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OPEN DAY della RICERCA

Dipartimento di Informatica

Before looking out of the box, look inside the box.

CHI

Il Dipartimento si occupa di ricerca e didattica su temi innovativi di ICT.

COSA

Il Dipartimento apre le porte dei suoi progetti di ricerca alle aziende, agli studenti, alle università e a tutti coloro che ne sono interessati.

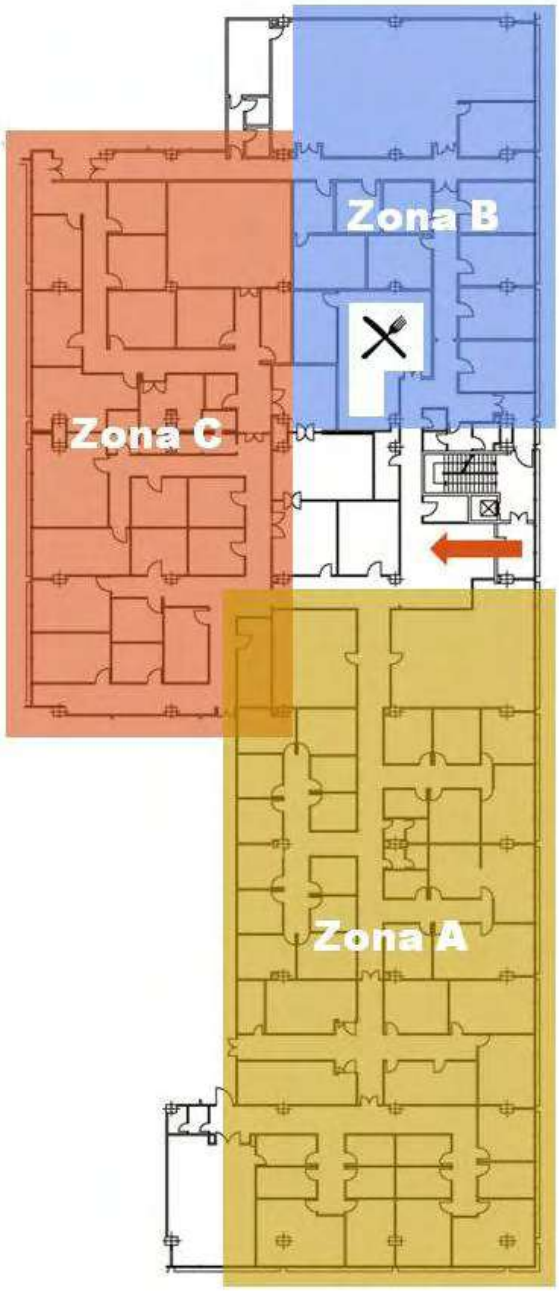
COME

Durante l'open day, i visitatori potranno visitare il Dipartimento e visionare i diversi progetti.
I progetti verranno presentati attraverso brevi sessioni interattive durante tutta la giornata.

OPPORTUNITA' €

Conoscere i protagonisti della ricerca
Conoscere progetti innovativi
Conoscere nuove tecnologie
Collaborare sui progetti di ricerca

Dipartimento di Informatica - Via Pessinetto 12, Torino, Italia
Per maggiori informazioni: **openday@di.unito.it**



Piano Primo
Open Day in action

Zona A: uffici e poster della ricerca

Zona B: uffici e poster della ricerca

Zona C: uffici e poster della ricerca

Lunch time e poster centri di ricerca (sala riunioni)

ZONA A

Labyrinth

Ontology-based 3D Visualization for Cultural Heritage

ARCHETYPE ONTOLOGY - categories

- Archetypes (e.g the Hero, the Journey...)
- Story (e.g. the Mith of the Minotaur...)
- Action (e.g. Killing Action, Heroic Action...)
- Character (e.g.Hercules, Theseus...)
- Location (e.g. Italy, Turkey...)
- Epoch (e.g. Ellenic Period...)
- Format (of the Artifact) (e.g. jpg, mpeg...)
- Artifacts (e.g. painting «Minotauromachia»...)
- Description Templates (e.g. Role: Killer...)

SYSTEM ARCHITECTURE

The user explores a repository of media resources through the conceptual mediation of an "archetype" of narrative nature, in a 3D environment based on the metaphor of the labyrinth.

- The Ontology Server maintains the ontology, maps the media resources onto the ontology (through a SWRL rule base), and provides the reasoning services.
- The Media Repository is indexed by a relational database.
- The Web Service provides search and navigation by querying the Ontology Server through SPARQL API.
- The Visualization Module supports the interaction with the user through maps, timelines and 3D navigation.

USER APPLICATION

Choose archetype

Choose category

Walk the maze

See the artifacts

Explore relations

Progetto Labyrinth 2012 - 2014– Polo di Innovazione Creatività e Multimedialità, POR-FESR 2007-2013, Regione Piemonte

2COMM: a middleware for social computing in JADE and Jason

M. Baldoni[1], C. Baroglio[1], F. Capuzzimati[1]

[1] Università degli Studi di Torino, Dipartimento di Informatica

Social computing: why we need it

Large-scale, cross-organizational systems that support human users (like so-colled socio-techincal systems) require a societal perspective rather than individualistic. The reason is that such systems perform a *social computation*, i.e. the sum of the independent contribution of parties. Our claim is that:

MAS platforms need to explicitly allow the design of a social layer, that contains regulations that norm the overall system behaviour.

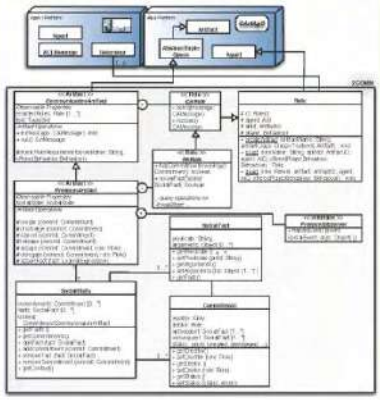
Normative MASs foresee a normative layer: they
+ represent norms that rule the system, but
- lack of abstractions for capturing the *social state*.

The *social state* of an interaction is the sum of existing and evolving social relationships and dependencies among parties.

Most of Multi-agent frameworks and platforms do not explicitly account for the social state, nor for social relationships between parties.

Social relationships:
- connect interacting parties
- have a *normative value*
- can be verified based just on *observable behaviours*

2COMM4JASON: architecture



- Class *CommunicationArtifact*
  Basic *in* and *out* operations, role enactment
- Class *ProtocolArtifact*
  Allows modeling social layer using *commitments* objects
  Manage commitments lifecycle and assertion of *facts*
- Class *SocialState*
  Modify and update social state inside protocol artifact

Building a framework for social relationships

Our proposal is **2COMM**, a middleware built upon a popular agent framework, **JADE**. It offers design and developing support for social relationships, thus enabling social computing. A connector for another wide-spread platform, **Jason**, is also provided.

Social relationships:
- are modeled as *commitments*;
- are created by the execution of *commitment-based interaction protocols*;
- provide *expectations* on the agents' behaviour.

Some former equations:

Algorithms + Data Structures = Programs

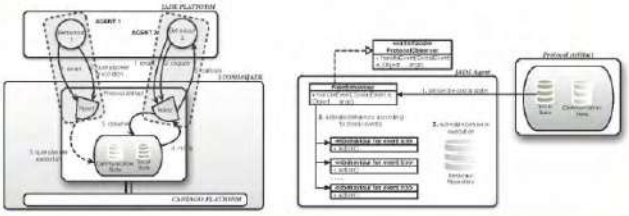
Algorithm = Logic + Control

The new equation:

Social computing = Engagements + Autonomous Control

Using social relationships for practical reasoning

2COMM4JADE is a framework that allow modeling of *commitment-based interaction protocols* as **CArtAgO artifacts**.
Execution of protocols is *reified* via artifacts; *practical reasoning* about social expectation is enabled by means of commitments.



Commitments for social relationships in Jason

Commitments can be used in contexts and in plans as:

test goals: $?cc(debtor, creditor, antecedent, consequent, status)$

achievement goal: $!cc(debtor, creditor, antecedent, consequent, status)$

Possible ways to specify plans whose triggering events involve commitments:

$+'cc(debtor, creditor, antecedent, consequent, status) : \langle context \rangle \leftarrow \langle body \rangle$

$-'cc(debtor, creditor, antecedent, consequent, status) : \langle context \rangle \leftarrow \langle body \rangle$

$+cc(debtor, creditor, antecedent, consequent, status) : \langle context \rangle \leftarrow \langle body \rangle$

$-cc(debtor, creditor, antecedent, consequent, status) : \langle context \rangle \leftarrow \langle body \rangle$

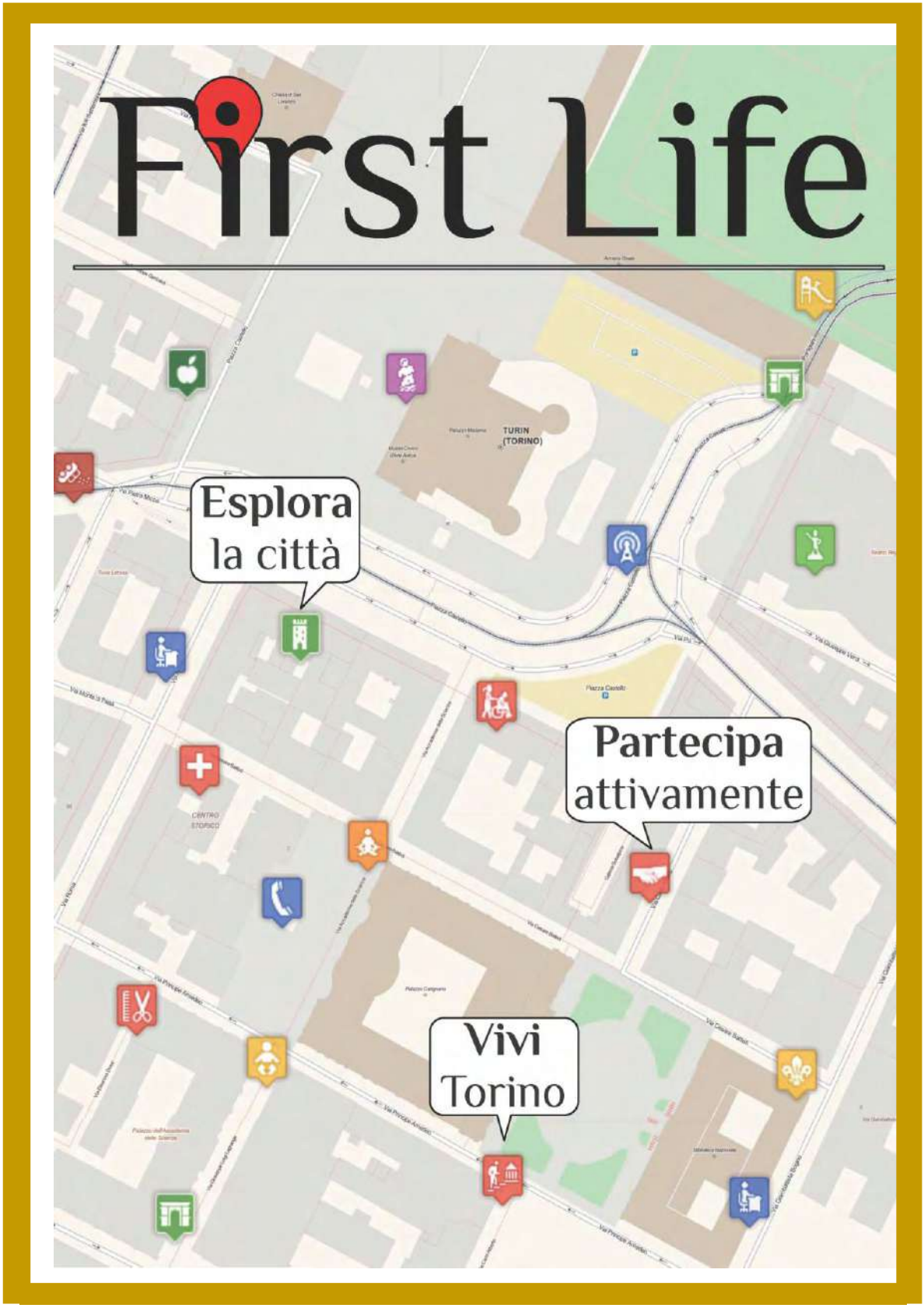
Conclusions

- Flexibility and openness typical of socio-technical systems
- Modularity and compositionality typical of design and development methodologies
- The logic of interaction is not hardcoded into the agents anymore
- As simple as programming plans for dealing with social relationships given in term of commitments
- A normative value thanks to commitment-based approach

References

[Baldoni et al., 2013] Baldoni, M., Baroglio, C., and Capuzzimati, F. (2013). 2COMM: A commitment-based MAS architecture. In *Post-proc. of EMAS 2013*.

[Baldoni et al., 2013] Baldoni, M., Baroglio, C., and Capuzzimati, F. (to appear). A Commitment-based Infrastructure for Programming Socio-Technical Systems. In *ACM Transactions on Internet Technology*.


First Life
Esplora
la città
Partecipa
attivamente
Vivi
Torino
TURIN
(TORINO)

Gruppo Social Computing

Università di Torino

Dipartimento di Informatica

EUCases

EUCases è un progetto di ricerca collaborativo supportato dai finanziamenti del **Seventh Framework Programme (FP7).**

EUCases svilupperà una **piattaforma informatica** per facilitare la crescita di un "unico" **diritto europeo dei consumatori** attraverso il collegamento tra loro di informazioni giuridiche e giurisprudenza, nonché la trasformazione di legal **open data multi-lingua** in dati collegati tra loro secondo analisi semantiche e strutturali.

Il progetto risponde alla priorità ribadita dalla Unione Europea di "stabilire un unico ordine normativo a livello europeo" al fine di rendere «accessibili e consultabili le base di dati nazionali riguardanti la giurisprudenza sul diritto europeo dei consumatori».

Easy Town

Easytown è un progetto finanziato **dal bando MIUR Smart Cities, Social Innovation and Communities**. L'obiettivo è quello di sfruttare **linked open data e smart devices** per facilitare la fruizione, da parte dei cittadini, di regolamenti della Pubblica Amministrazione e testi normativi in generale.

La soluzione proposta dal progetto poggia su tre pilastri fondamentali:

1. Un **sito web intelligente per presentare regolamenti** che siano già stati spiegati e tradotti, personalizzati per le diverse esigenze dei diversi utenti;
2. Un'app che chiarisca **l'esecuzione di procedure con l'utente passo dopo passo**, e, quando possibile, implementando le azioni prescritte (ad esempio, un pagamento elettronico, il recupero di un certificato elettronico, l'invio di mail automaticamente);
3. Applicazioni Web per riutilizzare linked open data al fine di **creare servizi di "help desk"** efficienti ed economici.

Eunomos

Eunomos è un sistema di **gestione documentale per testi legislativi e regolamentari** con sistema di aggiornamento automatico della normativa e classificazione delle norme.

Eunomos comprende **strumenti per il supporto al lavoro giuridico**, quali ad esempio:

1. la gestione di archivi di leggi;
2. la verifica della compliance normativa;
3. la stesura di documenti normativi quali i contratti;
4. l'aggiornamento automatico di repository di leggi;
5. ricerca sperimentale su temi di informatica giuridica, per il trattamento di testi normativi e gestione di ontologie giuridiche.

People

Guido Boella, Cristina Baroglio, Matteo Baldoni, Luigi Di Caro, Livio Robaldo, Alan Perotti, Alessio Antonini, Federico Capuzzimati, Silvano Colombo Tosatto, Andrea Violato, Carlo Emilio Salaroglio, Loredana Cupi, Alice Ruggeri, Alessia Calafiore

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Internet of Things for Quantified Self

Quantified Self

Quantified Self (QS) is a school of thought which aims to use technology for acquiring and collecting data on different aspects of people's daily lives in order to provide for self-reflection and acquiring of self-knowledge.

Tangible Interaction

A **user interface** in which a person interacts with digital information through the physical environment. It takes the advantage of human abilities to grasp and manipulate physical objects and materials.

Seamless Interaction

A **natural form** of interaction that is transparent to the users. The users are monitored without any intrusive tools or devices and without any need to change their habits.

iCube

- We design a tangible interface in the form of an iCube which allows a new form of self-monitoring by involving the users in self-collection of data.
- It allows to collect 6 states, corresponding to six levels of energy.
- Based on Arduino and several sensors: IMU, temperature, pressure, wi-fi, etc.

Ontologies for QS

- We design conceptual models for collected data: mood, sleep, daily activities, places visited.
- The key ontologies: Sleep, Activity, Wellbeing, Location ontology.
- This permits integration of heterogeneous data and reasoning on these data in order to provide meaningful visualization.

iCushion

- We design an iCushion able to seamlessly gather data about user's level of inactivity.
- It allows to monitor how long the user is sedentary.
- It provides also a visual output changing its colors when a certain level of inactivity is reached.
- Based on Lilypad and thermochromic inks.

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TELECOM ITALIA

Federica Cena,
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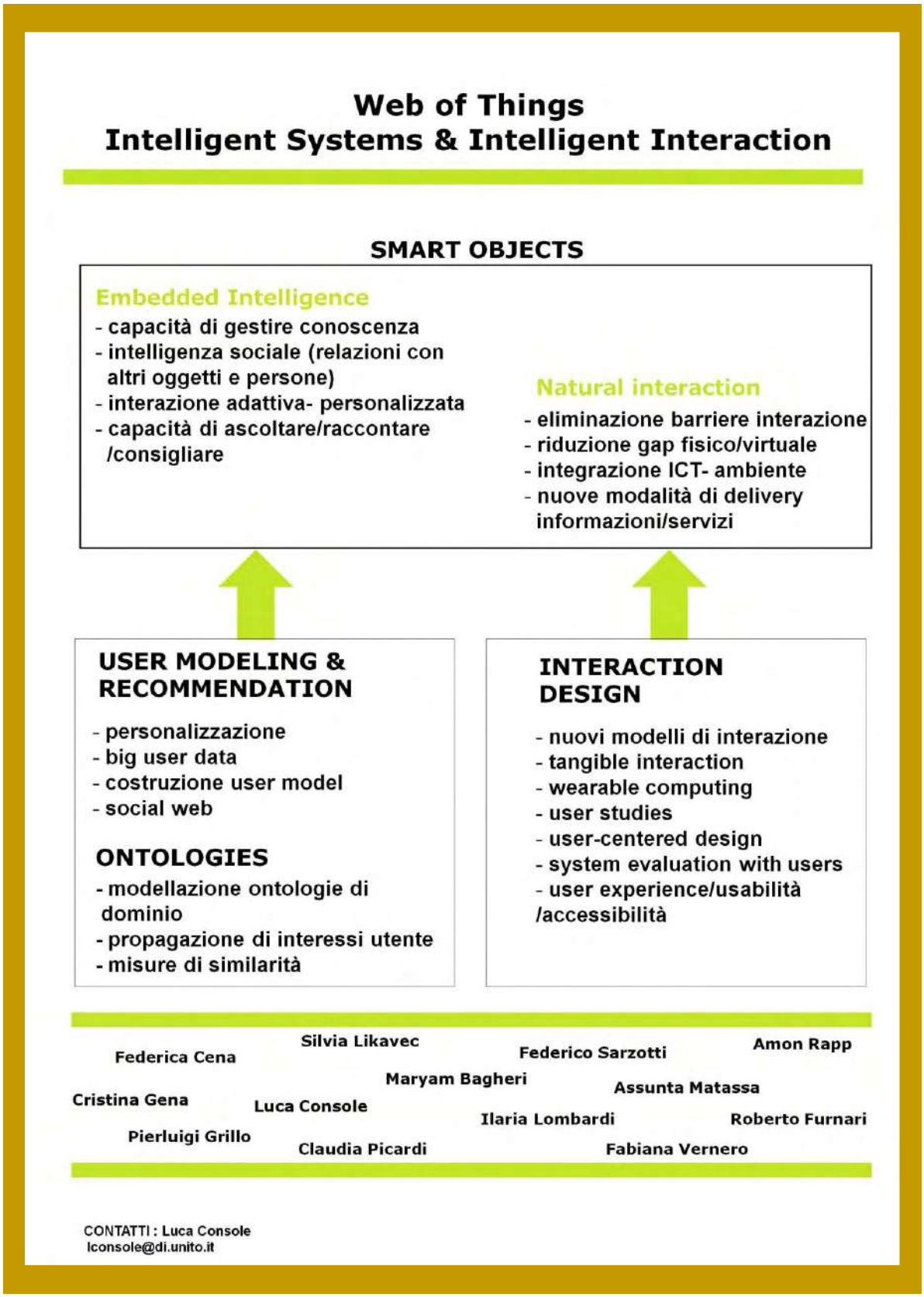
Web of Things
Intelligent Systems & Intelligent Interaction
SMART OBJECTS
Embedded Intelligence
- capacità di gestire conoscenza
- intelligenza sociale (relazioni con altri oggetti e persone)
- interazione adattiva- personalizzata
- capacità di ascoltare/raccontare /consigliare
Natural interaction
- eliminazione barriere interazione
- riduzione gap fisico/virtuale
- integrazione ICT- ambiente
- nuove modalità di delivery informazioni/servizi
USER MODELING & RECOMMENDATION
- personalizzazione
- big user data
- costruzione user model
- social web
ONTOLOGIES
- modellazione ontologie di dominio
- propagazione di interessi utente
- misure di similarità
INTERACTION DESIGN
- nuovi modelli di interazione
- tangible interaction
- wearable computing
- user studies
- user-centered design
- system evaluation with users
- user experience/usabilità /accessibilità
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wanteat

Intelligent Systems & Intelligent Interaction

Interagire con gli oggetti per navigare un territorio

- Oggetto = amico con cui interagisco per scoprire il suo mondo
- Un mondo fatto di territorio, oggetti, persone
- Obiettivi:
  - Promuovere il territorio e produzioni di qualità
  - Augmented experience

I nostri oggetti

- Cibi, negozi, ristoranti, luoghi, ...
- Non sono infrastrutturati
- Contatto=foto etichetta, nome, ... oppure geolocalizzazione

Gli oggetti sono intelligenti

- Ascoltano e raccontano
- Mantengono legami sociali che si modificano nell'interazione
- Mi introducono nel loro mondo e mi permettono di scoprilo

Un modello innovativo di interazione "LA RUOTA"

Oggetto con cui sto interagendo circondato dal suo mondo (amici)

Companion applications

- Web companion
- Applicazioni per stakeholder per:
  - Registrare oggetti
  - Scoprire cosa hanno fatto gli oggetti, "strumenti di business intelligence"(es produttore scopre amici del suo formaggio; ufficio turismo scopre cosa ha fatto chi ha visitato un luogo)

Sperimentazione

- App IOS – Android
- Sperimentata a Salone del Gusto 2010-2012 e Cheese 2011

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REGIONE PIEMONTE · Slow Food Italia · TELECOM ITALIA

OPEN DAY DELLA RICERCA

Digital Content Protection through Fragile Watermarking

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Dipartimento di Informatica

Web: http://kdd.di.unito.it/~botta/KLTWatermark/WSKLT.html

What is Digital Watermarking

Insert a signal, called watermark, into a digital object
Typical watermarking applications are:

- track of origin
- copyright protection
- content integrity protection, i.e. tamper detection
- content authentication

Fragile Watermarking Properties

Detectability and localization of the modified regions of the digital object
Imperceptibility during the normal use of the digital object
Resistance to attacks aimed at modifying the object without being detected

Design Goals

Generation of high-quality pictures whose content is protected against modifications

- Fragility
- High Quality
- Security
- Flexibility
- Generality
- Independence from (uncompressed) image format

Algorithm Main Features

- Watermark is inserted into a secret space
- Watermark is dependent on watermarked image (to avoid copy-and-paste and transplantation attacks)
- Tamper detection ability at block level (of size $n \times n$)
- Works on uncompressed, lossless compressed and JPEG compressed images
- Works on grayscale and colour images
- Modularity for customization (the system is composed of several modules that can be combined together)

Original | Watermarked | Tampered | Detected

System Performances

- High quality of protected images: typical values range from 55 to 60 dB (i.e. humans cannot distinguish original from watermarked)
- High security due to high sensitivity
  - High sensitivity to modifications: ~83% recognized tampered blocks for ±1 single pixel value modifications
  - ~97% recognized tampered blocks for ±2 single pixel value modifications
- Typical attacks or modifications make larger pixel modifications
  - E.g., JPEG (QF=85, 90, 95, 100) compression modifications are detected as 99.99% tampered blocks (only 2 blocks out of 10000)

The holiDES Project

Holistic Human Factors **Design** of Adaptive Cooperative Human-Machine Systems

Susanna Donatelli, Marco Beccuti, Marco Botta, Elvio Amparore, Jeremy Sproston
(susi, beccuti, botta, amparore, sproston)@di.unito.it

HoliDes addresses Adaptive Cooperative Human-Machine Systems (AdCoS) where humans and machines act together, and human factor considerations mixes with embedded system construction and qualification.

