/iwcim/