Website: http://www.holides.eu/

holiDES project

Statement:

HoliDes addresses development and qualification of *Adaptive Cooperative Human-Machine Systems* (AdCoS) where many humans and many machines act together, cooperatively, in a highly adaptive way. They adapt to each other and to the context to guarantee fluent and cooperative task achievement. Such systems with higher levels of automation are needed to enhance safety and to increase the confidence of human operators.

The focus is on Adaptiveness in Cooperative Human-Machine Systems on the Health, Aeronautics, Control Rooms and Automotive market. HoliDes will research affordable means of compliance which enable to formalize certifiable adaptation strategies for AdCoS systems.

Application Domains of the project:

Control Rooms · Healthcare · Automotive · Aeronautics

Research dimensions:

HoliDES research will target the development of techniques & tools on 5 research dimensions:

- automated AdCoS reconfiguration based on e.g. real-time predictive human models;
- holistic formal (human & machine) modelling and accelerated analysis;
- new empirical task, exploration and validation analyses of AdCoS
- a formalized synergetic empirical and model-based methodology;
- integration of all techniques & tools in a *Human Factors Reference Technology Platform* (HF-RTP) to foster interoperability and to support human factors along the whole engineering life-cycle.

The partners of the HoliDES project consortium are:

Use case: design of an adaptive vehicle co-pilot.

Prototype vehicle developed by CRF:

We are developing a new approach for the implementation of a virtual driver for a car, designed for assisting the driver in potentially dangerous situations.

- New technique: co-pilot reasoning uses Markov Decision Processes generated with Markov Decision Petri Nets, and solved with approximate techniques.
- Decision process focused on human cognition.

The car developed at the CRF:

- Passenger car: FIAT 500L
- Includes a sensor system for lane analysis, object detection, pedestrian recognition, that involves multiple coordinated sensors.

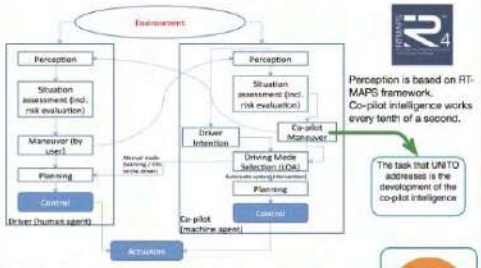
External camera to detect lanes on the road and the relative position of the vehicle in the lane.

Internal camera to detect the position of the driver's head (and where he/she is looking at).

LIDAR (*Laser Imaging Detection and Ranging*) to detect obstacles.

- Uses the *Cognitive Architecture for Safety Critical Task Simulation* (CASCaS), to improve safety control and to reduce the human mistakes in a human-machine interaction.
- Integrates a full hardware/software stack for co-driver.
- Implements a computational model aimed to simulate the behavior of a driver.

Analysis of sensor data:



Perception is based on RT-MAPS framework. Co-pilot intelligence works every tenth of a second.

The task that UNITO addresses is the development of the co-pilot intelligence

RT-MAPS software framework is modified to provide:

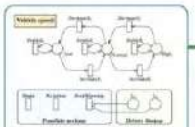
- Automatic lane detection from the front/rear cameras installed on the vehicle.
- Automatic recognition of the driver distraction level (internal camera pointing at the human driver).
- Integration of multiple sensor inputs + visual analysis.
- Obstacle detection using LIDAR proximity sensors, with a classification between cars, stationary obstacles, and pedestrians.

LIDAR coverage.

Predicting the near future to prevent dangerous situations:

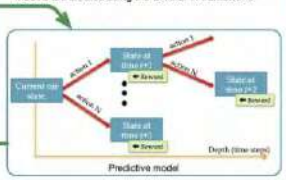
Goal: predict the non-deterministic evolution of the car's environment, assigning warning levels for each possible future evolution.
The approach: use of a Markov Decision Process for deciding if any of the possible near-future scenarios are dangerous.
Based on the warning level, the co-pilot may turn on a signal on the car dashboard.

Generic structure of a single-agent decision process.



Markov Decision Petri Net for the co-pilot.

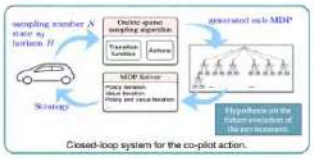
We use MDPN (*Markov Decision Petri Net*) to provide a high-level representation of the MDP of the car data. Models are created using the GreatSPN framework.



Predictive model

The derived MDP is then solved with GreatSPN, to produce the optimal strategy for the co-pilot.

How the co-pilot works:



Closed-loop system for the co-pilot action.

The warning system

The target scenarios considered for this approach are:

- Enhanced Forward Collision Warning (FCW+): warning for incoming obstacles, assisted braking.
- Enhanced Adaptive Cruise Control (ACC+): keep safe distance from vehicles ahead + emergency braking in case of imminent collision and distracted driver.
- Lane-Change Assistant (LCA):

MDPN of the described scenarios are evaluated for the near-future evolution of the surrounding car environment. MDP solution is done in real-time, inside the co-pilot closed loop, using the *sparse sampling* method.
System Adaptivity to human factors: automatic learning and reconfiguration of the system in case, for example, of loss of attention of the human driver.

Model-based evaluation, verification and optimization

Website: http://www.di.unito.it/~greatspn/index.html

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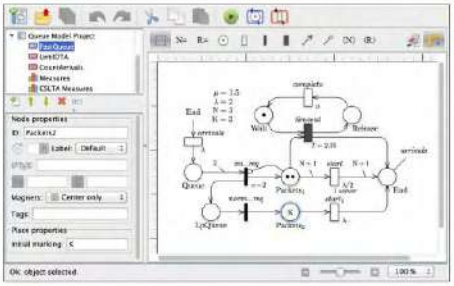
{susi, beccuti, amparore, sproston, balbo}@di.unito.it

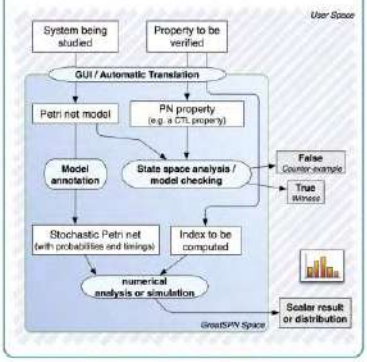
The GreatSPN tool

GreatSPN is a software framework for modeling, verifying and evaluating performance measures on systems using Generalized Stochastic Petri Nets. The framework is composed by several tools, including a user-friendly GUI that allows the modeler to draw an abstract representation of the modeled system using the GSPN formalism. A screenshot of the editor is shown below.
GreatSPN includes tools for performing several tasks on the modeled systems, including:

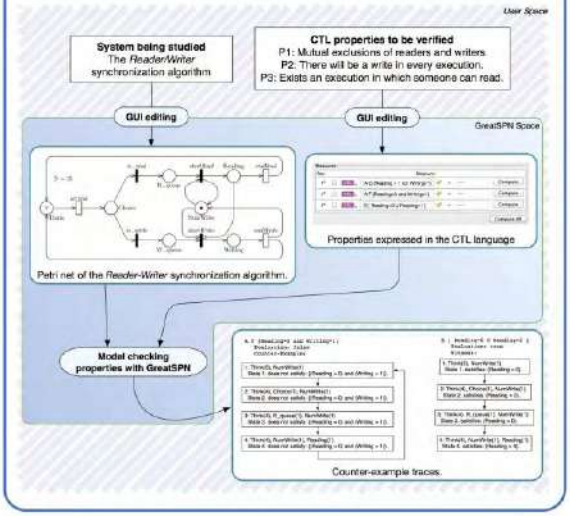


- **Structural analysis** and structural properties: place and transition invariants, deadlocks, boundedness, mutual exclusion, ...
- **Properties derivable with linear programming**, such as upper and lower bounds for places and transition throughputs.
- **State space** generation, using advanced techniques like symbolic data structures.
- **Verification** of logical and behavioral properties expressed in the CTL logic.
- **Numerical analysis** of quantitative properties, such as average place distributions,expected transition throughputs, probability of exposing a specific behavior defined using the CSLTA logic, etc...
- **Simulation** techniques available for very large model, where the construction of the reachability graph is impracticable.
- **Optimization** problem, described in the form of Markov Decision Processes (MDP).

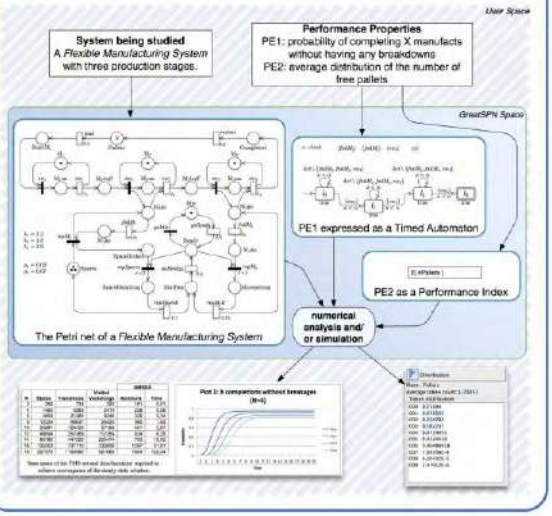
Analysis workflow with GreatSPN:



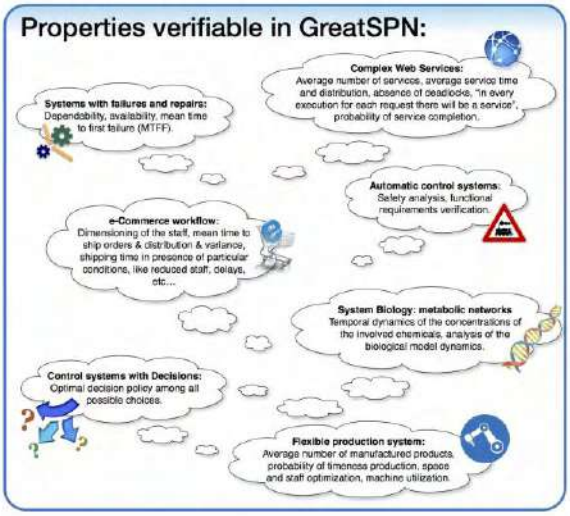
Verification: CTL model checking



Performance evaluation example:

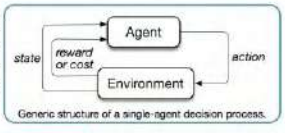


Properties verifiable in GreatSPN:

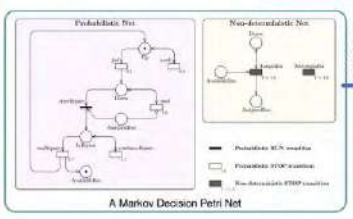


Decision processes:

GreatSPN provides an high-level formalisms to model decision processes in which an agent takes decisions to reach a goal, knowing the global system state.
The solution of the decision problem consists in defining, for each system state, a corresponding agent' action that maximizes (or minimizes) some reward (or cost) function.

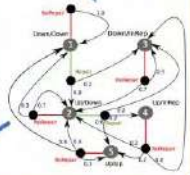


Generic structure of a single-agent decision process.



A Markov Decision Petri Net

From MDPN (Markov Decision Petri Net), GreatSPN automatically generates the corresponding MDP (Markov Decision Process).



Solving the derived MDP, GreatSPN produces the optimal strategy.

System State	Agent Decision
s0	action0
s1	action1
s2	action2

FastFlow: multicore and GPGPU programming made easy

University of Torino & University of Pisa, Italy * http://sourceforge.net/projects/mc-fastflow * Open source software under LGPLv3

Motivation

The whole computer hardware industry embraced parallel platforms, such as multicore, GPGPUs, and cloud. For these platforms, the extreme optimisation of sequential algorithms is no longer enough to squeeze the real machine power. In the long term writing parallel programs ought to be as efficient, portable, and correct as it has been to write programs for sequential computers. To date, however, the parallel programming drill does not embrace much more than low-level communication libraries. In the hierarchy of abstractions, it is only slightly above toggling absolute binary into the front panel of the machine. By definition, the raison d'être for parallel computing is high performance, but speed-up need not be the only measure. Human productivity, total cost and time to solution are equally, if not more important.

Material and methods

FastFlow is a C++ parallel programming framework advocating high-level, pattern-based parallel programming. It chiefly supports streaming and data parallelism, targeting heterogeneous platforms composed of clusters of shared-memory platforms, possibly equipped with computing accelerators. The FastFlow run-time support efficiently support fine grain parallelism via non-blocking multi-threading with lock-less synchronisations, zero-copy network messaging, asynchronous GPGPU offloading.

FastFlow team

M. Aldinucci, M. Torquati, M. Danelutto
M. Drocco, C. Misale, G. Peretti Pezzi, F. Tordini

High-level pattern-based parallel programming for C/C++

Data parallelism: `ParallelFor, MapReduce, StencilReduce`

Data parallel patterns can be easily deployed onto multi-cores and multiple GPGPUs. No additional programming effort with respect to OpenMP.

```
// FastFlow (--std=c++11)
ff::ParallelFor pf;
pf.parallel_for(0L,N,[&A](const long i) {
  A[i]++;
},nworkers);
```

```
// OpenMP (-fopenmp)
#pragma omp parallel for num_threads(nworkers)
for(long i=0;i<N;++i) {
  A[i]++;
};
```

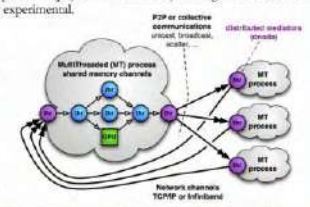
Stream parallelism: `Pipeline, Farm`

Stream parallel patterns can be deployed onto multi-cores, distributed platforms, and clouds (e.g. Amazon EC2). Stream patterns can be composed to model arbitrary streaming networks, and can be nested with data parallel patterns. This makes it possible to use the aggregate power of (physical or virtualised) heterogenous clusters of multicore and GPGPUs. FPGA support is currently experimental.

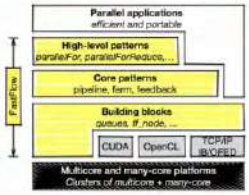
Platforms and OSes support

Being a plain header-only C++ library, FastFlow can be used (or easily ported) on any homogenous or heterogenous parallel platform. Among the others, the following platforms are supported:

Intel x86_64 - Linux/MacOS - gcc/clang/icc
Intel x86_64 - Windows 7/8 - MS Visual Studio
Arm - Linux - gcc
Arm - iOS - clang (experimental)
IBM Power - Linux - gcc
Accelerators: NVidia/CUDA/OpenCL, Intel Phi, Tilera Tile64



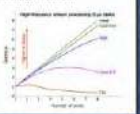
FastFlow architecture



Performance

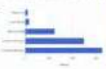
Like other high-level programming frameworks, such as Intel TBB, OpenMP, Hadoop, FastFlow simplifies the design and engineering of portable parallel applications. However, it has a clear edge in terms of expressiveness and performance with respect to other parallel programming frameworks in specific application scenarios, including, inter alia:

- ✔ fine-grain parallelism
- ✔ streaming applications
- ✔ coupled usage of GPU and multi-core
- ✔ memory-bound problems
- ✔ recursive, graph-oriented algorithms
- ✔ high-frequency problems



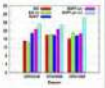
Signal filtering

A high-performance filter for real-time video denoising. The filter is composed of two phases: detection (e.g. classical median filter) and correction. The filter achieve very good restoration quality, comparable to jpeg compression. Unlike traditional methods, the correction phase is based on a variational method and succeeds to restore also extremely noisy images (up to 90% of noisy pixels). FastFlow provided seamless portability to CUDA boards (e.g. NVidia K-40). This work has been presented at Nvidia GTC 2014.



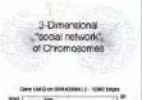
DNA alignment (Bowtie2 & BWA)

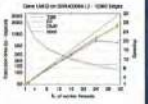
Bowtie2 and BWA are among the fastest and most used alignment tools for genome analysis in bioinformatics. In the FastFlow porting, the concurrency structure has been redesigned passing from a pool of thread accessing shared data to a Farm/Master-Worker equipped with automatic memory affinity scheduling. The FastFlow port differs from original code no more than a dozen of code lines but gains up to ten speedup points over the original parallel, hand-optimised software.



Next-gen DNA analysis (nuChart-II)

Hi-C data analysis has emerged as a powerful technique to understand how the genomic is packaged in cells to control gene expression. nuChart-II provides a gene-centric view of the 3D chromosomal neighbourhood. Starting from the sequential C++ implementation, the graph exploration loop has been parallelised by using the ParallelFor pattern provided by FastFlow, that permitted to improve the performance with minimum effort.





Projects & partnerships, over 10M€

Intelligent Agents for Autonomous systems

Dipartimento di Informatica
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People: D. Dell'Anna (dellanna@di.unito.it), F. Di Mauro (dimauro@di.unito.it), R. Micalizio (micalizio@di.unito.it), E. Scala (u5686530@anu.edu.au), G. Torta (torta@di.unito.it)

The Problem

Increasing **autonomy** in a variety of (cyber physical) systems
Search for **Autonomy Architecture**
Multi layer architecture: not only robotic level and control level but also **decision layer.**
The role of Artificial Intelligence:
- Automated planning and scheduling
- Intelligent agents with reactive and deliberative capabilities
- Management of uncertainty and incomplete knowledge(partial observability of the environment)

Plan Repair

Exogenous events make current plan no more adequate/executable:
- Action failures
- Delays
- Change in the contextual conditions

New goals to achieve

Plan repair: modify the current plan to satisfy the new constraints/goals by adding/deleting actions and/or change of execution modalities.

Plan repair may be quite complex or even fail

Plan stability (useful when human in the loop)

Plan Quality: solutions not too far from complete replanning (sometime too costly in an online setting)

Temporal constraints and consumable resources

- Qualitative Conditions (symbolic approach, propositional variables)
- Quantitative Conditions on time and consumable/renewable resources (numeric fluents approach)
- Concurrency and mutual exclusion constraints

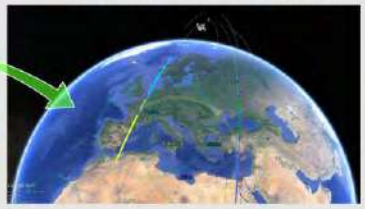
An action model for the observation of a target object:

```
(durative-action observe
   parameters (?target)
   duration (>= ?duration (obs_duration ?target))
   condition (and
      (at start (sensor_on))
      (over all (sensor_on))
      (at end (sensor_on))
      (at start (sensor_available))
      (at start (> (power_level) 0))
      (over all (> (power_level) 0))

      (at start (pointing ?target))
      (over all (pointing ?target))

      (at start (observable ?target))
      (over all (observable ?target))
      (at end (observable ?target))

      (at start (not (observed ?target)))
      (over all (not (observed ?target)))
   )
   effect (and
      (at start (not (sensor_available)))
      (at end (sensor_available))
      (at end (observed ?target))
      (at end (not (pointing ?target)))
      (decrease (power_level) (* #t 1))
   )
)
```

An interesting domain: planning for satellite

1a. Plan under execution

1b. Plan updated for new target *Atene*



2a. Plan under execution

2b. Plan updated for new target *North NZ*

The real-world projects

(competitive calls)

SMAT F1 and SMAT F2 (Advanced systems for territory monitoring via UAV)
- Funding: PON_FESR 2007-13
- Coordinator: Alenia Aermacchi
- Contribution: **mission management and planning** (coordination and planning for multi-UAV missions)

STEPS (Systems and technologies for space exploration)
- Funding: PON_FESR 2007-13
- Coordinator: Thales Alenia Space
- Contribution: **Human Robot Interaction for intelligent monitoring of planetary rover missions**

Some results

- **Innovative techniques for plan repair** (suitable for online applications - near real time, robust execution, proactive behavior),
- **Ability of dealing with temporal constraints and numeric resources**
- **Systems with multiple deliberative components** (both off line and online)
- **Robust plans vs optimal plans**
- **Human in the loop**

Other interesting domains

- **Service robotics**
- **Intelligent manufacturing**
- **Underwater robotics**

Some recent publications

- E. Scala, R. Micalizio, P. Torasso: Robust plan execution via reconfiguration and replanning. AICommun. 28(3): 479-509 (2015)
- E. Scala, P. Torasso: Deordering and Numeric Macro Actions for Plan Repair. IJCAI 2015: 1673-1681 (2015)
- E. Scala, P. Torasso: Proactive and Reactive Reconfiguration for the Robust Execution of Multi Modality Plans. ECAI 2014: 783-788 (2014)
- S. Cafi, F. Di Mauro, E. Scala: A Numeric PDDL Based Approach for Temporally Constrained Journey Problems. ICTAI 2014: 99-106 (2014)
- M. Beccalatte et al.: A Multi-UAS Cooperative Mission Over Non-Segregated Civil Areas. J. Intelligent and Robotic Systems 70: 275-295 (2013)
- R. Micalizio, E. Scala, P. Torasso: Towards Robust Execution of Mission Plans for Planetary Rovers. Acta Futura 5: 53-63 (2012)
- P. Torasso, G. Torta: Exploiting Automatic Validation in Human Mission Planning. In Res. and Dev. in Intelligent Systems XXVIII 21-34, Springer (2011)

Accountable Trustworthy (h) Organizations and Systems

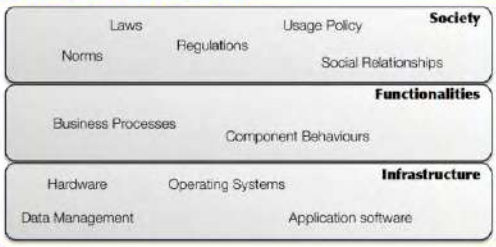
M. Baldoni[1], C. Baroglio[1], F. Capuzzimati[1], R. Micalizio[1]
[1] Università degli Studi di Torino, Dipartimento di Informatica

AThOS Project's Objectives

AThOS is a 2-year project funded by Compagnia di San Paolo whose main objectives are:

1. Development of a **novel standard for the representation of Socio-technical Systems** (STS), including a **declarative methodology** for modeling interactions among stakeholders
2. Study of **accountability as a property for stakeholders and organizations** based on model-based diagnostic methods for tracking down objective and decisional responsibilities
3. Implementation of **novel tools** that realize objectives 1) and 2) to ensure STSs accountability

Socio-Techincal Systems

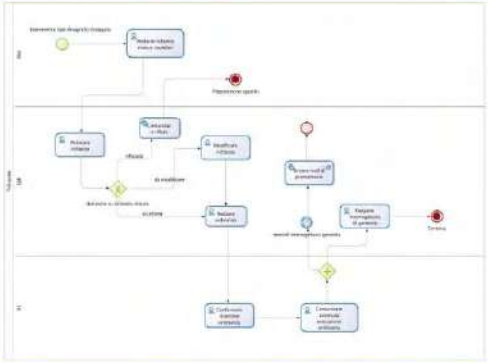


BPMN shortcomings

BPMN is strongly **procedural**

- business processes are seen as **workflows**
- **workflows implement a single course of actions**
  - **the autonomy** of the involved actors **is limited**
  - actors are **unable to take advantage of emerging opportunities** or tackle unexpected situations

A **procedural representation is inadequate to represent STSs** because the human actors are limited in their autonomy.



Accountability is hard to obtain

Procedural representation hinders any reasoning about actors and their interactions, and hence **hinders any attempt of reasoning about the accountability of an organization**

AThOS Proposal

WHAT

- AThOS proposes to realize STSs that build upon Multi-Agent Systems (MAS)
- AThOS aims at **detecting anomalies** and **identifying**:
  - **Decisional Responsibilities** (*Accountable Roles*): individuals at the top of the decision making chain
  - **Objective Responsibilities** (*Responsible Roles*): individuals delegated by accountable roles, and in charge of carrying out tasks

References

[Baldoni et al., 2013 a] Baldoni, M., Baroglio, C., and Capuzzimati, F. (2013). 2COMM: A commitment-based MAS architecture. In *Post-proc. of EMAS 2013.*

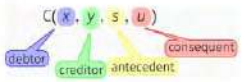
[Baldoni et al., 2013 b] Baldoni, M., Baroglio, C., and Capuzzimati, F. A Commitment-based Infrastructure for Programming Socio-Technical Systems. In *ACM Transactions on Internet Technology.*

[Micalizio et al., 2014] Micalizio, R., and Torasso, P. Cooperative Monitoring to Diagnose Multiagent Plans In *Journal of Artificial Intelligence Research*

HOW

Conceptually

- extending formalisms for modeling business processes by **explicitly modeling social relationships as social commitments**



agent x commits to agent y that when condition s holds, it will bring about u

- only the debtor can take on a commitment
- the creditor is not committed to bring about the antecedent
- commitments are directly manipulable by agents via standard operations

Software tools

- **2COMM**: is MAS platform which provides the programmer with the notion of commitments as a primitive programming tool, and hence it is a good starting point for developing the AThOS proposal
- **Cooperative Weak-Committed Monitoring** (CWCM): is a diagnostic procedure that can be adopted for detecting anomalies (e.g., violation of commitments), and explaining them in terms of accountable and responsible roles.

A Common-Sense Conceptual Categorization System Integrating Heterogeneous Proxytypes and the Dual Process of Reasoning

Antonio Lieto°*, Daniele P. Radicioni° & Valentina Rho°
° Dipartimento di Informatica — Università di Torino — Italy
* ICAR-CNR, Palermo — Italy
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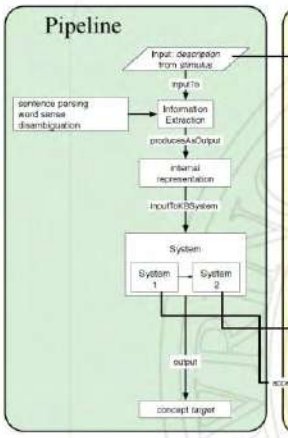
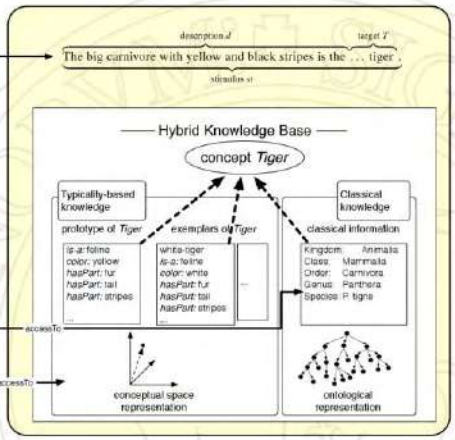
Pipeline





Categorization Algorithms

Data: Linguistic d
Result: A class assignment, as computed by $\mathcal{S}1$ and $\mathcal{S}2$

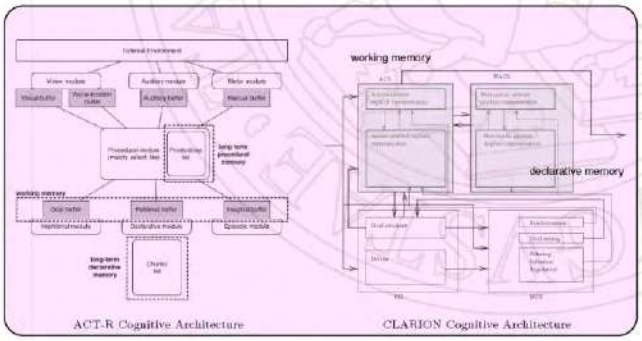
```
trialCounter ← 0;
closed^S1 = {0}
while trialCounter < maxTrials do
    // conceptual spaces output
    c ← S1(d, closed^S1);
    if trialCounter == 0 then c* ← c;
    // ontology based consistency check
    cc ← S2(d, conceptPointedBy(c));
    if cc equals(conceptPointedBy(c)) then
        return (c*, cc);
    else
        closed^S1 add(conceptPointedBy(c))
    end
    ++trialCounter;
end
cc ← S2((d, Thing));
return (c*, cc);
```

Algorithm 1: The $\mathcal{S}1$-$\mathcal{S}2$ categorization process.

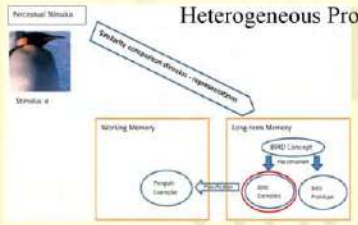
Data: Linguistic description: d; list of inconsistent concepts: $closed^{\mathcal{S}1}$.
Result: A typicality based representation of a category.

```
S1_EX ← categorizeExemplars(d);
if firstOf(S1_EX, closed^S1), distance(d) <
similarityThreshold then
    return firstOf(S1_EX, closed^S1);
else
    S1_PR ← categorizePrototypes(d);
    // in case of equal distance prefer
       exemplars
    typicalityCategorization ← sortResults(S1_EX, S1_PR);
    return firstOf(typicalityCategorization, closed^S1);
end
```

Algorithm 2: $\mathcal{S}1$ categorization with prototypes and exemplars implementing the instruction in Algorithm 1: line 4.



Heterogeneous Proxytypes



Dual Process

Type 1 System	Type 2 System
Unconscius	Conscious
Automatic	Controllable
Evolved early	Evolved late
Indipendent from Language	Related to Language
Parallel, Fast	Sequential, Slow
Pragmatic/contextualized	Logical/Abstract

Evaluation

a. Accuracy rates obtained for the CC-ACC and P-ACC metrics.

test	CC-ACC	P-ACC
with no IE	95.6% (86/90)	86.0% (74/86)
with IE	85.6% (77/90)	75.3% (58/77)

b. Analysis of the errors in the proxyfication (P-ACC metrics).

test	Proxyfication error		
	Ex-Proto	Proto-Ex	Ex-Ex
with no IE	12.8% (11/86)	1.1% (1/86)	0.0% (0/86)
with IE	18.2% (14/77)	0.0% (0/77)	6.5% (5/77)

Reference

Antonio Lieto, Daniele Paolo Radicioni, Valentina Rho, A Common-Sense Conceptual Categorization System Integrating Heterogeneous Proxytypes and the Dual Process of Reasoning, *Proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence (IJCAI 2015)*, pp. 875-881, AAAI Press, 2015.

Toreador
a EU project on Big Data

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Motivations

Big Data are everywhere, involve almost all the applications and carry a richness of information and knowledge that must be exploited.

Risks

Big Data are overwhelming, are too fast, are too much, are too complex, are unpredictable, ...

The Project

Toreador is funded by EU H2020 under the Call on Big Data.

Partners are: CINI (a Consortium of Italian University research groups specialized on Big Data)

Companies: SAP, AVIO, energy distribution, software development companies, ...

Goals

Toreador promise is the delivery of an open, European marketplace for Big-Data-As-A-Service, with affordable costs and easy-to-understand Service Level Agreements (SLAs) in terms of accuracy, performance, confidentiality and privacy.

Toreador Models

Toreador recommends the description and management of data and processes using a set of common models and models transformations (machine readable, comparable and with provable properties).

Reduce the learning curve for analytics and simulation-driven applications in different domains.

Architectural Challenges

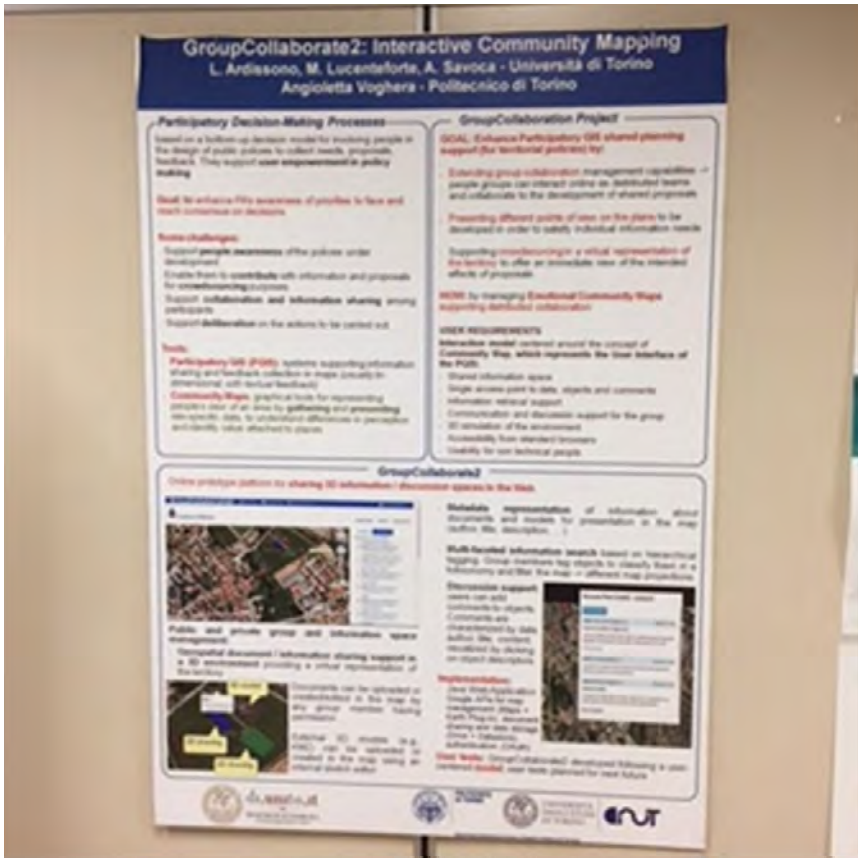
1. Use of data sources at all layers of the protocol stack
2. Cost-effective discovery and choice of computational resources and data sources
3. Analytics–driven choice of data representations (abstraction, aggregation, anonymity and privacy preservation, credibility)
4. Integration and management of heterogeneous, structured and not structured, multimodal, open and legacy data
5. Data quality assessment and improvement
6. Smooth integration of stream and data-set analytics
7. Adaptable reporting formats and visualization

Work Areas

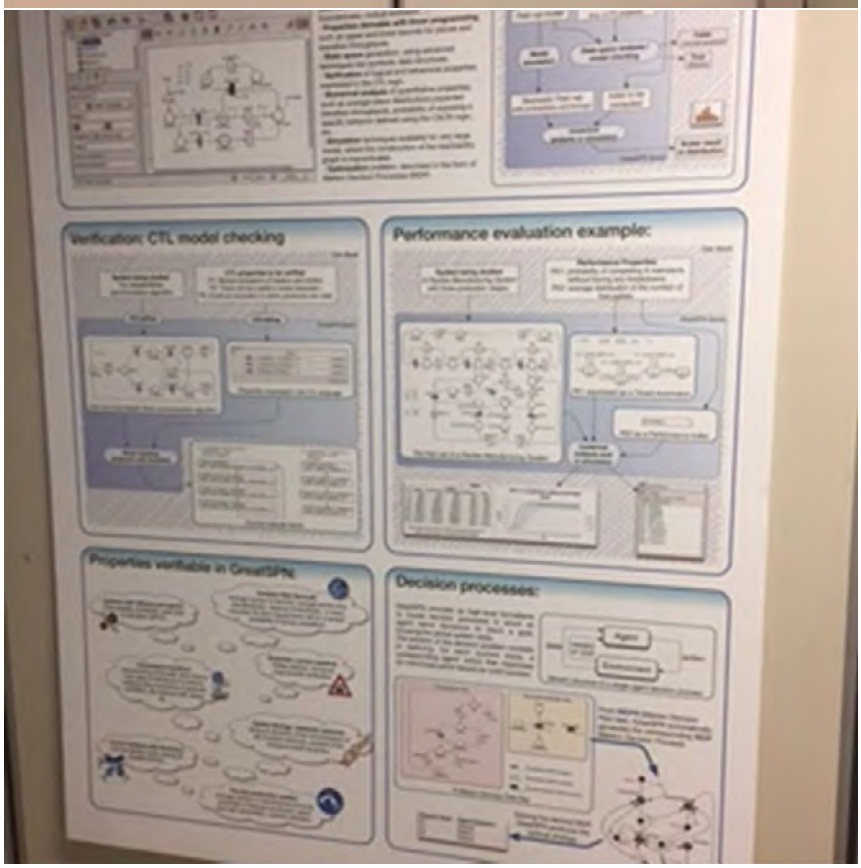
1. Models and Languages
2. Big Data As A Service
3. Architecture and Toolkit
4. Pilots, Exploitation/Innovation
5. Project Management

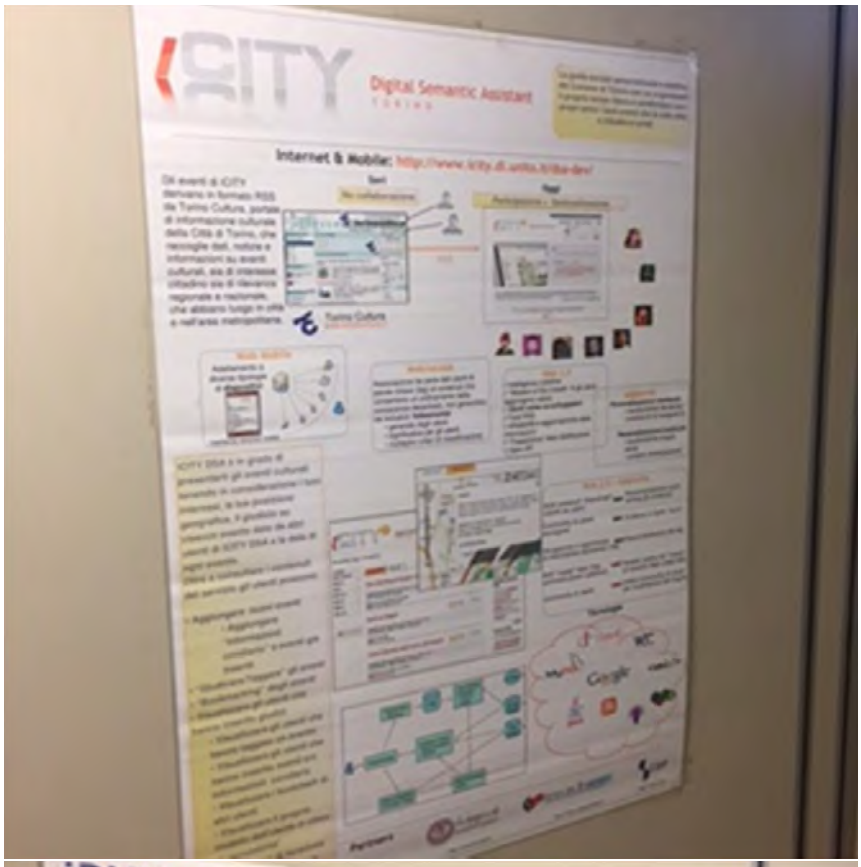
Pilots

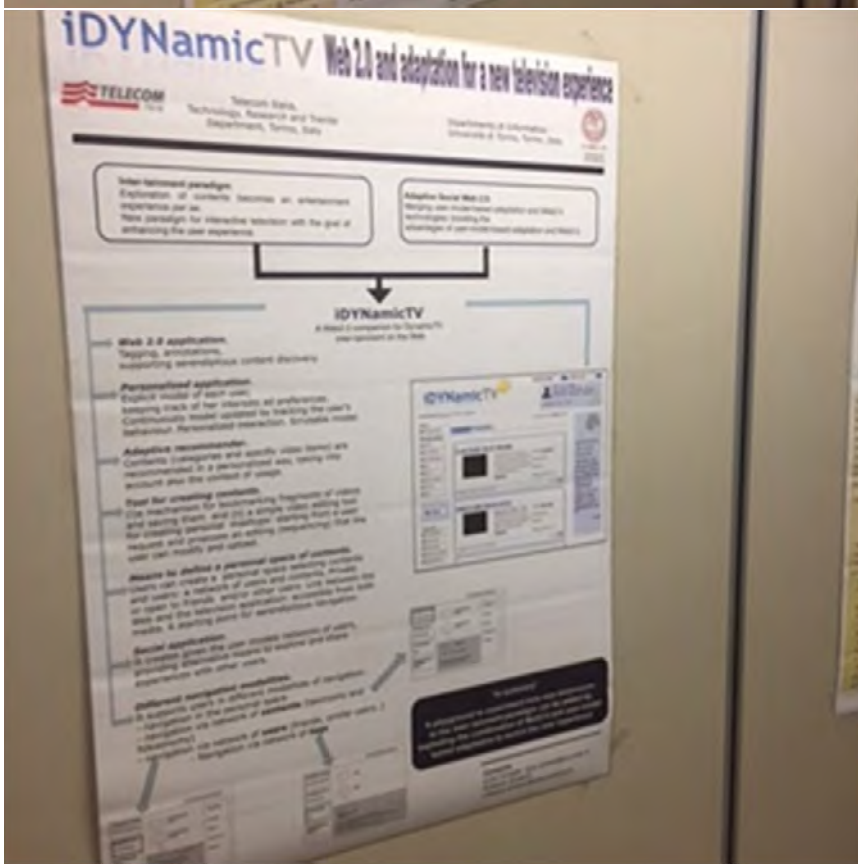
1. Supporting fraud detection and security in ICT
2. Production, distribution and energy storage in homes
3. Internet Of Things and sensors data on manufacturing machines for improvement of manufacturing processes
4. Online marketing fraud detection

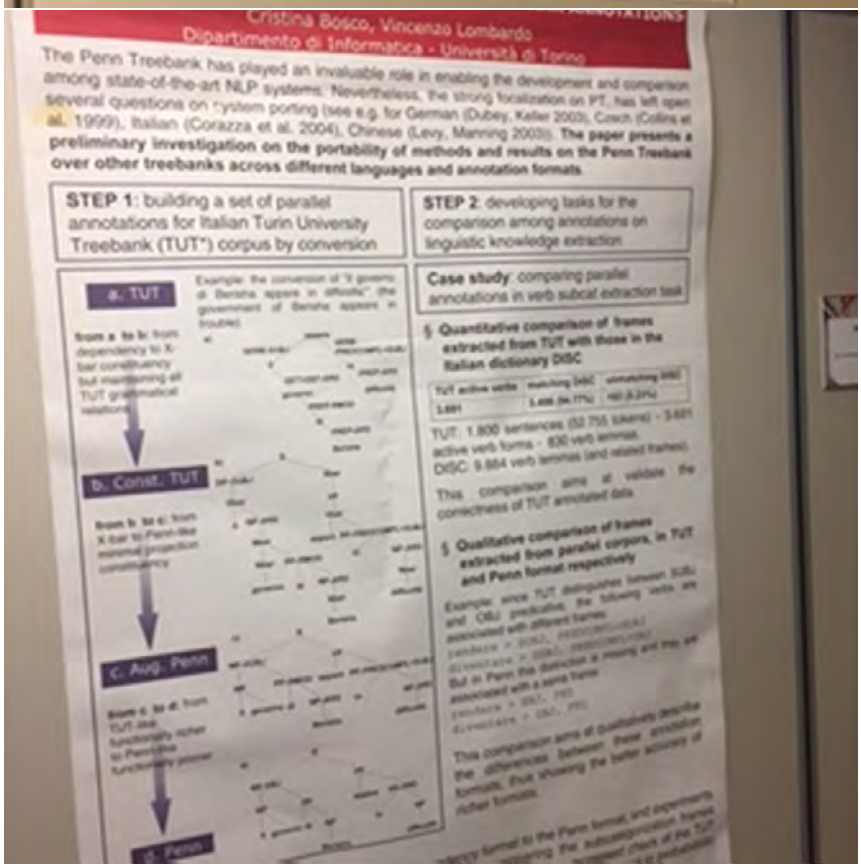

GroupCollaborate2: Interactive Community Mapping
L. Ardissono, M. Lucentefforte, A. Savoca - Università di Torino
Angioletta Voghera - Politecnico di Torino
Participatory Decision-Making Processes
GroupCollaboration Project
GroupCollaborate2


COMPUTER VISION
NATURAL INTERFACE
AUGMENTED REALITY
OBJECT RECOGNITION
CONTEXT AWARENESS
RETAIL 4.0
SMART CITIES
HOME AUTOMATION


Verification: CTL model checking
Performance evaluation example:
Properties verifiable in GreatSPN:
Decision processes:


iCITY
Digital Semantic Assistant
TORINO
Internet & Mobile:


iDYNamicTV
Web 2.0 and adaptation for a new television experience
TELECOM
iDYNamicTV



Cristina Bosco, Vincenzo Lombardo
Dipartimento di Informatica - Università di Torino

The Penn Treebank has played an invaluable role in enabling the development and comparison among state-of-the-art NLP systems. Nevertheless, the strong focalization on PT, has left open several questions on system porting (see e.g. for German (Dubey, Keller 2003); Czech (Collins et al. 1999); Italian (Corazza et al. 2004); Chinese (Levy, Manning 2003)). **The paper presents a preliminary investigation on the portability of methods and results on the Penn Treebank over other treebanks across different languages and annotation formats.**

STEP 1: building a set of parallel annotations for Italian Turin University Treebank (TUT*) corpus by conversion

STEP 2: developing tasks for the comparison among annotations on linguistic knowledge extraction

Case study: comparing parallel annotations in verb subcat extraction task

a: TUT

Example: the conversion of "Il governo di Berlino appare in difficolta" (the government of Berlino appears in trouble)

from a to b: from dependency to X-bar constituency but maintaining all TUT grammatical relations

b: Const.: TUT

from b to c: from X-bar to Penn-like minimal projection constituency

c: Aug.: Penn

from c to d: from TUT-like functionality richer to Penn-like functionality poorer

d: Penn

§ **Quantitative comparison of frames extracted from TUT with those in the Italian dictionary DISC**

TUT active verbs	matching DISC	unmatching DISC
3.691	1.406 (38,11%)	160 (8,23%)

TUT: 1.800 sentences (52.755 tokens) - 3.691 active verb forms - 830 verb lemmas.
DISC: 9.884 verb lemmas (and related frames).

This comparison aims at validate the correctness of TUT annotated data.

§ **Qualitative comparison of frames extracted from parallel corpora, in TUT and Penn format respectively**

Example: since TUT distinguishes between SUBJ and OBJ predicative, the following verbs are associated with different frames:

But in Penn this distinction is missing and they are associated with a same frame:

This comparison aims at qualitatively describe the differences between these annotation formats, thus showing the better accuracy of richer formats.


Arte, cultura e spettacolo
Lavoro e attività produttive
Residenza e vicinato
Spazi pubblici e cittadinanza attiva
Istruzione e formazione
Trasporti e mobilità
Servizi e commercio
Socializzazione, sport e tempo libero
PARTECIPAZIONE
ESPLORA LA CITTÀ
VIVI TORINO
EVENTI
TERRITORIO
OPEN DATA
GRUPPI LOCALI
CO-PRODUZIONE
ACCESSIBILI
firstlife il nuovo social network di quar


firstlife


firstlife
il nuovo social network di quartiere
Cibo e territorio
Cibo in città
APE
Libraio

firstlife
il nuovo social network di quartiere
Cibo e territorio
Cibo in città
APE
Libraio

ZONA B

Supporting Users' Privacy in Online Social Networks

Rosa Meo, Ruggero G. Pensa, Gianpiero Di Blasi
Università di Torino - Dipartimento di Informatica

UNIVERSITÀ DEGLI STUDI DI TORINO

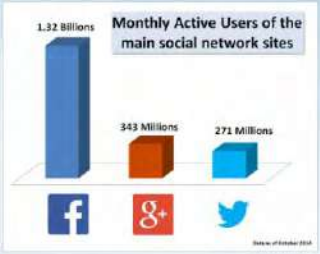
di.unito.it
DIPARTIMENTO DI INFORMATICA

Privacy issues in social networks

The number of **monthly active users** of the main social networking platforms are increasing every year. In 2014, near **30% of the entire world's population** actively uses social media!

Unfortunately, the users privacy on social media is undermined by identity thefts and by spreading the users' personal or private facts to the public and to unauthorized people. Examples refer to private life facts, sexual preferences, health facts, political ideas, etc.

Our goal is to **build privacy-preserving tools** and **protect the users' privacy** with new tools that inform the users of the privacy breaches they are exposed to.



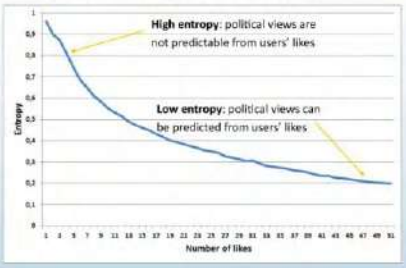
By the knowledge of the users' likes on Facebook it is possible to reveal their private personality traits (e.g., see *http://youarewhatyoulike.com/*)

Our proposal

We investigate a framework to let the user control:

What?

We use **entropy** as a measure of predictability of sensitive personality traits given the users' likes. E.g., **Political view**:



Entropy is viewed as the remaining charge of a privacy battery. How safe is to like another user's post? (how much "privacy charge" do we loose?)

Chris Giompanis's B.Sc Thesis, 2014

To whom?

We use **active learning** to suggest personalized privacy settings for each user's friend.

Would you share your pictures with


John Smith ✗


Alice Green ✓

The users answer a few questions to train a **classifier** that predicts the "allow/deny" class for all other friends:

The active learning process is reactivated each time a **privacy score** goes below an alert threshold. The privacy score is based on the **Item Response Theory (IRT)** and considers:

- **Sensitivity** of profile items
- **Visibility** of profile items
- **Discrimination power** of profile items
- Users' **attitude**

Luca Iencco's M.Sc. Thesis, 2014

AML-project

Discovering Money Laundering with Machine Learning

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Motivations

The fight against money-laundering and terrorism financing is one of the cornerstones for the safeguard of the economic-financial system integrity

Risks

1. The reuse of the money originating from criminal activities into the legal economy alters the correct operation of the mechanisms of resources allocation and endangers the stability and solidity of the subjects that operate in the financial markets
2. it constitutes attempts to subtract financial resources to the tax levy

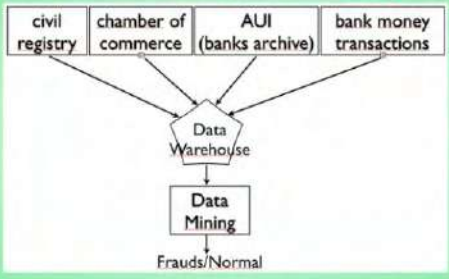
The Present System

Most of the Banks in Italy rely on Gianos©, an expert system based on a set of static rules that encode the key factors for the determination of the reliability of the clients and the illegal behaviors and are used to monitor and identify the suspect money transactions

Problems

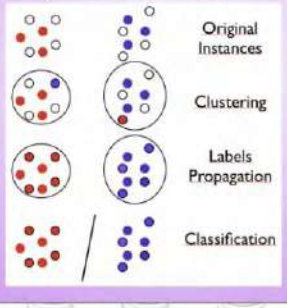
1. Static rules are not sufficient since the frauds mechanisms evolve with time and in response to laws
2. The present system raises many false positives which involve large teams in the individual and manual checks

Architecture of the talenTO system



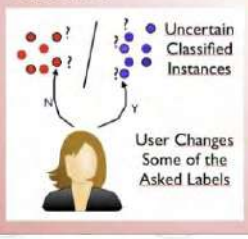
Semi-Supervised Learning

1. Uses both labelled and unlabelled instances
2. Less labelled instances are needed
3. All available instances are used at the same time
4. Fraud/normal models are able to evolve with time (are based on the similarity relationship with other instances)



Active Learning

1. Each prediction is associated to a credibility measure that is used to rank the anomalies
2. The user is involved in the loop in order to confirm the label (Fraud/ Normal) of a reduced number of anomalies (the most uncertain ones)
3. After the new labels have been provided by the user the training phase is re-executed in an incremental fashion and the learning model is updated; thus the system is able to evolve itself and incorporate the users' suggestions.



Anomaly measure

$$\alpha_{iy} = \frac{\sum_{j=1}^{k} D_{ij}^{y}}{\sum_{j=1}^{k} D_{ij}^{-y}}$$

instances: i,j
classes: $y, -y$
proximity: D

Credibility measure:

$$p - value_{iy} = \frac{|\{j = 1, \ldots, n_y : \alpha_{jy} \geq \alpha_{iy}\}|}{n_y}$$

Android security
a dynamic analysis approach

F. Bergadano, V. Costamagna
Dipartimento di Informatica, Università degli studi di Torino

The Android system is now widespread, and lots of applications are developed each day. These applications are mostly written in Java, though it is possible to do calls to binaries or shared libraries. The rise of Android security is related to many factors:

- widely adopted and heterogeneous devices
- producers push patches/update very slowly
- operators and producers customization (often closed source)
- custom Kernels
- sensitive information on the phone
- few (or none) barriers in official market

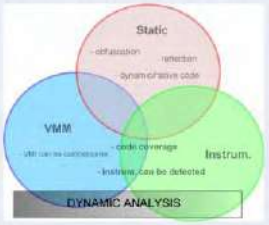
Worldwide Device Shipments by Operating System in Mature Markets (Thousands of Units)

Operating System	2013	2014	2015
Android	266,701	313,529	337,791
IOS/Mac OS	157,273	167,787	182,564
Windows	138,312	141,977	149,128
Others	100,633	48,130	29,352
Total	**662,920**	**671,424**	**698,835**

Shipments include mobile phones, ultramobiles (including tablets) and PCs
Source: Gartner (October 2014)

Challenges

Software analysis types and their cons.



malware is spreading fast

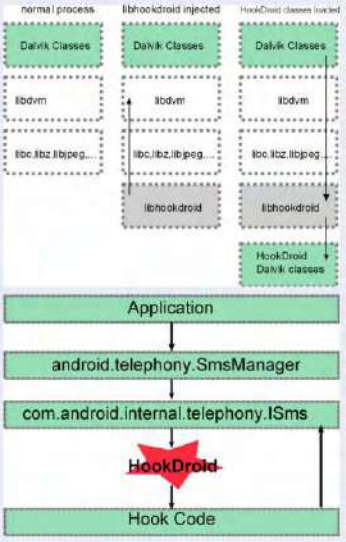
security bugs are around the corner

Major Android Bug is a Privacy Disaster (CVE-2014-6041)

Exploiting Android (and Kindle) Apps with the JavaScript Bridge
March 25, 2014 [1]

HookDroid: Dalvik Dynamic Instrumentation framework

HookDroid framework



HookDroid exploit the Dalvik Dynamic Instrumentation technique for:

- tracing code without app or system modification
- modifying some behaviours and inputs that are out of our control

model security policies as automaton

- automatizing security policies validation
- hooking applications or Android API methods
- patching code into running application
- reverse-engineering application
- bytecode runtime manipulation

Future developments are:

- new android runtime ART
- automatizing code exploration
- code similarity
- web control interface

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Summarization of Maps with Social Metadata

SMATF2

di.unito.it

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The Context

The SMAT project developing a system for territory monitoring by means of Unmanned Aircraft Vehicles equipped with payload sensors that will download images

Goals

1. Creating a thematic, interactive geographical map
2. Providing up to date informations on the locations and on the services available on the territory

The Annotations

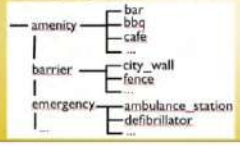
Data on locations come from social networks (Volunteered Graphic Information projects).

OpenStreetMap
provides a free, editable map of the whole world

FOURSQUARE
provides the description of 60 millions of venues (1 March 2014)

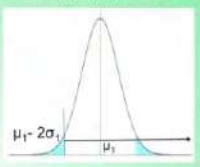
Annotations Ontologies

Annotations have a semantics, a category and attributes



Statistical Filter for the Annotations

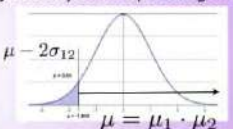
1. Sample construction by means of a grid on the geographical area



2. Computation of the frequency distribution for each annotation category:
the frequency distribution of each category of annotations in the grid cells is computed
3. the law of the large numbers is applied:
determination of the minimum density threshold ⇒ automatic density parameter estimation without any possibility of user's errors
4. a density-based clustering algorithm (similar to DBSCAN) is run in order to determine the geographic areas with a high density of certain events

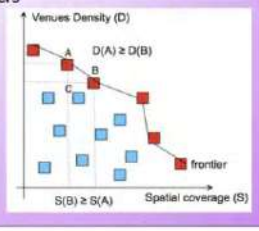
Clusters with More Categories, Validation, Publication and Selection

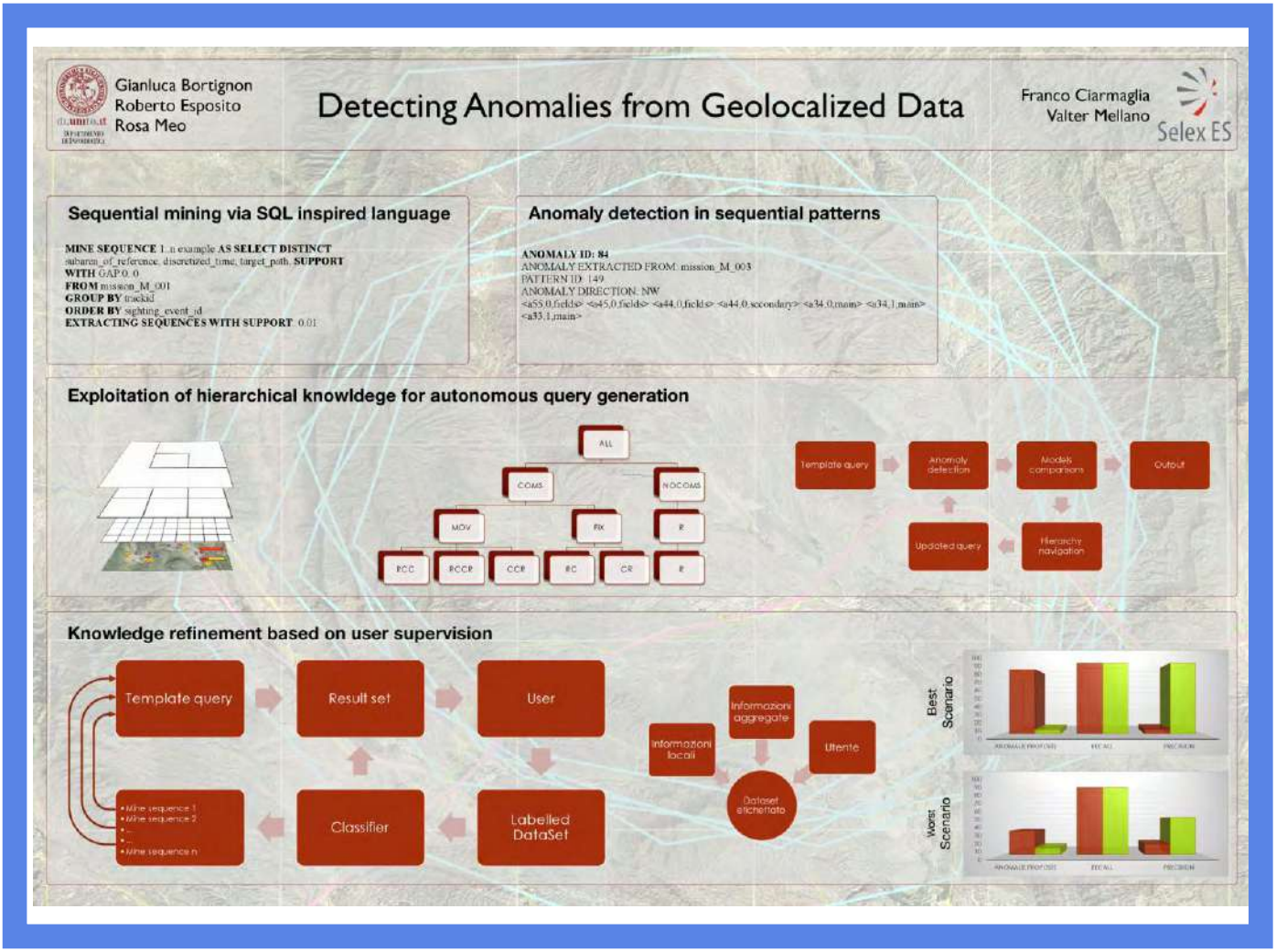
1. The hypothesis of independence assumption between the annotation categories is made: $f_{12}=f_1 \times f_2$
2. The new frequency distributions of category pairs (and then their combinations) are generated
3. the law of the large numbers is applied to determine the minimum density threshold
4. a density-based clustering algorithm (GeoSubClu) is run in order to determine the geographic areas with a high density of multiple categories



$$\sigma_{12} = \sqrt{\frac{\sum_{cells}(f_{i1}f_{i2} - \mu_1\mu_2)^2}{N\_cells}}$$

5. The geometry description of the clusters with their statistics is published in the Semantic WEB in OpenAnnotation and can be queried by GeoSparql
6. The best clusters are statistically validated and then selected by a Pareto multi-strategy optimization (clusters surface, venues density, category heterogeneity)




Gianluca Bortignon
Roberto Esposito
Rosa Meo
Detecting Anomalies from Geolocalized Data
Franco Ciarmaglia
Valter Mellano
Selex ES
Sequential mining via SQL inspired language
MINE SEQUENCE 1..n example AS SELECT DISTINCT
subarea_of_reference, discretized_time, target_path, SUPPORT
WITH GAP 0..0
FROM mission_M_001
GROUP BY trackid
ORDER BY sighting_event_id
EXTRACTING SEQUENCES WITH SUPPORT 0.01
Anomaly detection in sequential patterns
ANOMALY ID: 84
ANOMALY EXTRACTED FROM: mission_M_003
PATTERN ID: 149
ANOMALY DIRECTION: NW
<a55.0,fields> <a45,0,fields> <a44.0,fields> <a44.0,secondary> <a34.0,main> <a34,1,main>
<a33.1,main>
Exploitation of hierarchical knowldege for autonomous query generation
ALL
COMS
NOCOMS
MOV
FIX
R
RCC
RCCP
CCR
RC
CR
R
Template query
Anomaly detection
Models comparison
Output
Updated query
Hierarchy navigation
Knowledge refinement based on user supervision
Template query
Result set
User
Classifier
Labelled DataSet
Mine sequence 1
Mine sequence 2
Mine sequence n
Informazioni aggregate
Informazioni locali
Utente
Dataset etichettato
Best Scenario
Worst Scenario

ZONA C

Some issues on Italian to LIS automatic translation. The case of train announcements

LIS4ALL has been partially funded by Regione Piemonte, Innovation Hub for ICT, 2011-2014, POR-FESR 07-13
Part of the research received funding from ERC Grant Agreement N°324115-FRONTSEM and from Institut d'Etudes Cognitives (ENS) grants ANR-10-IDEX-0001-02 PSL* and ANR-10-LABX-0087 IEC

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The train station messages

P1 *Manuale degli Annunci Sonori,* Rete Ferroviaria Italiana
http://www.rfi.it/cms-file/allegati/rfi/MAS.pdf
A2

Human Translation

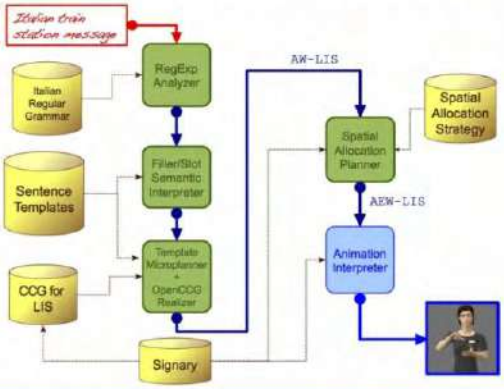
Il treno Regionale 10220 di Trenitalia delle ore 05:35 proveniente da Cuneo arriverà con un ritardo previsto di 10 minuti .

TRENO REGIONALE NUMERO 10220 TRENITALIA POSS ORE 5:35 MATTINA CUNEO VENIRE , RITARDO 10 MINUTI PREVISTO ARRIVARE FUT_DEVE

Lingua dei Segni Italiana

- The syntax is independent from Italian
- The syntax is far from being complete
- SOV
- No prepositions, genres, determiners
- Considerable amount of dialectal variation
- Non Manual Components
- The spatial dimension conveys linguistic meaning
- No written form

The machine translation architecture



The stations names

Felicità

Leonardo Allisio, Valeria Mussa, Emilio Sulis, Manuela Sanguinetti, Giancarlo Ruffo, Viviana Patti, Cristina Bosco

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Raccogliere i dati sulla felicità

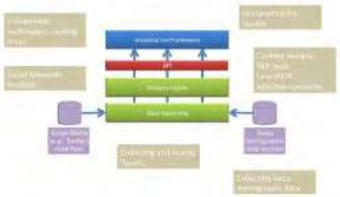
I social media come Twitter e Facebook sono il luogo in cui un numero sempre crescente di persone si esprime e comunica liberamente.

Big data:

- Twitter conta attualmente circa 500 milioni di utenti registrati; oltre 5 milioni in Italia.
- circa 1 milione di post al giorno.

Da questi dati la piattaforma Felicità:

- estrae quotidianamente un campione che include informazioni sulla geolocalizzazione
- lo analizza e lo combina con altre sorgenti di informazione per rilevare e visualizzare il grado di felicità.



Analizzare sentimenti e opinioni

sentiment, opinioni, emozioni nei post ...
su eventi, trasmissioni televisive, prodotti di mercato, politici, rock star, sport ....

Estrarre, comprendere e classificare automaticamente il sentiment, la valenza positiva o negativa oppure le emozioni dei messaggi lasciati in rete dagli utenti.

Le tecniche di Sentiment Analysis e Opinion Mining applicate ai Social Media affrontano il problema di rilevare e misurare opinioni e espressioni emotive.

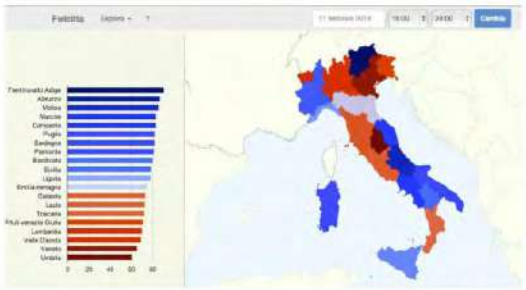
Contatti e riferimenti

email: {bosco, ruffo, patti}@di.unito.it

Allisio, L., Mussa, V., Bosco, C., Patti, V., and Ruffo, G. (2013). Felicità: Visualizing and estimating happiness in Italian cities from geotagged Tweets. In Proc. of ESSEM@AI*IA13, volume 1096, pp 95–106. CEUR-WS.org.

Visualizzare la felicità

La felicità rilevata nelle regioni italiane



La felicità rilevata nelle città italiane

Analisi di dati Twitter e opportunità

- Per le imprese: attingere a esigenze e preferenze dei consumatori
- Indicazioni sugli orientamenti politici dei cittadini.
- Data journalism: fact checking

- Rilevare informazioni cruciali in situazioni di emergenze di massa (es. terremoti, ...)
- Scienze sociali: contribuire a interpretare il grado di benessere di un paese, misurando il benessere soggettivo percepito dalle persone.

ExceptionOWL

Gian Luca POZZATO
Andrea IACONA
Giancarlo RUFFO
Rossano SCHIFANELLA

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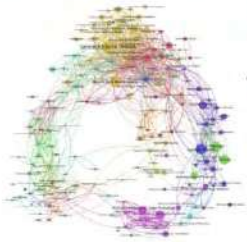
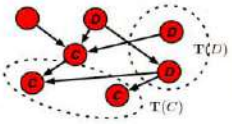
Dipartimento di Informatica
Dipartimento di Informatica

http://dl.unito.it/exceptionowl/

Nonmonotonic Extensions of **Description Logics** and **OWL** for defeasible inheritance with exceptions





$\mathbf{T}(Newborn \sqcap Bald) \sqsubseteq HighHematocrit$

$Newborn(aldo) \rightarrow HighHematocrit(aldo)$

$Newborn(aldo) \rightarrow LowHematocrit(aldo)$

$\exists HasNeonatalDisease.Anemia(aldo)$

$HighHematocrit \sqcap LowHematocrit \sqsubseteq \bot$

$\mathbf{T}(Newborn) \sqsubseteq HighHematocrit$

$\mathbf{T}(Newborn \sqcap \exists HasNeonatalDisease.Anemia) \sqsubseteq LowHematocrit$

Principal Investigator

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Progetti di Ateneo 2014

Call 1 "Excellent (Young) PIs"

UNIVERSITÀ DEGLI STUDI DI TORINO

Compagnia di San Paolo

Ontologies with exceptions-based diagnosis and home monitoring

*Alternative semantics for DLs allowing to consider plausible but surprising scenarios for **serendipitous search***

state of the art

DLs + nonmonotonic reasoning machinery (circumscription, MKNF, default, ...) present difficulties

proposed solution

Extending standard DLs with a T operator

T(C) = "most normal" / "typical" instances of a concept C

Semantics of T related to nonmonotonic consequence relation in KLM logics

Preferential models with an irreflexive, transitive, well-founded, modular relation among elements of Δ

$(\mathbf{T}(C))^I = Min_{<}(C^I)$

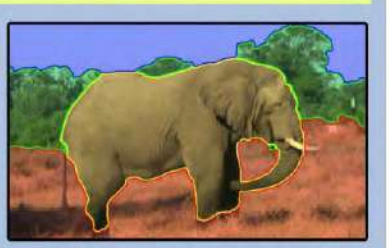
Nonmonotonic semantics based on rational closure and minimal entailment

For expressive DLs minimal entailment is in the same complexity class of the underlying (classic) DL

objectives

Beyond the state of the art for nonmonotonic DLs
Applications of DLs with typicality

*Extensions of DLs and OWL with exceptions for formalization and reasoning about structured information extracted from the **social media** ecosphere*



*Ontologies with exceptions combined to low-level features for **automated image interpretation***

C. Bosco[1], V. Patti[1], M. Lai[1], M. Stranisci[1], D. Virone[2], D.I. Hernandez Farias[1,3]

Tweeting on political reforms

Within **social media**, users voice and share their views, generating a large amount of textual data, about topics that vary from elections to commercial products.
Big social data can be a great opportunity to investigate **communicative behaviors** and new forms of **conversational context**, also in order to develop **techniques for automatically determining** from text **whether the author is in favor or against to a given target**, when the topic is controversial.

The application of such techniques implies as prerequisite detailed analysis and annotation of datasets, i.e. **CORPORA**, to be used as examples for training and testing systems implementing them.
We are currently working on two datasets whose topic are two political reforms strongly impacting on society and therefore widely discussed by users in Twitter and other platforms.

Twitter-MariagePourTous is a French corpus from Twitter collected within a project about communication of political topics by filtering Twitter with the hashtag **#mariagepourtous**.
Size of the annotated corpus: ~ 3.000 messages
Annotation: polarity (POS, NEG, NONE, MIXED), irony (HUM-POS and HUM-NEG) and a few target semantic areas of the debate (LOI, FAMILLE, DEBAT, MANIF).

Twitter-BuonaScuola is an Italian corpus from Twitter and from the online platform LaBuonaScuola collected within a project about communication of political topics by filtering data with keywords (**#buonascuola**, ...).
Size of the annotated corpus: ~ 7.000 messages
Annotation: polarity (POS, NEG, NONE, MIXED), irony (HUM-POS and HUM-NEG) and a few target semantic areas of the debate (DOCENTI, VALUTAZIONE, RECLUTAMENTO, ...).

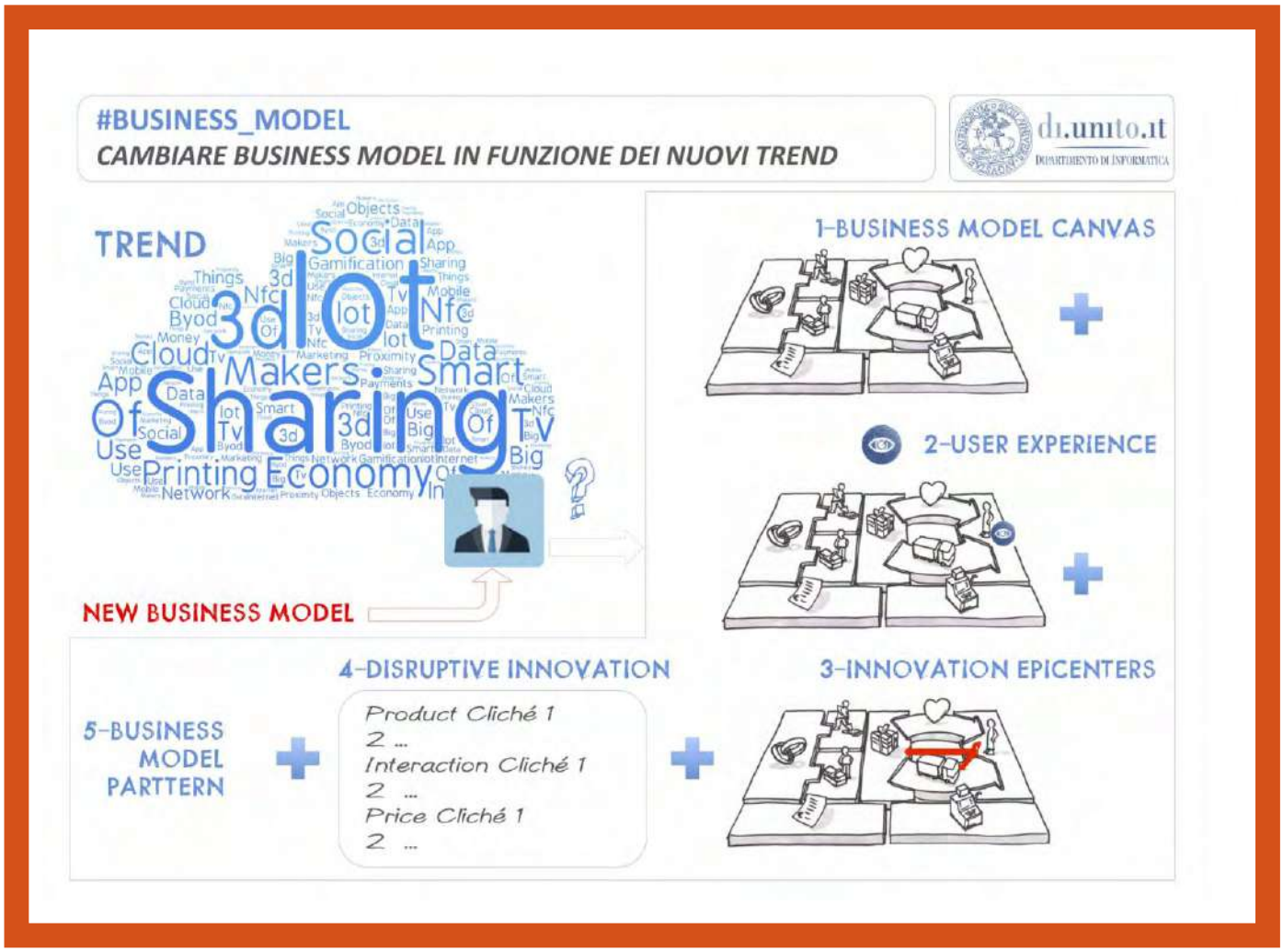
Wa applied on these datasets **ANALYSES** that vary from the frequency of tweets in different time slots and its relationships with socio-political events, contribution of users to the debate (e.g. presence of opinion leaders), detection of semantic targets by applying community detection techniques (DSAA 2015).

M. Lai, C. Bosco, V. Patti, D. Virone. 2015. *Debate on political reforms in Twitter: A hashtag-driven analysis of political polarization*. In Proc. of 2015 IEEE International Conference on Data Science and Advanced Analytics (IEEE DSAA'2015) Paris, France.

M. Stranisci, C. Bosco, V. Patti , D. I. Hernandez Farias. 2015. *Analyzing and annotating for sentiment analysis the socio-political debate on "La Buona Scuola"*. In Proceedings of the 2th Italian Conference on Computational Linguistics (CLiC-IT 2015), Trento, Italy.

[1]Dipartimento di Informatica – Università degli Studi di Torino, [2]Dipartimento di Studi Umanistici – Università degli Studi di Torino, [3]Universitat Politecnica de Valencia


INNOVARE
CREARE GESTIRE DIFFONDERE INNOVAZIONE
DEFINIRE "JOB TO BE DONE" DEL CONSUMATORE
Il consumatore compra un prodotto se lo aiuta a svolgere un'attività, un task o a raggiungere un obiettivo
DEFINIRE GLI OUTCOMES DA RAGGIUNGERE
Il consumatore svolge le sue attività valutandole attraverso delle metriche di valutazione soggettive
IDENTIFICARE L'OUTCOME DA SVILUPPARE ATTRAVERSO L'ALGORITMO DI OPPORTUNITA'
Le opportunità sono definite in base agli outcome e non in base ai prodotti dell'azienda o dei competitors
CAPIRE QUALI SONO I VINCOLI
Nello svolgere le sue attività il consumatore incontra dei vincoli
• PREVENIRE LA PELLE SECCA DURANTE LA RASATURA
• DIMINUIRE IL NUMERO DI MACCHIE SULLA PELLE
• MINIMIZZARE IL TEMPO DI RASATURA
• MINIMIZZA IL TEMPO DI RASATURA (IMPORTANTE PER I CLIENTI MA SERVITI MALE DAL MERCATO)
• BISOGNO DELLO SPECCHIO
MARKET SEGMENTATION
MESSAGING AND POSITIONING
PURPOSE BRAND DEVELOPMENT
COMPETITIVE INTELLIGENCE
CONCEPT GENERATION AND EVALUATION
SELLING
PATENT PORTFOLIO DEVELOPMENT
PIPELINE PRIORITIZATION
Dove applicare questa metodologia di innovazione ?
CHI USA QUESTO METODO
BOSCH
Invented for life
Abbott
Microsoft
Kimberly-Clark


#BUSINESS_MODEL
CAMBIARE BUSINESS MODEL IN FUNZIONE DEI NUOVI TREND
di.unito.it
DIPARTIMENTO DI INFORMATICA
TREND
1-BUSINESS MODEL CANVAS
2-USER EXPERIENCE
NEW BUSINESS MODEL
4-DISRUPTIVE INNOVATION
3-INNOVATION EPICENTERS
5-BUSINESS MODEL PARTTERN
Product Cliché 1
2 ...
Interaction Cliché 1
2 ...
Price Cliché 1
2 ...

MeSOOnTV

Tracking and Analyzing TV Content on the Web through Social and Ontological Knowledge

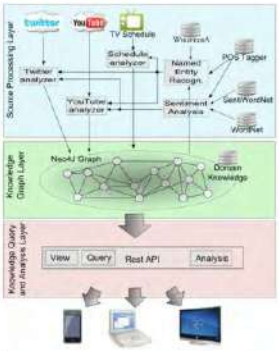
The **ME**dia and **SO**cial-driven **ON**tology-based **TV** knowledge management system is a model for the integration of heterogeneous data from

- Social sources
- Non-social sources

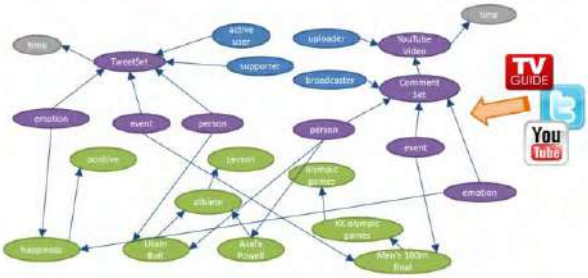
Tight integration between

- Web
- Television

New data analysis and mining techniques that take into account the complexity and heterogeneity of the networks



The knowledge model



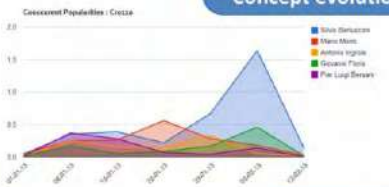
Graph-based knowledge base

The knowledge graph represents the result of public actions of users in social environments.

MeSoOnTV at work

Concept context

Concept evolution



Sentiment analysis

Cross-source analysis

Università degli Studi di Torino
Dipartimento di Informatica
Maria Luisa Sapino
Paolo Pasteris
Ruggero G. Pensa
Alessio Antonini

http://hdm.di.unito.it/mesoontv.html

RAI, Centro Ricerche e Innovazione Tecnologica
Luca Vignaroli
Claudio Schifanella
Roberto Del Pero
Raffaele Terzoni Prioletti

The Shortest Path to Happiness Recommending Beautiful Routes in the City

Daniele Quercia, Rossano Schifanella, Luca Maria Aiello

Dipartimento di Informatica, Università degli Studi di Torino and Yahoo Labs, Barcelona, Spain

Smart and efficient cities are crucial for sustainability

Psychological perceptions of the urban environment

Future cities solely engineered for **efficiency might not be good places to live in**.

Urban spaces and, in general, architecture are related to the **perception of emotions**.

Which urban elements make people happy?

POSITIVE ELEMENTS

Victorian houses, red brick (e.g., in London)

Public gardens, green spots

Squares and elements that foster social interaction

NEGATIVE ELEMENTS

Cars, trafficked streets

Isolated buildings are symptoms of a disconnected society

High buildings make people crazy

Today mapping services are all able to suggest the **shortest route**

at times we enjoy alternatives that offer **beautiful urban sceneries**

our goal is to **automatically** generate routes that are not only **short** but also **emotionally pleasant.**

How it works

Divide a city in cells

Build a graph linking all adjacent cells

Calculate **k-shortest paths** between source and destination

Select the path with the highest average [happiness,beauty,quiet] scores

We use Flickr images and metadata as a proxy for beauty

In Torino!

ACQUISIZIONE DEL MOVIMENTO E ANTROPOMETRIA

Nello Balossino, Elena Gianaria, Marco Grangetto, Maurizio Lucenteforte
Dipartimento di Informatica, Università degli Studi, Torino, Italy

Sommario

La camminata umana sembra possedere caratteristiche di singolarità utili ai fini dell'attribuzione di identità: sono coinvolti non solo gli arti inferiori ma anche quelli superiori, il tronco, le spalle e la testa. L'acquisizione dei dati del movimento può avvenire con limitata invasività, richiedere poca collaborazione da parte del soggetto ripreso ed essere ripetuta nel tempo. L'analisi successiva permette di ricavare parametri utili alla caratterizzazione della struttura antropometrica di un soggetto e delle modalità di esecuzione dell'atto motorio; entrambe contribuiscono ad associare un'identità ad un soggetto non noto.

Il metodo proposto per la caratterizzazione del movimento si basa sull'acquisizione di dati tridimensionali associati a uno scheletro virtuale, proposto dal sensore Microsoft Kinect e adattato al soggetto ripreso.

La sperimentazione realizzata su un gruppo di 20 soggetti, ha permesso di estrarre parametri caratterizzanti utili per la discriminazione dell'atto motorio. È emerso, in questa fase preliminare, che sono sufficienti pochi parametri per distinguere la camminata di soggetti diversi.

Tecnologia

Per l'acquisizione del movimento è stato utilizzato il sistema Microsoft Kinect (Fig. 1) che permette di monitorare, a distanza e senza collaborazione del soggetto, il movimento del corpo e la gestualità.

Fig. 1 Kinect.

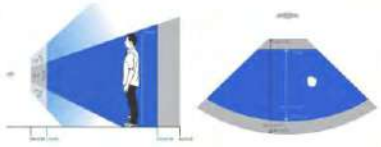


Fig. 2 Kinect range verticale e orizzontale del FOV.

L'apparecchiatura è a basso costo, non intrusiva ed è costituita da: una telecamera RGB; un emettitore infrarosso (IR); un sensore IR di profondità che misura la distanza rispetto a punti di repere del soggetto; un motore di movimento che modifica di ±27° la variazione verticale del FOV (l'angolo di vista corrispondente a 43° verticale e 57° orizzontale) (Fig. 2).

Metodo utilizzato

Lo scheletro proposto da Microsoft Kinect rappresenta 20 punti di repere fra loro collegati che contribuiscono nella globalità a caratterizzare la camminata di un soggetto. Le elongazioni fra coppie di punti determinano la lunghezza del segmento anatomico corrispondente.

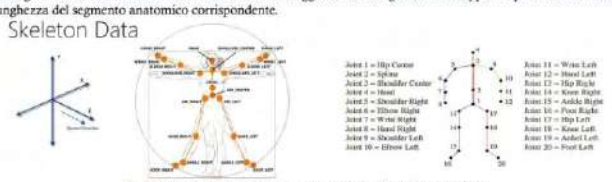


Fig. 3 Riferimento spaziale e mappa dei punti di repere dello scheletro proposto da Kinect.

Etichetta	Parametro
$\alpha \mid \beta$	lunghezza gambe e braccia
γ	altezza
δ	lunghezza del passo
ν	velocità della camminata
$\varepsilon \mid \kappa \mid \eta \mid \lambda$	distanza media fra gomiti, ginocchia, mani, caviglie
$\sigma^2_{H,x} \mid \sigma^2_{H,y}$	varianza della testa nelle direzioni x, y
$\sigma^2_{SL,x} \mid \sigma^2_{SR,x}$	varianza della spalla sinistra e destra nella direzione x
$\sigma^2_{EL,y} \mid \sigma^2_{ER,y}$	varianza del gomito sinistro e destro nella direzione y
$\sigma^2_{KL,y} \mid \sigma^2_{KR,y}$	varianza del ginocchio sinistro e destro nella direzione y

Tabella I. Notazione dei parametri del cammino.

I parametri presi in considerazione per caratterizzare l'atto motorio si classificano come (Tabella I):

- ***statici***: lunghezza degli arti (braccia e gambe); altezza del soggetto.
- ***dinamici standard***: lunghezza del passo; velocità della camminata.
- ***dinamici sperimentali***: media e varianza dei punti di repere lungo gli assi *x* e *y*; distanza mutua fra i corrispondenti punti destri e sinistri, come gomiti, ginocchia, mani, caviglie.

La Fig. 4 riporta alcuni esempi di acquisizione del movimento. Si noti come lo scheletro virtuale si adatti al singolo soggetto nei punti di repere di cui alla Fig. 3.

La visualizzazione delle immagini è sottoposta a trasformazione speculare come proposto nei videogiochi che usano Kinect.

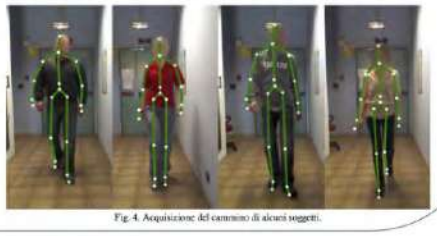


Fig. 4. Acquisizione del cammino di alcuni soggetti.

Risultati sperimentali

Goal	Esperimenti	Clustering	Metrica di confronto
Estrazione dei parametri più significativi per descrivere e classificare la camminata	20 soggetti (12 maschi, 8 femmine) 10 campioni per soggetto	*K*-means, algoritmo non supervisionato con distanza euclidea	*Producer Accuracy*: rapporto fra i campioni correttamente classificati e il numero totale

- ***Passo 1*** → discriminare fra due soggetti con altezza compatibile
  K-means con *K=2* eseguita su 5 coppie di persone.
- ***Risultati passo 1*** (vedi Fig. 8, linea blu):
  - bassa accuratezza di classificazione usando differenti combinazioni di caratteristiche statiche e dinamiche;
  - alta accuratezza di classificazione usando solo ε e κ (distanza media fra gomiti e ginocchia) e altri parametri dinamici.

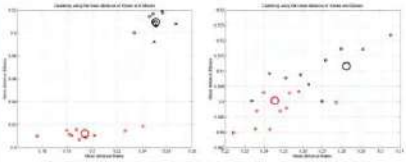


Fig. 5. Dispersione dei campioni nel piano e corrispondenti centroidi di due coppie: corretto (sinistra) errato (destra).

- ***Passo 2*** → discriminare fra tutti i soggetti
  - *K*-means con *K=20* eseguito su 20 soggetti differenti.
- ***Risultati passo 2*** (vedi Fig. 8, linea rossa):
  - la migliore producer accuracy è di circa il 50% (migliore rispetto ad un sorteggio casuale pari a 1/20, ovvero 5%);
  - il dominio ε, κ conduce ancora ad un'alta accuratezza nel clustering.

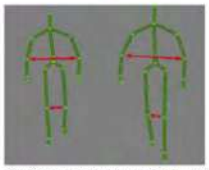


Fig 6. Scheletro di un soggetto durante la camminata in cui sono evidenziati i parametri maggiormente discriminanti.

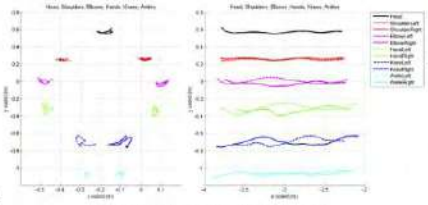


Fig. 7. Traiettoria dei punti di repere durante la camminata, proiettati sul piano frontale *xy* (sinistra) e quello sagittale *xy* (destra)

Set	Parametri della camminata
1	α, β, γ
2	$\alpha, \beta, \gamma, \delta, \nu$
3	$\alpha, \beta, \gamma, \varepsilon, \kappa$
4	$\alpha, \beta, \gamma, \varepsilon, \kappa, \sigma^2_{SL,x}, \sigma^2_{SR,x}$
5	$\alpha, \beta, \gamma, \varepsilon, \kappa, \sigma^2_{SL,x}, \sigma^2_{SR,y}, \sigma^2_{HL,x}, \sigma^2_{HR,x}$
6	$\alpha, \beta, \gamma, \varepsilon, \kappa, \sigma^2_{SL,x}, \sigma^2_{SR,y}, \sigma^2_{FL,y}, \sigma^2_{FR,y}$
7	$\alpha, \beta, \gamma, \varepsilon, \kappa, \sigma^2_{SL,x}, \sigma^2_{SR,y}, \sigma^2_{HL,y}, \sigma^2_{HR,y}, \sigma^2_{FL,y}, \sigma^2_{FR,y}$
8	ε, κ
9	$\varepsilon, \kappa, \lambda$
10	$\varepsilon, \kappa, \eta$
11	$\varepsilon, \kappa, \eta, \lambda$
12	$\varepsilon, \kappa, \sigma^2_{SR,x}, \sigma^2_{SR,y}$
13	$\varepsilon, \kappa, \sigma^2_{SR,x}, \sigma^2_{SR,y}, \sigma^2_{HR,x}, \sigma^2_{HR,y}$
14	$\varepsilon, \kappa, \sigma^2_{SR,x}, \sigma^2_{SR,y}, \sigma^2_{FL,y}, \sigma^2_{FR,y}$
15	$\varepsilon, \kappa, \sigma^2_{SR,x}, \sigma^2_{SR,y}, \sigma^2_{HR,x}, \sigma^2_{HR,y}, \sigma^2_{FL,y}, \sigma^2_{FR,y}$
16	$\varepsilon, \kappa, \sigma^2_{SR,y}, \sigma^2_{FL,y}$
17	$\varepsilon, \kappa, \sigma^2_{SR,y}, \sigma^2_{HR,y}$
18	$\varepsilon, \kappa, \sigma^2_{SR,y}, \sigma^2_{FL,y}, \sigma^2_{FR,y}, \sigma^2_{HR,y}$
19	$\varepsilon, \kappa, \sigma^2_{SR,y}, \sigma^2_{FL,y}, \sigma^2_{HR,x}$
20	$\varepsilon, \kappa, \sigma^2_{SR,y}, \sigma^2_{FL,y}, \sigma^2_{HR,x}$

Tabella II. Insieme dei parametri della camminata usati per il clustering in cornice quelli più significativi.

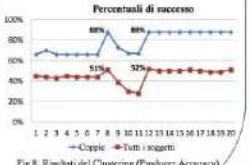


Fig 8. Risultati del Clustering (Producer Accuracy) sulle coppie e sulla totalità dei 20 soggetti per gli insiemi di Tabella II.

Conclusioni e sviluppi futuri

L'esperimento condotto con il sensore Kinect evidenzia come siano sufficienti pochi parametri per caratterizzare la camminata. In particolare, sembrano assumere un valore altamente discriminatorio per distinguere la camminata di soggetti diversi sia l'evoluzione della posizione delle ginocchia sia quella dei gomiti. I risultati preliminari raggiunti devono essere perfezionati al fine di poterli utilizzare in sistemi di video-sorveglianza. Per l'approfondimento della ricerca è necessario disporre di un data base di camminate da condividere con la comunità scientifica.

Ringraziamenti: MIUR, i figuranti della sperimentazione, Davide Cavagnino e lo staff ICT del Dipartimento di Informatica.

Concepts Representation and Reasoning: A Dual Process Architecture for Ontology Based Systems

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Dipartimento di Informatica

Concept Representation

Different and contrasting theories on how humans represent and organize the information in their mind.

Heterogeneous hypothesis on concepts (Machery, 2010)

Dual Process Theory of Reasoning (Stanovitch & West, 2000; Evans & Frankish, 2008; Kahnemann 2011)

Representational and reasoning capabilities of formal ontologies can be extended by using different representational frameworks, each allowing a particular form of reasoning.

Classical Theory
Concepts as lists of necessary and sufficient conditions

Prototype Theory
Category membership is not based on necessary and sufficient conditions but on typicality traits. There are members of a category that are more typical and cognitively relevant w.r.t. others.

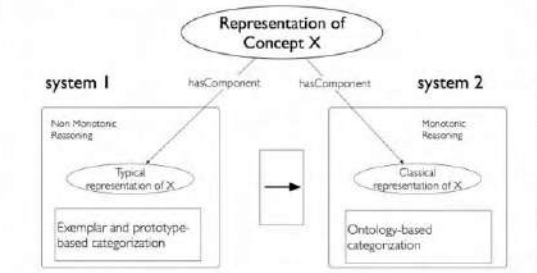
Formal Ontologies for classical representations.

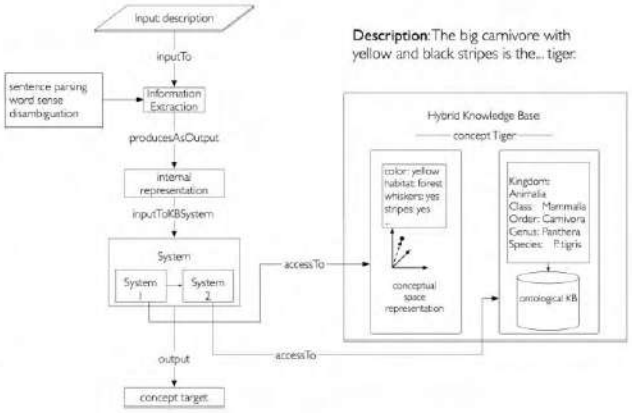
Conceptual Spaces for typical representations:

Standard Ontological Languages (such as *OWL* and *OWL2*) are based on Description Logics formalisms. They allow to represent **information on concepts and properties by using logical axioms** and according to standard Tarskian-like DLs formalisms.

Conceptual Spaces (Gärdenfors, 2000; 2014) have been proposed for dealing with prototypical representation of concepts and the **similarity**. Geometrical representational framework where the information is organized by **quality dimensions** are sorted into **domains.**

Dual Process Architecture





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COST Action IC1201 2012 | 2016

BETTY

Behavioural Types for Reliable Large-Scale Software Systems

In the past, computing consisted of isolated computers processing data. Programming languages quickly adopted data types in order to codify the structure of data and support the development of reliable data-processing software. Today, computing depends on communication between co-operating components, and verification of dynamic properties is essential. Behavioural types include: types for structured communication, such as session types; contracts expressed as types; and types for properties such as termination, liveness and deadlock-freedom. They have the potential to support the development of reliable communication-oriented software, but have not yet been systematically put into practice.

Objectives

- To develop the domain of certified software for global services, by incorporating behavioural types into programming languages and software engineering tools for automatically checking behavioural properties of communicating software systems.
- To co-ordinate European research activity on the theory and application of behavioural types, and the deployment of programming languages and tools based on them.
- To build an effective working community of European researchers in this area.
- To encourage the industrial adoption of advanced programming languages and tools.

Working Groups

- WG 1: Foundations
  (Chairs: Hans Hüttel & Vasco Vasconcelos; Vice-Chair: Ivan Lanese)
  developing the theory of behavioural types in order to support their applications
- WG 2: Security
  (Chair: Ilaria Castellani; Vice-Chair: Hugo Vieira)
  integrating behavioural types with techniques for security analysis
- WG 3: Languages
  (Chair: Luca Padovani; Vice-Chairs: Giuseppe Castagna & Nobuko Yoshida)
  implementing behavioural types in practical programming languages
- WG 4: Tools and Applications
  (Chair: Thomas Hildebrandt; Vice-Chair: Fabrizio Montesi)
  developing software engineering tools and applying them to realistic case studies

Recent and Forthcoming Activities

- 3rd International Workshop on Behavioural Types (BEAT) at CONCUR, September 2014.
- Working Group Meetings: April 2014 (at ETAPS), September 2014 (at CONCUR).
- 1st International Summer School on Behavioural Types: Lovran, Croatia, July 2014.
- Funding for Short-Term Scientific Missions between participating countries.

Get Involved

- Contact the Action Chair, Simon Gay, with details of your interests.

Information and Communication Technologies (ICT)

Participating countries: 22

BA, CY, DE, DK, EE, ES, FR, GR, HR, IE, IT, LT, MK, MT, NL, NO, PL, PT, RO, RS, SE, UK

Global collaboration:

AR

Contact details

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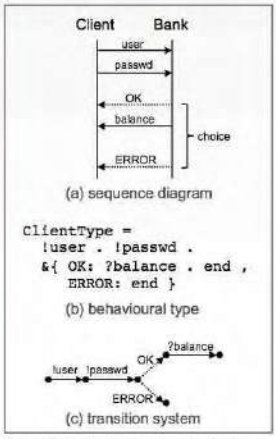
Simon Gay (Simon.Gay@glasgow.ac.uk)

Vice-Chair
António Ravara (aravara@fct.unl.pt)

Domain Committee Rapporteur
Jan Mikkelsen (hmi@es.aau.dk)

Science Officer (COST Office)
Ralph Stübner (Ralph.Stuebner@cost.eu)

Website
www.behavioural-types.eu



Describing structured communication.

COST is supported by the EU RTD Framework Programme

EUROPEAN SCIENCE FOUNDATION

ESF provides the COST Office through a European Commission contract

Reputation by design

Reputation is

expectation about an entity's behavior based on informations of its past behavior

Reputation statement structure

A source makes a claim about a target

Problems of today's reputation systems

Claims representation fails to distinguish different aspects: the resulting value does not reflect the related contexts in which it is earned (see example on the left)

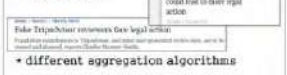
a 5 stars rating + a text mixing comments about: seller, product, delivery, price/quality

If the product is popular should user analyse all texts? What is the meaning of the 3/5 stars?

informations used to built reputation is completely subjective (entirely rely on users' feedbacks), even concerning attributes that could be objectively measured

There are many problems related to subjective feedbacks from users:

- fake reviews



- different aggregation algorithms give different reputation results
- almost impossible to design a totally manipulation-resistant rs

- absence of reputation systems evaluating public services (schools, hospitals)
- no use of important sources like: certifications, standards, open data

Is the value perceived by users?

Research goals

Reputation of a service should be composed of all the aspects the can be perceived as a value by users

Services should be analysed in order to detect:

- all the features that compose the service
- which of these features can be objectively measured/certified
- what is the added value of standards and certifications from users' perspective

This analysis must be performed at the beginning of RS development involving all the stakeholders: users, service providers, software engineers. The analysis tools and methodologies should overcome socio-technical mismatch

Research steps

Development of software engineering methodologies and tools for reputation systems design

Users evaluation to measure impact/ perception

Development of case studies (RS for public and private business/services)

Evaluation of user perception of standards and quality certifications

Evaluation of impact on business model innovation, organization, brand perception

Preliminary results

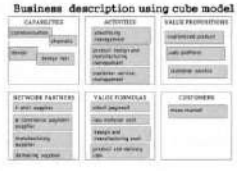
S. Capecchi, P. Pisano Reputation by design: using VDML and ServiceML for reputation systems modeling

IEEE International Conference on e-Business Engineering, 5-7 November 2014, Guangzhou, China

Business description

Online store which provides customized T-shirts. Customers enter website, create their own T-shirt by uploading images and, if they are satisfied by the displayed prototype they buy the product. After receiving the item, customers can benefit from a customer care service which handle returns.

Business description using cube model



Value Delivery Modeling Language (VDML)

Provides visual notation for all 6 views of the cube

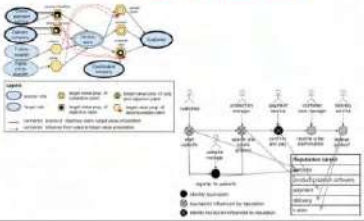
Service Modeling Language (ServiceML)

Provides visual notation of user's service experience

Our contribution:

VDML+ ServiceML +

visual notation for reputation systems concepts



Result of the business analysis:

lists of subjective (to be evaluated BY users) and objective (to be displayed TO users)

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di.unito.it DIPARTIMENTO DI INFORMATICA

GroupCollaborate2: Interactive Community Mapping

L. Ardissono, M. Lucenteforte, A. Savoca - Università di Torino
Angioletta Voghera - Politecnico di Torino

Participatory Decision-Making Processes

based on a bottom-up decision model for involving people in the design of public policies to collect needs, proposals, feedback. They support **user empowerment in policy making**

Goal: to enhance PA's awareness of priorities to face and reach consensus on decisions

Some challenges:

- Support **people awareness** of the policies under development
- Enable them to **contribute** with information and proposals for **crowdsourcing** purposes
- Support **collaboration and information sharing** among participants
- Support **deliberation** on the actions to be carried out

Tools:

- **Participatory GIS (PGIS):** systems supporting information sharing and feedback collection in maps *(usually bi-dimensional, with textual feedback)*
- **Community Maps**: graphical tools for representing people's view of an area by **gathering** and **presenting** site-specific data, to understand differences in perception and identify value attached to places

GroupCollaboration Project

GOAL: Enhance Participatory GIS shared planning support (for territorial policies) by:

- Extending group collaboration management capabilities -> people groups can interact online as distributed teams and collaborate to the development of shared proposals
- Presenting different points of view on the plans to be developed in order to satisfy individual information needs
- Supporting crowdsourcing in a virtual representation of the territory to offer an immediate view of the intended effects of proposals

HOW: by managing **Emotional Community Maps** supporting distributed collaboration

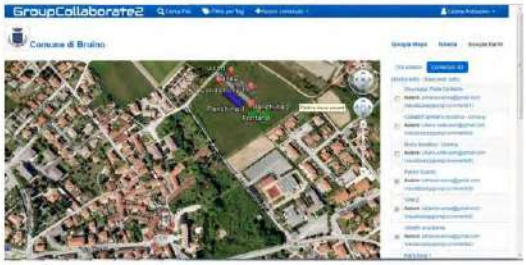
USER REQUIREMENTS

Interaction model centered around the concept of **Community Map, which represents the User Interface of the PGIS:**

- Shared information space
- Single access point to data, objects and comments
- Information retrieval support
- Communication and discussion support for the group
- 3D simulation of the environment
- Accessibility from standard browsers
- Usability for non technical people

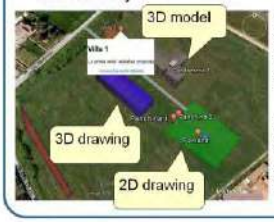
GroupCollaborate2

Online prototype platform for **sharing 3D information / discussion spaces in the Web**



Public and private group and information space management:

- **Geospatial document / information sharing support in a 3D environment** providing a virtual representation of the territory



Documents can be uploaded or created/edited in the map by any group member having permission

External 3D models (e.g., KMZ) can be uploaded or created in the map using an internal sketch editor

- **Metadata representation** of information about documents and models for presentation in the map (author, title, description, ...)
- **Multi-faceted information search** based on hierarchical tagging. Group members tag objects to classify them in a folksonomy and filter the map -> different map projections
- **Discussion support:** users can add comments to objects. Comments are characterized by date, author, title, content; visualized by clicking on object descriptors

Implementation:

- Java Web Application Google APIs for map management (Maps + Earth Plug-in), document sharing and data storage (Drive + Datastore), authentication (OAuth)

User tests: GroupCollaborate2 developed following a user-centered **model**; user tests planned for next future

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Fast and Exact Inference in Graphical Models (with caveats)

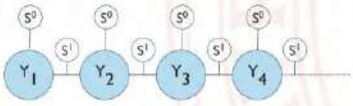
Roberto Esposito (esposito@di.unito.it) Daniele P. Radicioni (radicion@di.unito.it) Alessia Visconti (a.visconti@imperial.ac.uk)

Problem: Given output variables $Y_1 \dots Y_T$ find the assignment that maximises $P(Y_1 \dots Y_T \mid \text{data})$
The problem is NP-Hard in the general case. Traditional approaches run in $O(TK^2)$ time on sequences and trees.

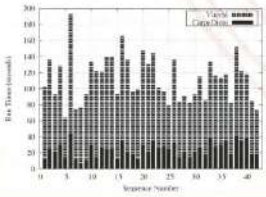
CDoS

Structure: sequence

Weights: the reward function can be factorised into order-0 factors and order-1 factors.



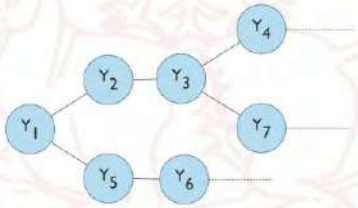
Theorem: CDoS has $O(TK^2)$ worst case time complexity and $O(TK\log K)$ best case time complexity.



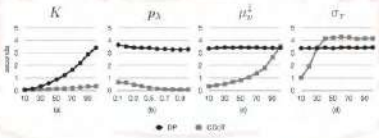
CDoT

Structure: trees

Weights: same as in the case of the sequence



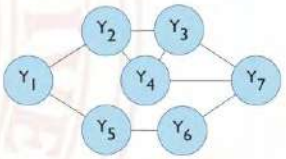
Theorem: CDoT has $O(TK^2)$ worst case time complexity and $O(TK\log K)$ best case time complexity.



CDoG

Structure: any

Weights: the reward function can be factorised into order-0, order-1, …, order-n factors.



Theorem: CDoG has $O(KT)$ worst case time complexity and $O(TK\log K)$ best case time complexity.

Preliminary performance results: very fast when particular structures are present in the graph.

Type Driven Program Synthesis

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Problem: Synthesis from Components

Component: any program or system module, that can be composed with others either deeply (at compiling time) or shallowly (linking precompiled modules from libraries or from a network).

Specification: a declarative description of component interface and behavior; specifications could be formal (logical formulas, LTL or CTL formulas, types) or semi-formal (UML diagrams, LOTOS, ...).

Problem: given components $C_1, \ldots, C_n$ with specifications $\sigma_1, \ldots, \sigma_n$ and a program specification τ, find a program $P[C_1, \ldots, C_n]$ such that:

$$C_1 \models \sigma_1, \ldots, C_n \models \sigma_n \Longrightarrow P[C_1, \ldots, C_n] \models \tau.$$

Approach and Methodology

Most of the current works are based on automata theory and model-checking. These is a quite general approach, but it faces serious difficulties when the focus is on composition of sophisticated modules such as those of object oriented systems.

Approach: the **synthesis problem** is seen as a **derivation reconstruction problem** in a suitable type system. Types represent specifications, terms of a formal calculus are programs; assumptions (contexts or bases) are interfaces made of module names and the respective specifications.

Metodology: starting with a formal calculus to represent the system at hand (e.g. a programming language) we develop a translation into a λ-calculus with types, inducing a type system for the original calculus. Then we adapt proof-search techniques like the *inhabitation semi-algorithm*, to synthesize the program from a library of modules.

Types as Specifications

Suitably reach types can be used as specifications in several contexts, e.g.:

- **Correctness and safety properties:** types as syntactic constraints, well-typed code as error-free programs
- **Carry-Howard correspondence:** types as logical formulas, typed λ-terms as proofs
- **Intersection types:** types as sets, untyped λ-terms as inhabitants
- **Session types:** types as service interfaces, process algebraic terms as service implementations

Type checking is in general more efficient than theorem proving or model checking.

Intersection Types and Program Synthesis

Intersection types (Coppo, Dezani) are an extension of Carry's simple types, that can be seen as sets of programs satisfying abstract properties:

$$\mathsf{Succ} : (\mathsf{EvenInt} \to \mathsf{OddInt}) \cap (\mathsf{OddInt} \to \mathsf{EvenInt})$$

Terms from Combinatory Logic (CL) inhabiting a type w.r.t. a given "basis" (a finite set of components and specifications) can be automatically synthesized by solving the **inhabitation problem**:

$$\{C_1 : \sigma_1, \ldots, C_n : \sigma_n\} \vdash \; ? \; : \tau$$

This is decidable in k-bounded CL (Rehof, Urzyczyn).

Intersection Types for Objects

Intersection types can be used to type records and objects (considered as some kind of recursive records) (de'Liguoro):

$$\frac{\mathsf{self}_1 : \omega \vdash 3 : \mathsf{int}}{\vdash \lambda \mathsf{self}_1.3 : \omega \to \mathsf{int}} \qquad \frac{\mathsf{self}_2 : (\mathsf{m} : \omega \to \mathsf{int}) \vdash \mathsf{self}_2 \Leftarrow \mathsf{m} : \mathsf{int}}{\vdash \lambda \mathsf{self}_2.(\mathsf{self}_2 \Leftarrow \mathsf{m}) : (\mathsf{m} : \omega \to \mathsf{int}) \to \mathsf{int}}$$
$$O : (\mathsf{m} : \omega \to \mathsf{int}, \mathsf{get} : (\mathsf{m} : \omega \to \mathsf{int}) \to \mathsf{int})$$

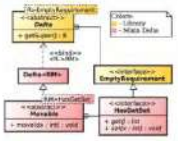
where $O = [\mathsf{m} = \lambda \mathsf{self}_1.3, \mathsf{get} = \lambda \mathsf{self}_2.(\mathsf{self}_2 \Leftarrow \mathsf{m})]$.

Setting $O \Leftarrow \mathsf{m} = (O.\mathsf{m})O$ (self-application), this yields:

$$\frac{O : (\mathsf{m} : \omega \to \mathsf{int}, \mathsf{get} : (\mathsf{m} : \omega \to \mathsf{int}) \to \mathsf{int}) \cap (\mathsf{m} : \omega \to \mathsf{int})}{O \Leftarrow \mathsf{m} : \mathsf{int}}$$

Intersection Types for Classes and Mixins

From a UML diagram:



and (pseudo)-code:

```
Mixin Movable(C)
Requirements
    get: Unit → int
    set: int → Unit
Definitions
    move: int → Unit
    move(dx) = super.set(super.get()+dx)
```

we get a λ-term after (Bracha-Cook):

$$\begin{array}{l}\mathsf{Movable} = \lambda \mathsf{super}.\lambda \mathsf{myClass}.\lambda x.\lambda \mathsf{self}.\\ \quad \mathsf{let}\ c = Y((Y\,\mathsf{super})\,x)\ \mathsf{in}\\ \quad \mathsf{let}\ \Delta = (\mathit{move} = \lambda dx.\ c.\mathit{set}(c.\mathit{get} + dx), \mathit{new} = \lambda x'.Y(\mathsf{myClass}\,x'))\ \mathsf{in}\\ \quad c \oplus \Delta\end{array}$$

and a typing

$$\begin{array}{l}\sigma_1^{\mathsf{Movable}} = (\mathsf{get} : \mathit{Int}, \mathsf{set} : \mathit{int} \to (\mathit{int} \times \mathit{Unit}), \mathsf{shift} : (\mathit{Int} \times \mathit{Unit}))\\ \qquad \cap\, (\mathsf{move} : \mathit{int} \to (\mathit{Int} \times \mathit{Unit}), \mathsf{new} : \mathit{int} \to \omega)\\ \sigma_2^{\mathsf{Movable}} = (\mathsf{get} : \mathit{Int}, \mathsf{set} : \mathit{int} \to (\mathit{int} \times \mathit{Unit}), \mathsf{shift} : (\mathit{Int} \times \mathit{Unit}))\\ \qquad \cap\, \underbrace{(\mathsf{move} : \mathit{int} \to (\mathit{Int} \times \mathit{Unit}), \mathsf{new} : \mathit{int} \to \sigma_1^{\mathsf{Movable}})}_{\text{type } \sigma_2^{\mathsf{Movable}} \text{ induced by the mixin description}}\\ \kappa_1^{\mathsf{Movable}} = \mathit{int} \to (\omega \to \sigma_1^{\mathsf{Movable}})\\ \kappa_2^{\mathsf{Movable}} = \mathit{int} \to (\omega \to \sigma_1^{\mathsf{Movable}}) \cap (\sigma_1^{\mathsf{Movable}} \to \sigma_2^{\mathsf{Movable}})\\ \kappa^{\mathsf{Movable}} = (\omega \to \kappa_1^{\mathsf{Movable}}) \cap (\kappa_1^{\mathsf{Movable}} \to \kappa_2^{\mathsf{Movable}})\end{array}$$

(from [Bessai et alii 2014])

Collaborations and projects

Prof. Jakob Rehof, Technische Universität Dortmund, Germany
Prof. Viviana Bono, Dep. Comp. Sci., Università di Torino
Behavioural Types for Reliable Large-Scale Software Systems, COST Action IC1201
CINA: Compositionality, Interaction, Negotiation, Autonomicity, Miur-PRIN project

CINA:
Compositionality, Interaction, Negotiation, Autonomicity

A MIUR PRIN project

The project deals with the issues related to the development and management of open-ended IT systems consisting of heterogeneous, highly parallel, massively distributed components with complex interactions and behaviours and with autonomy in terms of individual properties, objectives and decision-making.
It aims at developing a coherent, integrated set of languages, methods and tools to build systems that can operate in open-ended, unpredictable environments while adapting to changing contexts or requirements, and that behave reliably and are able to cope with failures and attacks

Autonomicity:
Adaptivity and Self-Awareness

Negotiation:
Transactions, Reversibility and Compensations

Glocality:
Reconciling Local and Global Views

Performability:
Evaluating for Deciding

Trustworthiness:
Correctness and Security

Applications

green traffic and transport support systems

citizen-centric delivery of services

emergency management

Contacts

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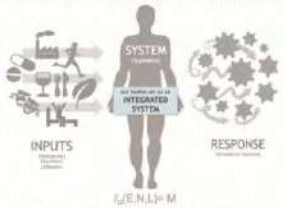
Next Generation Biology:
How Mathematics and Computer Science Meet Biology
- A Multidisciplinary Approach To Study Cancer -

Balbo G, Beccuti M, Calogero RA, Cordero F, Donatelli S,
Ferrero G, Fornari C, Novara L, Totis N

The group of **Systems and Computation Biology** @ Dept of Computer Science is interested in the global comprehension of the functional, genetic and epigenetic aspects of the cells.
This is fundamental for the translation of results obtained from the analysis and integration of several types of biological experiments into clinical research.
Our research projects represent a concrete step in the usage of new high-throughput technologies to obtain data and knowledge for defining personalized treatments. Our projects will be an example of the translation and clinical utilization of the computational models created.

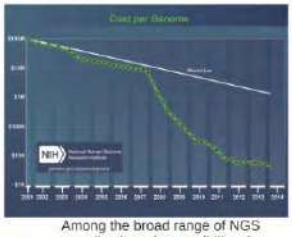
A tailored therapeutic treatment will undoubtedly favor a reduction of the economic burden for the healthcare system that is mainly related to subsequent patients' hospitalization and to the high cost of different treatments.

In particular, we have experience in different aspects of algorithms and analysis techniques of data from high-throughput technologies, both microarray and Next Generation Sequencing, and in the definition and development of methods that allows the description of biological systems and their qualitative and quantitative analysis.

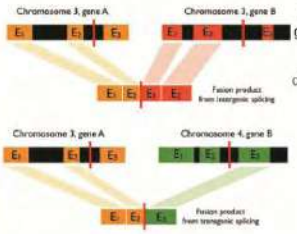


Genome High-Throughput Data Analysis

The cost of sequencing human genome is dropping rapidly, due to the continual development of new, faster, cheaper DNA sequencing technologies such as "next generation DNA sequencing".



Among the broad range of NGS applications the possibility of discover new *fusion genes* at genome level is one of the most exciting. Indeed, *fusion genes*, also known as chimeras, play important roles in tumorigenesis and cancer progression.

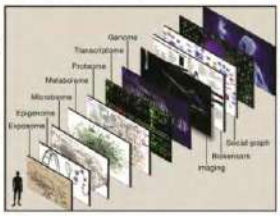


The role of Chimeras becomes crucial in the areas of biomarkers and therapeutic targets investigation. High-throughput sequencing technologies combined with sophisticated bioinformatics tools might facilitate the discovery of such aberrations.

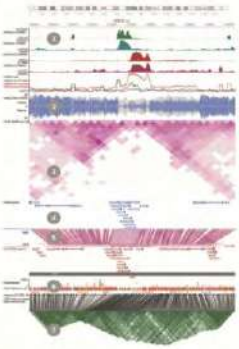
High-Throughput Data Integration

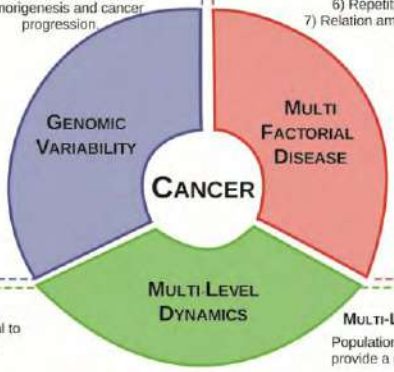
Physiology of each individual is the result of a multi-layered organization of biological components starting from intracellular level.

Data integration is the combination of heterogeneous data produced by High-Throughput (HT) technologies to gain a better understanding of a biological systems or a complex disease.



Example of genome-wide information
1) Epigenetic modifications
2) DNA methylation data
3) Chromatin interactions
4) Human gene annotations
5) Human/mouse genomic alignments
6) Repetitive elements
7) Relation among variants





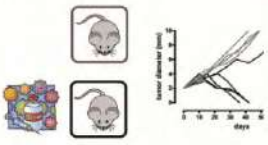
From Data To Mathematical Models

The combination of experiments and theory is crucial to uncover general control principles in cancer biology, specifically in cell fate decisions.

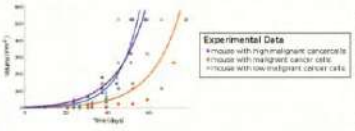
In Vivo Data: Tumor Growth & Vaccination Effects

- Which are the biological factors that mostly promote breast caner?
- How tumor growth is affected by vaccination?

Tumor cells are implanted in mice to promote breast tumor development and some mice are vaccinated. Tumor volume is monitored over time in all mice and the corresponding data are integrated in our model.



In Silico Tumor Growth

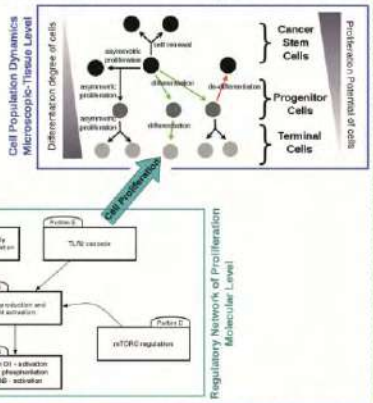


The malignancy of a subpopulation of cells is measured evaluating the tumor growth rate of the line that fits the corresponding data.

Our model is able to reproduce a real tumor growth and can be used to gain further knowledge from data.

Multi-Level Mathematical Model of Tumor Growth

Population dynamics are combined with molecular reactions to provide a detailed and multi-scale description of cancer growth.



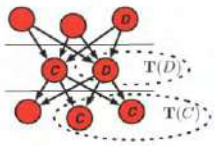
Laura GIORDANO, Valentina GLIOZZI, Nicola OLIVETTI, Gian Luca POZZATO

NONMONOTONIC EXTENSIONS OF DESCRIPTION LOGICS

- Description Logics (DLs): languages for ontologies
- KB=(TBox, ABox)
  - ABox -> properties of individuals
  - TBox -> taxonomy of concepts
- need of reasoning about
  - defeasible inheritance
  - prototypical properties

- Extensions of standard DLs with a T operator
- T(C) singles out the "most normal" or the "typical" instances of concept C
- The semantics of T is strongly related to the semantics of nonmonotonic consequence relation in Kraus, Lehmann and Magidor logics

- Ranked models $\mathcal{M} = \langle \Delta, I, < \rangle$
  - $<$ is irreflexive, transitive, well-founded, and modular relation among elements of Δ
  - $(\mathbf{T}(C))^I = Min_<(C^I)$



MINIMAL MODEL SEMANTICS

- Preference relation among ranked models
  - We prefer models which minimize the rank of the domain elements
  - We consider canonical models
    - each satisfiable concept "involved" in the KB is satisfied by a domain element
- Minimal model semantics is a semantic characterization of Rational Closure
- Characterization extended to the ABox

RATIONAL CLOSURE FOR $\mathcal{SHIQ}$

- Rational closure of TBox can be computed using entailment in $\mathcal{SHIQ}$
  - Entailment in $\mathcal{SHIQ}^{\mathrm{R}}\mathbf{T}$ can be polynomially reduced to entailment in $\mathcal{SHIQ}$
    - preferential and rational extensions of $\mathcal{SHIQ}$ are equivalent for TBox inclusions
    - we exploit the definition of the typicality operator in terms of a Gödel-Löb modality $\Box$
      $\mathbf{T}(C) \equiv C \sqcap \Box \neg C$
    - we introduce a new atomic concept $\Box_{\neg C}$ for each concept C occurring in $\mathbf{T}(C)$ and a new role R

TBox

$VIP \sqsubseteq Person$
$\mathbf{T}(Person) \sqsubseteq \leq 1 HasMarried.Person$
$\mathbf{T}(VIP) \sqsubseteq \geq 2 HasMarried.Person$

TBox reasoning

$\mathbf{T}(VIP \sqcap Tall) \sqsubseteq \geq 2 HasMarried.Person \in \overline{TBox}$

Does not follow from TBox

ABox $Person(marco)$

$\leq 1 HasMarried.Person(marco) \in \overline{ABox}$

ABox $Person(marco)$, $VIP(marco)$

$\geq 2 HasMarried.Person(marco) \in \overline{ABox}$

ABox reasoning

FUTURE DIRECTIONS

- semantics with multiple preference relations
- implementation of reasoning mechanism
- extension to $\mathcal{SHOIQ}$ (the notion of canonical model is too strong, due to the interaction between nominals and number restrictions)

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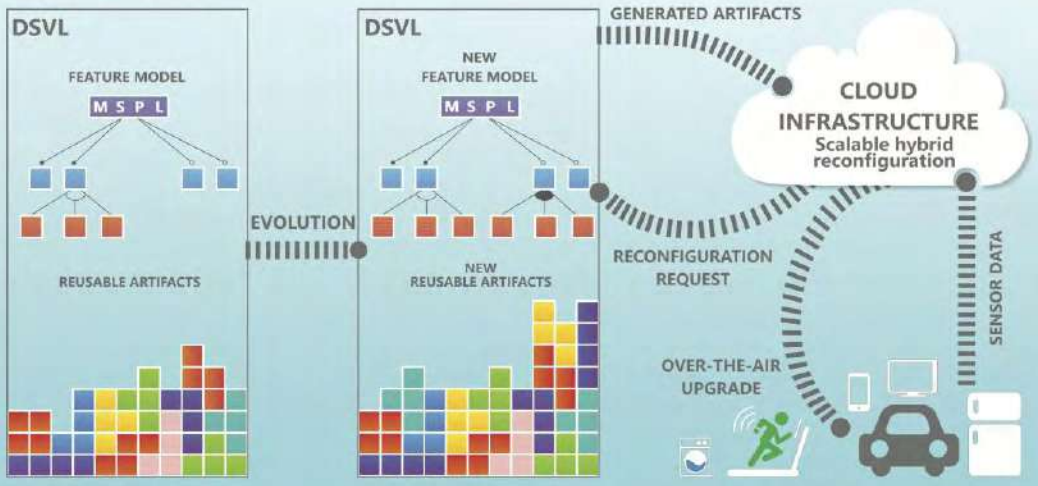
HyVar

Scalable Hybrid Variability for Distributed Evolving Software Systems

http://hyvar-project.eu

DSVL - Domain Specific Variability Language
MSPL - Multi Software Product Line



HyVar proposes a development framework for continuous and individualized evolution of distributed software applications running on remote devices in heterogeneous environments processes.

This framework combines:

- **Domain specific variability language** to describe evolution as software product line.
- **Scalable cloud infrastructure** for monitoring and individualized customization of software upgrades for the remote devices.
- Continuous software evolution using **over-the-air upgrade** technologies.

The framework ensures upgrades will be seamless and sufficiently nonintrusive to enhance the user quality experience, without compromising the robustness, reliability and resilience of the distributed application instances.

Reply
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atbrox
MAGNETI MARELLI

"HyVar project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 644298"

Primacy/recency effects in infant categorization

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Familiarization experiments typically assume the order of presentation of the stimuli does not affect the category being formed. We show, computationally and experimentally, that this is not the case: primacy/recency effects are present in early visual categorization.

The model: a self-organizing map based model predicts primacy / recency effects

Figure 1. model architecture

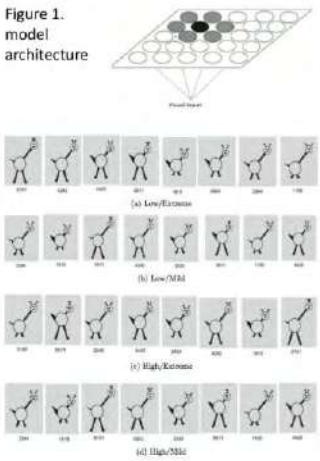


Figure 2. Training sequences

- Based on Gliozzi, Mayor, Hu, Plunkett (2009) (see Figure 1)
- Training analogous to infant presentation: each stimulus presented once
- 96 maps trained with sequences of 8 stimuli (see Figure 2), (from Younger, 1985)
- 4 conditions varying in two dimensions: average distance (low/high) between successive stimuli
  (as in Mather & Plunkett, 2011) and start/end stimuli (mild/extreme). Mild stimuli are closer to prototype than extreme stimuli (4422 vs. 1155)
- Each model's categorization is assessed by comparing the map's quantization error «looking time» to the average test stimulus (Figure 3) w.r.t. map's total looking time during test.

Average Test Stimulus: Peripheral Test Stimuli:

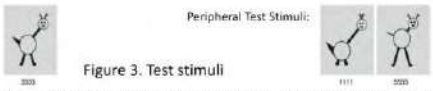


Figure 3. Test stimuli

- **Model: main effect on categorization of start/end stimuli (primacy/recency effect)**
  ANOVA with factors distance and start/end stimulus:
  main effect of start/ end stimulus ($F(1,92)=65.56$, $p=0.26^{-11}$)
  - Mild sequences (starting/ending with mild attributes, as in *b* or *d*) result in higher error (looking time) for peripheral test stimulus than extreme sequences (starting/ending with extreme attributes as *a* or *c*)

Conclusion: The model's perfomance is subject to primacy/recency effects

Does this reflect categorization in infants?

Infant Study: primacy/recency effects occur in 10-month-olds' categorization

- Participants: 97 infants (mean age: 310 days, 52 females)
- Method: Familiarisation / preference test with sequences in 4 conditions (see above): familiarisation - 8 trials (10 s each); 2 test trials (10 s each).
- **Results (see Figure 4): Test trial 1 is consistent with the model predictions:**
- Test 1: ANOVA with factors distance (low vs. high) and start/end stimulus (extreme vs. mild):
  - **main effect of start/end stimulus** ($F(1,92)=6.242$, $p=.014$)
  - Mild sequences: Average test perceived as familiar
  - Extreme sequences: no preference
- Test 2: **interaction of distance x start/end stimulus** ($F, 1,93)=5.534$, $p=.021$)

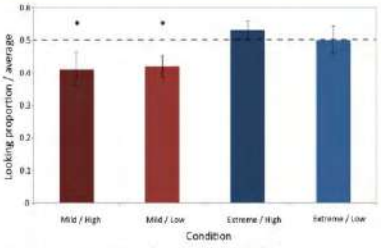


Figure 4. Infants' performance on test 1

Interpretation of results based on model's internal representation:

- Primacy / recency effects affect the central tendency of the learned category
- Mild conditions: central tendency near average stimulus → novelty preference for peripheral stimulus
- Extreme conditions: central tendency closer to peripheral stimulus → both stimuli equally interesting – therefore no preference

- Test 2:
  - Infants continue to learn during test trials, so preferences shift over time (subsequent retesting of the model yields similar results)

While null preferences are usually taken as a lack of category formation, the result here represents a shift in category representation

Conclusions:

- **Stimulus order affects category formation in 10-month-olds**
- **Results are consistent with both primacy and recency effects**
- The strong order effect may point towards a recency effect
- Future research will discriminate between primacy and recency effect

References: B. Younger, The segregation of items into categories by ten-month-old infants, Child Development, 1985
V. Gliozzi, J. Mayor, J. Hu , K. Plunkett, Labels as Features (Not Names) for Infant Categorization: A Neurocomputational Approach, Cognitive Science,2009
E. Mather, K. Plunkett, Same items, different order: Effects of temporal variability on infant categorization, Cognition, 2011

Crowdsourcing and Decision Making with OnToMap

L. Ardissono, M. Lucenteforte, A. Savoca, G. Torta, A. Voghera

Mappe di Comunità 3.0

- partners: UniTo DipInfo, PoliTo DIST, CSI Piemonte (external)
- funded by Fondazione CRT (2014-2015)
- main **goals**:
  - support the creation, sharing and visualization of cartographic information in order to...
  - improve communication and collaboration between PA and citizens in participatory decision making processes
- main **outcomes**:
  - OnToMap web application
  - Case Study (Venaria Reale)

Contacts & Info:
web: http://ontomap.dyndns.org
mail: liliana.ardissono@unito.it

OnToMap

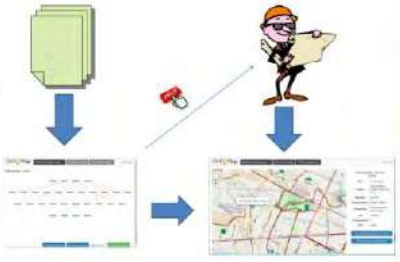
- ***query*** *possibly distributed cartographic data sources*
  - semantic representation of entities and relations (ontology)
  - multiple "views" (urban planning, cultural heritage, tourism)

- ***interact*** *with community maps*
  - show details of selected elements
  - navigate to related elements

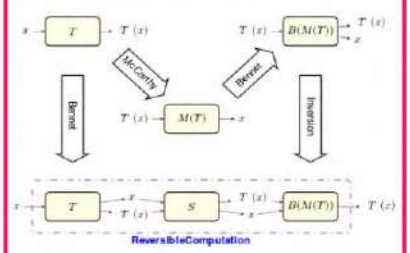
- ***contribute*** *and share content*
  - add comments to elements and areas
  - save customized maps
  - share maps with other people

Beyond "Mappe di Comunità 3.0"

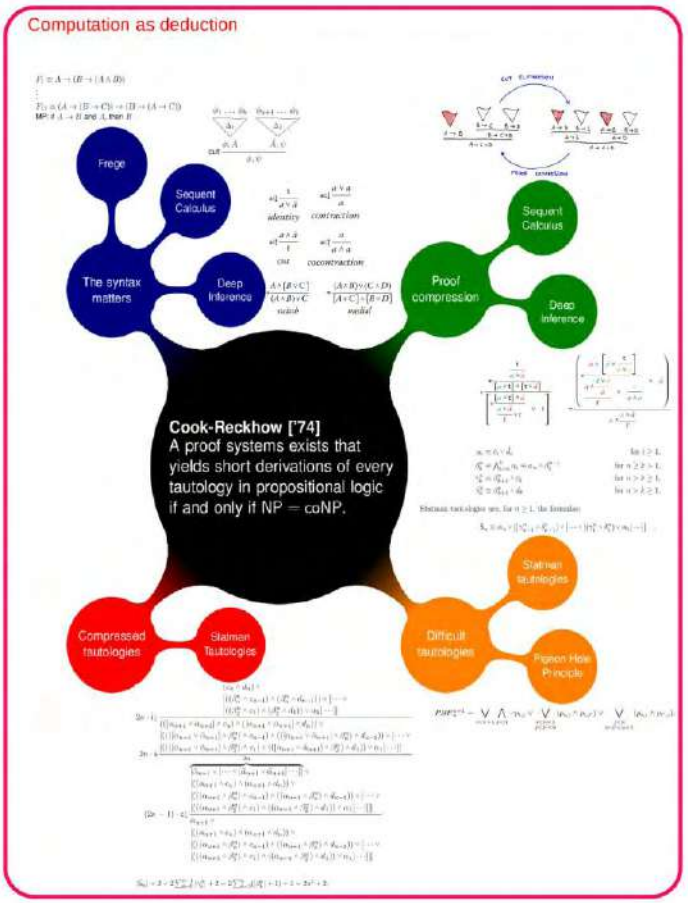
- UniTo DipInfo, self-funded (2015-2016)
- main goals:
  - **represent regulations** within the OnToMap ontology (city plans, etc.)
  - **support the awareness** about the consistency of existing territorial elements with the regulations
  - **check new proposals** in public policy making against the regulations
  - give understandable and useful **feedback to the user**



Computation as a physical process



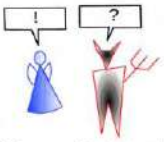
Computation as deduction



What is computation?

Felice Cardone Luca Paolini Luca Roversi
Dipartimento di Informatica

Computation as interaction: from dialogues to tally sticks



System (Proponent) Environment (Opponent)

Lorenzen dialogues

Justification of procedural rules:

1. the Proponent may only assert an atomic formula after the Opponent has asserted it
2. if one responds to an attack, this has to be the latest open attack
3. an attack may be answered at most once
4. an assertion made by P may be attacked at most once.

why?

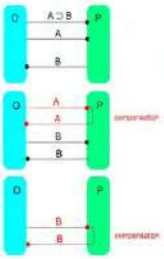
Think of A ⊃ B as a contract between a Proponent (passive) and an Opponent (active).

The execution of this contract is started by the active party, replacing

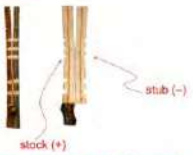
A ⊃ B

by a couple of contracts:

A where P is active, and
B where O is active



Tally sticks and their uses

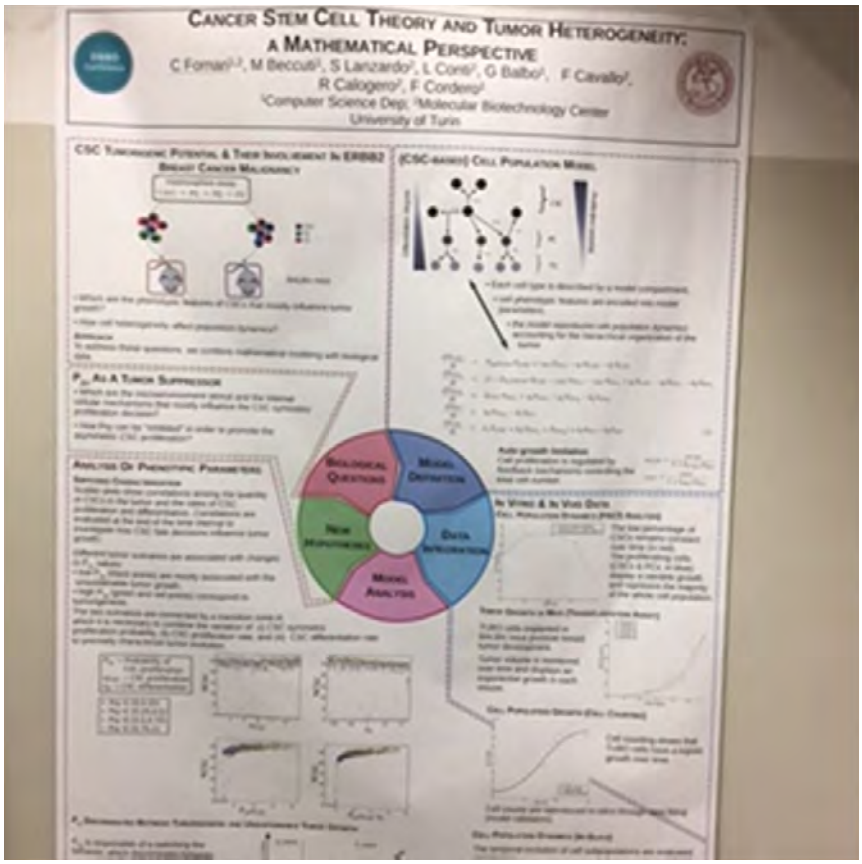


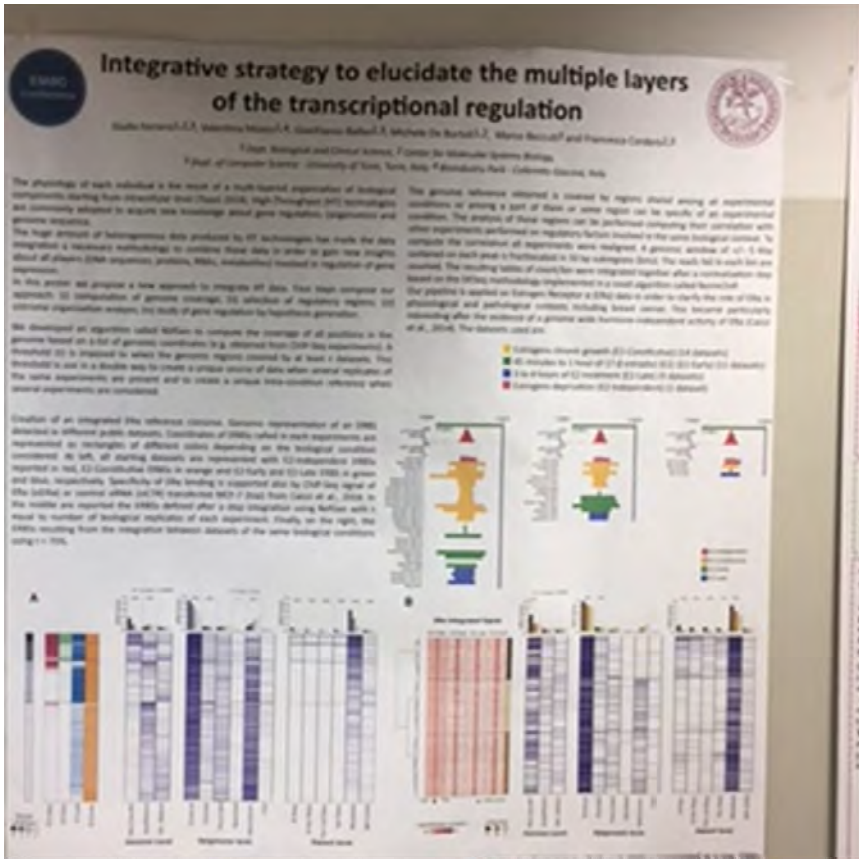
the medieval tally was split into two bits of unequal length. The stock was kept as a receipt by the person who handed over goods or money. The stub was kept by the receiver

Delegation with tally sticks

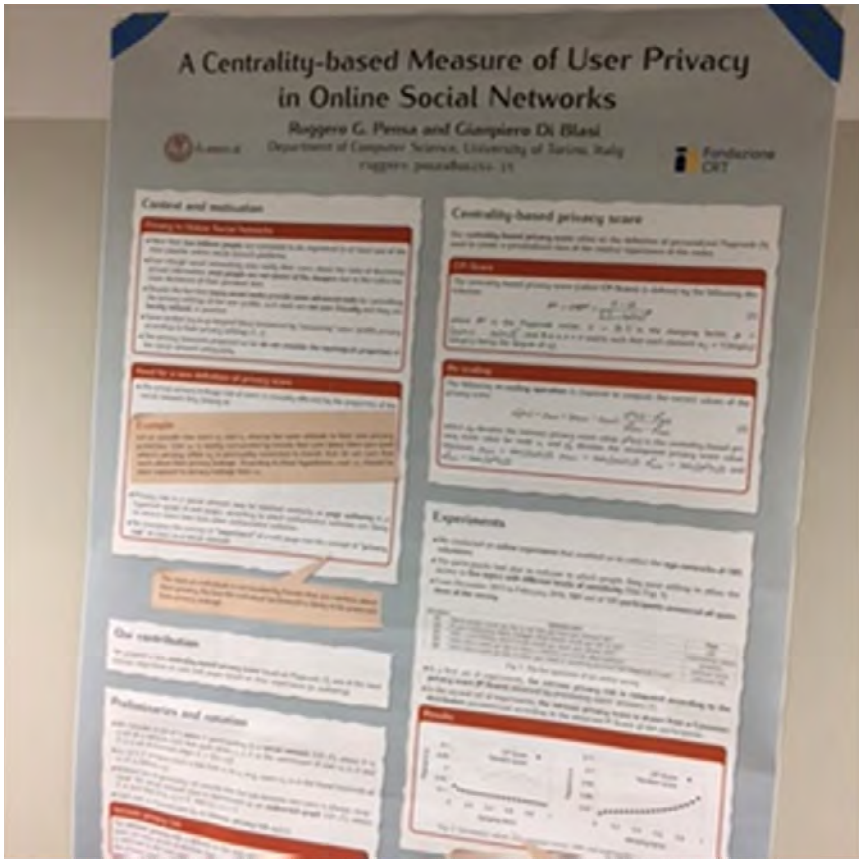
If the exchequer E was short of funds, it would cajole creditor B into taking not cash but a tally addressed to some tax collector A. The tally purported to be a receipt by the exchequer for such-and-such a sum, paid in by the collector A out of such-and-such type of revenue. Armed with this tally of assignment, creditor B presented himself to the collector, and — if all went smoothly — exchanged it for cash. The tally would afterwards serve the collector as his acquittance at the exchequer.

(Baxter, *Early accounting: The tally and the checkerboard*, **The Accounting Historians Journal, 1989**)

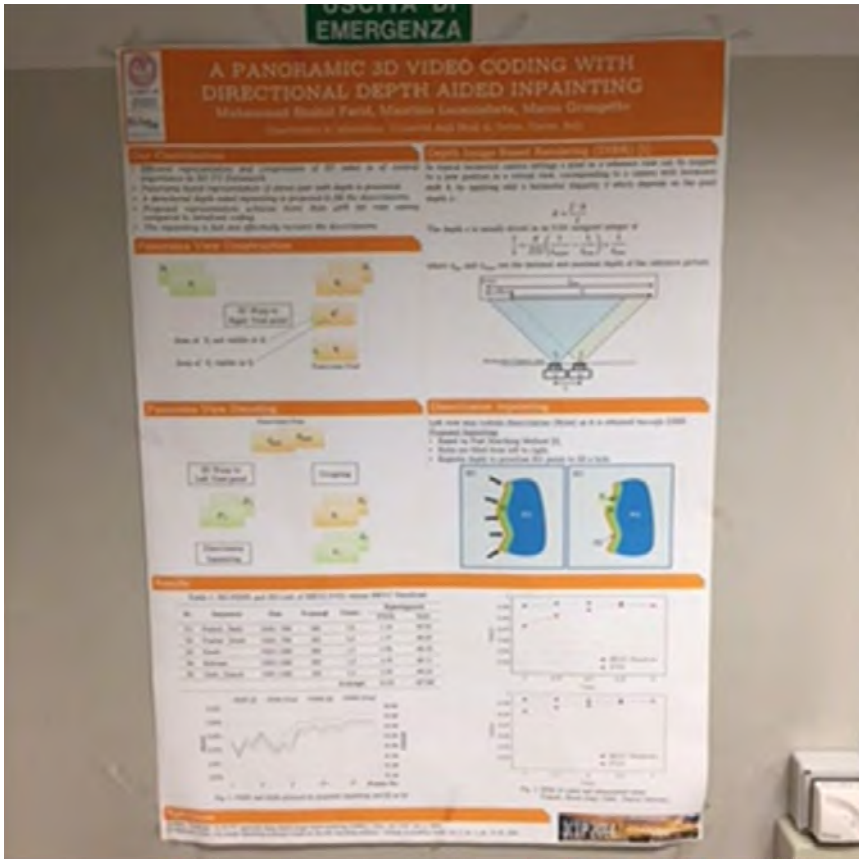

Cancer Stem Cell Theory and Tumor Heterogeneity:
A Mathematical Perspective
C Fornari[1,2], M Beccuti[1], S Lanzardo[2], L Conti[2], G Balbo[1], F Cavallo[2],
R Calogero[2], F Cordero[1]
[1]Computer Science Dep. [2]Molecular Biotechnology Center
University of Turin
CSC Tumorigenic Potential & Their Involvement in ERBB2 Breast Cancer Malignancy
[CSC-based] Cell Population Model
Biological Questions
Model Definition
Data Integration
Model Analysis
New Hypotheses


Integrative strategy to elucidate the multiple layers
of the transcriptional regulation


Supporting Users' Privacy in Online Social Networks
Rosa Meo, Ruggero G. Pensa, Gianpiero Di Blasi
Università di Torino - Dipartimento di Informatica
Privacy issues in social networks
Our proposal
what to disclose
to whom to disclose
What?
To whom?


A Centrality-based Measure of User Privacy in Online Social Networks
Ruggero G. Pensa and Gianpiero Di Blasi
Department of Computer Science, University of Turin, Italy
Fondazione CRT
Context and motivation
Centrality-based privacy score
Experiments
Our contribution
Preliminaries and notation


Semantic technologies for smart resource management
Web-based systems
Ontologies
Linked Open Data
Ontology of Information Elements
Geographic Ontology
Ontology of (historical) events
(NEXT)
FUTURE WORK
Semantic T++
Geolat:
HARLOCk & friends
FOR FURTHER INFORMATION:


EMERGENZA
A PANORAMIC 3D VIDEO CODING WITH DIRECTIONAL DEPTH AIDED INPAINTING


ACQUISIZIONE DEL MOVIMENTO E ANTROPOMETRIA
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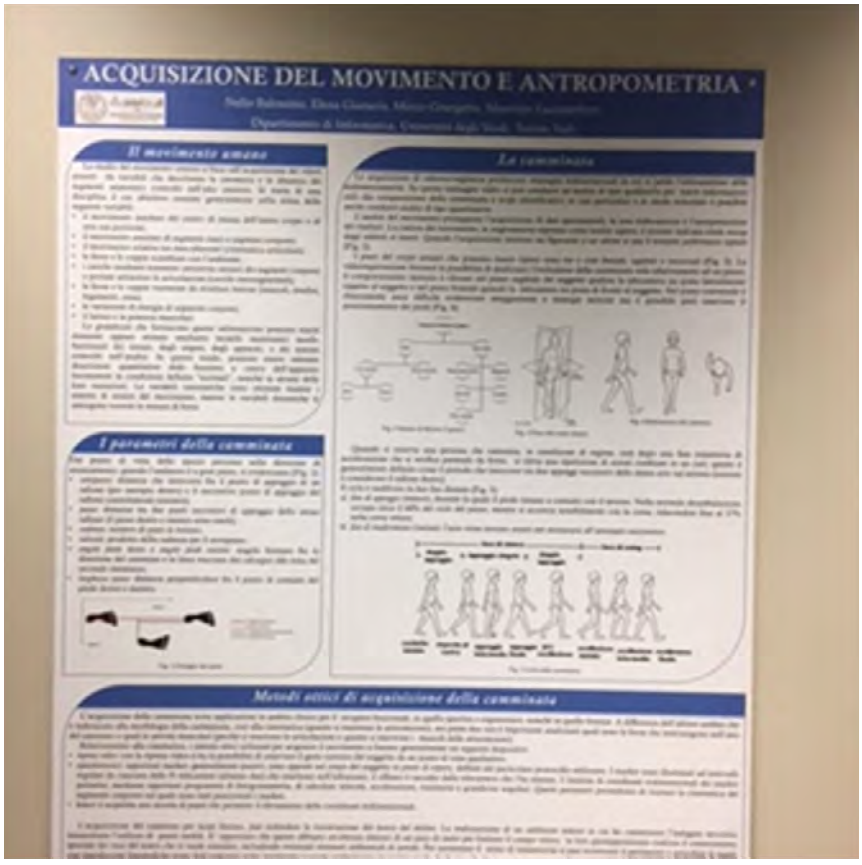
Etienne Jules Marey
Il movimento del cavallo
Eadweard Muybridge
Il movimento umano e la sua visualizzazione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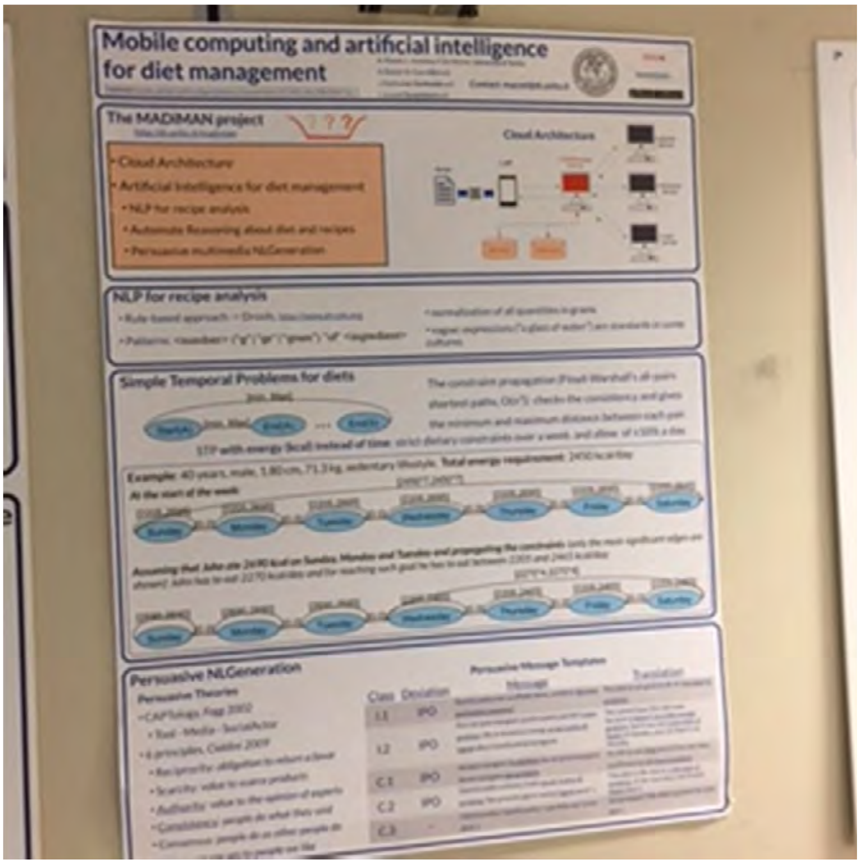
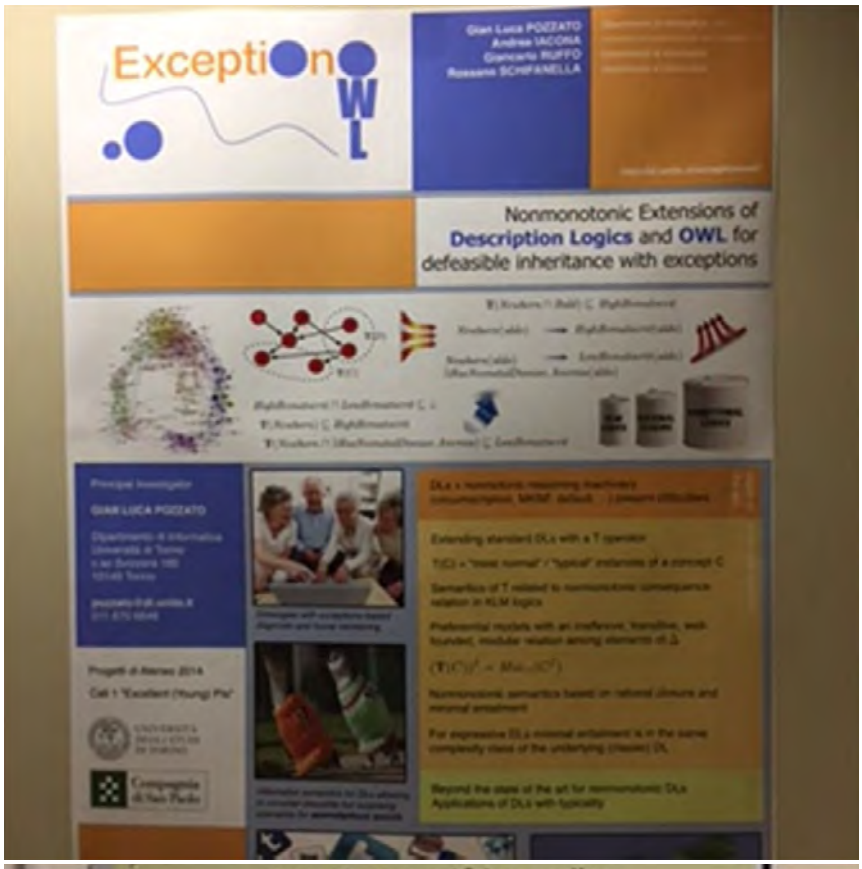
Il movimento umano
La cronofotografia
I parametri della camminata
Metodi ottici di acquisizione della camminata



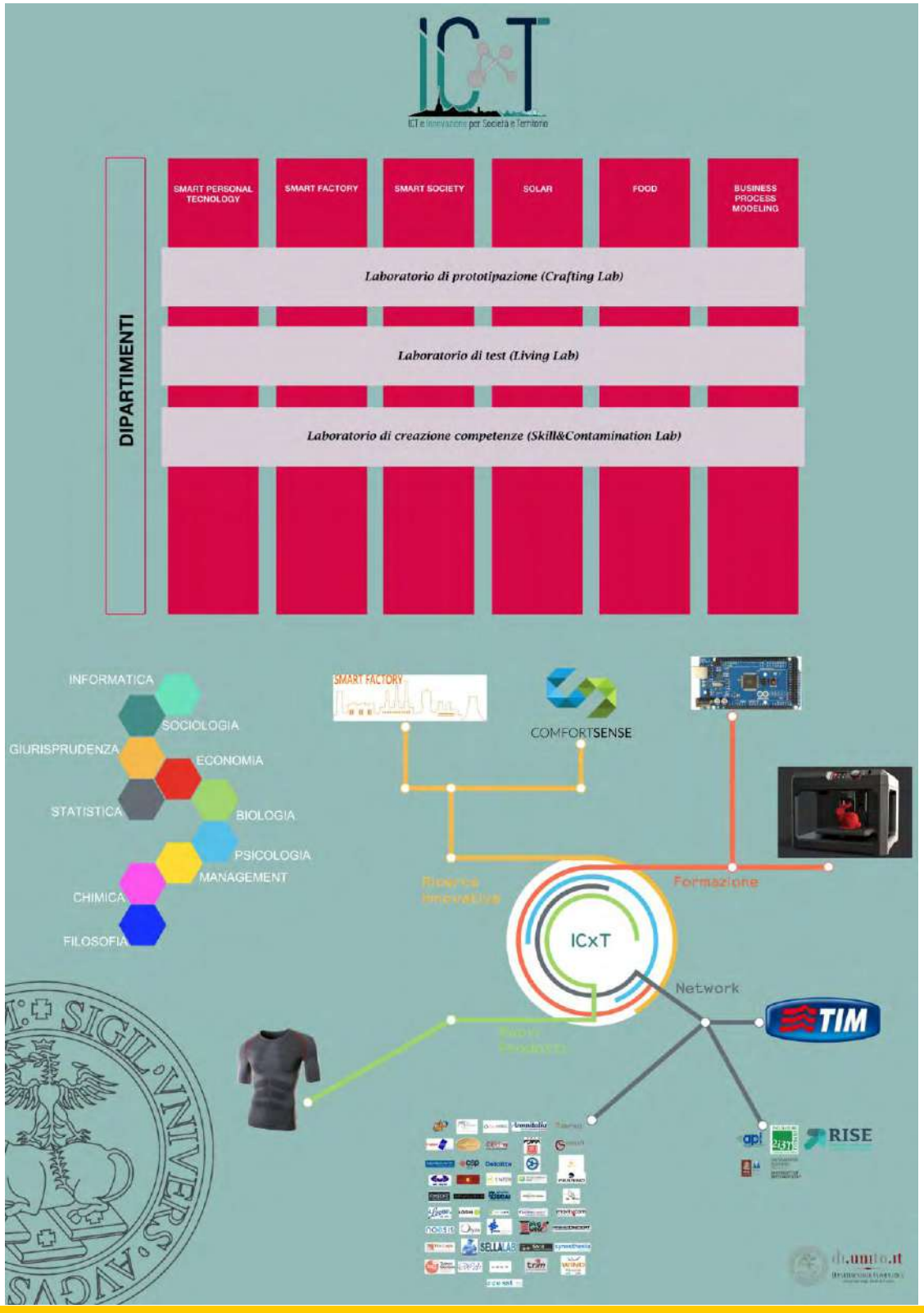
Mobile computing and artificial intelligence for diet management
The MADiMAN project
Cloud Architecture
Artificial Intelligence for diet management
NLP for recipe analysis
Cloud Architecture
NLP for recipe analysis
Simple Temporal Problems for diets
Persuasive NLGeneration
Persuasive Theories
Persuasive Message Templates
Class
Deviation
Message
Translation

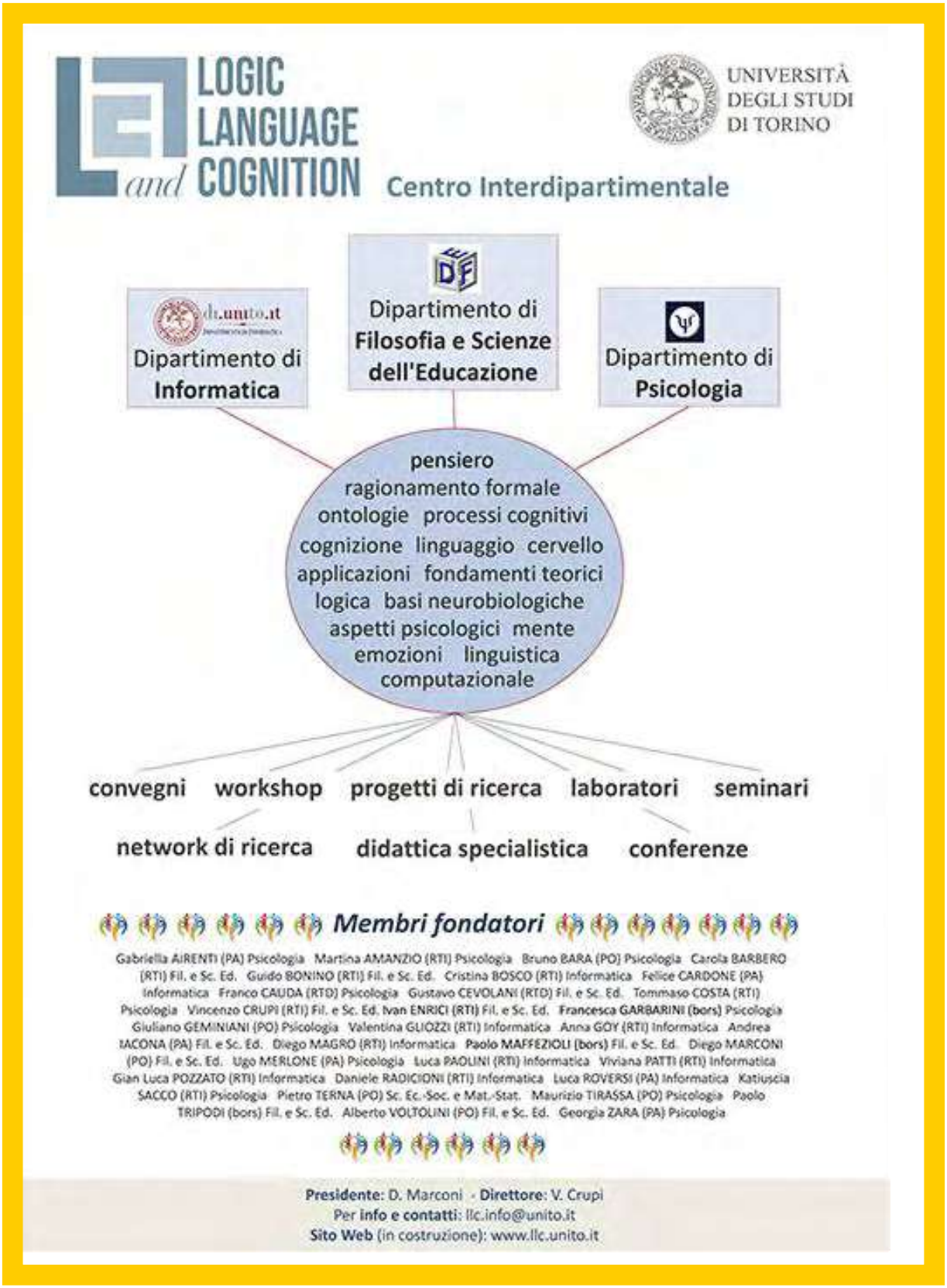
SimpleNLG-IT:
adapting SimpleNLG to Italian
https://github.com/alexmazzei/SimpleNLG-IT
SimpleNLG is a realization engine, i.e. it produces linearisation and morphological inflections of the proto-syntactic tree given in input. SimpleNLG was originally designed for English but it has been successively adapted to German, French, Brazilian-Portuguese and Telugu
SimpleNLG-IT is the porting of SimpleNLG for Italian: starting from French we have built a grammar, a lexicon and a treebank based evaluation
SimpleNLG
The grammar
Verb conjugation
• Features: TENSE, PERFECT, PROGRESSIVE, FORM
• Io scrivo (I write)
• Io sto scrivendo (I'm writing)
Noun phrase construction
• la grande casa gialla (the big yellow house)
• il mio primo grande viaggio (my first big travel)
Negative sentences
• Io non mangio mele (I don't eat apples)
• Io non ho nemmeno mangiato la mela (I have not even eaten the apple)
Verb phrase and sentence construction
• auxiliarie(s) + premod + verb + premod + (direct-object + indirect-object + other-complements) + postmod
• ho spesso dato libri a Maria in regalo (I often gave books to Maria as present)
Article elision
• l'uomo (the man)
• un'interessante proposta (an interesting proposal)
Preposition contraction
• la casa della zia (the house of the aunt)
Clitics
• Dammi la mela (Give me the apple)
• Dammela (Give me it)
• Dalla a me (Give it to me)
The lexicon
SimpleLEX-IT
Morph-it!: form-lemma-morphoFeats (Zanchetta and Baroni, 2005)
• 505,074 forms, 35,056 lemma
VdB-IT, Vocabolario di base della lingua italiana: sets of words (De Mauro, 1985)
• Vocabolario (1) fondamentale, (2) di alto uso, (3) di alta disponibilità
• 7,000 lemmas
Verb+Verbs: list of verbs from Wikipedia
PoS Number %
Adverb 146 2
Adjective 1,333 19
Noun 4,092 58
Verb 1,451 21
Total 7,022 100


ExceptionOWL
Nonmonotonic Extensions of
Description Logics and OWL for
defeasible inheritance with exceptions


Collect yourself by cycling

CENTRI DI RICERCA

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INFORMATICA NELLA SCUOLA

*Europe is going to miss the boat !? **

- quali aziende hanno bisogno che nella scuola **si insegni informatica in modo diverso** da ora?
  - tra 10 anni TUTTE le aziende
- quali settori della Pubblica Amministrazione potrebbero servire meglio le aziende se nella scuola **si insegnasse Informatica in modo diverso da ora?**
  - TUTTI tra meno di 10 anni
- **Preparare all'uso di strumenti digitali** (digital literacy o TIC) è importante ma **non basta**
- ***La conoscenza della Scienza dell'Informazione è fondamentale per creare e gestire al meglio nuove attività in tutti i settori, dall'industria all'artigianato alla PA***

Il dipartimento ha un gruppo di lavoro per la didattica dell'Informatica nella scuola

Livello locale e nazionale::

- Cerchiamo e valorizziamo le migliori attività già in corso nella scuola
- Ci confrontiamo con gli insegnanti e li supportiamo nei loro percorsi di aggiornamento
- Progetto Scuola 2.0 e Festival dell'Educazione con Assessora Pellerino del Comune di Torino
- Protocolli di intesa con Direzione regionale MIUR, con ASAPI e DISCHOLA
- Protocollo Robotica Unione Industriale
- Interventi nelle scuole di ogni ordine e grado ==> aggiornamento gratuito insegnanti
- Presidenza gruppo nazionale per la didattica dell'Informatica nella scuola

In Europa:

- Rappresentiamo l'Italia nel CECE - Computer Education Committee Europe
- Rappresentiamo l'Italia per la redazione del rapporto "Europe cannot afford to miss the boat"
- Abbiamo contribuito a creare la European Teachers Conference

T4T - Teachers for Teachers - t4t.di.unito.it

T4T

Proponiamo di affrontare insieme questo urgente problema: **commscuole@di.unito.it**

* adattamento da: "Informatics Education - Europe cannot afford to miss the boat", Joint Report ACM & Informatics Europe, Aprile 2013 - http://europe.acm.org/iereport/ie.html

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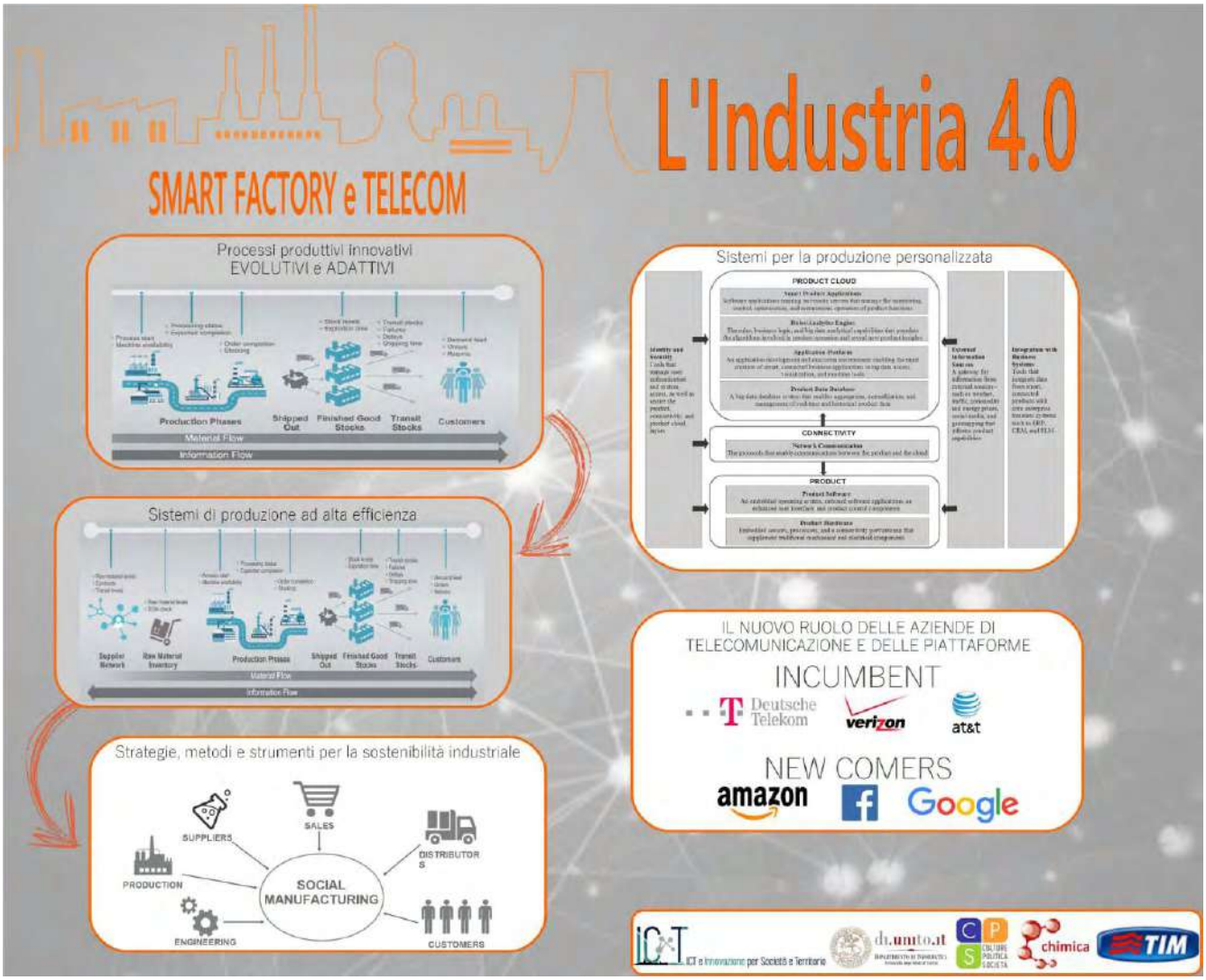
Corso Svizzera 185, 10149 Torino

Commissione Scuole: commscuole@di.unito.it


L'Industria 4.0
SMART FACTORY e TELECOM
Processi produttivi innovativi
EVOLUTIVI e ADATTIVI
Production Phases
Shipped Out
Finished Good Stocks
Transit Stocks
Customers
Material Flow
Information Flow
Sistemi per la produzione personalizzata
PRODUCT CLOUD
CONNECTIVITY
PRODUCT
Sistemi di produzione ad alta efficienza
Supplier Network
Raw Material Inventory
Production Phases
Shipped Out
Finished Good Stocks
Transit Stocks
Customers
Material Flow
Information Flow
IL NUOVO RUOLO DELLE AZIENDE DI
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Google
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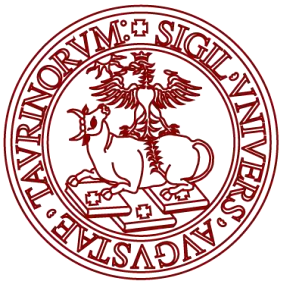

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