Cognitive Computing Framework

Leveraging Solution with Cognitive Technologies

What is the problem

The Cognitive Computing combines data mining, artificial intelligence and parallel and massive computing technologies and solutions to create specific smart solutions to set up and cope with big data. The applicative fields can be: social media, e-health, e-learning, smart city, etc. Applications in which there is a need for collecting and integrating data and big data coming from several different sources that need to be crawled, mined, integrated and disambiguated to create a unified ontological model. In turn, the ontological model has to cope with sophisticated metadata, cross media content and textual information, which have to be indexed and made accessible to be distributed towards users. Cross media have to be specially treated on the basis of their media kind (our solution cope with more than 500 formats), to be indexed, accessed, recommended, etc. Textual information may include person names, VIP names, user names of your portal and archives, geographical names, names of elements, and also dates in several different forms, etc. They need to be identified, synonymous identified, and disambiguated to be manifested as relations browseable by users.

How it has been solved

The DCCoF, DISIT Cognitive Computing Framework is based on Massive and parallel support on which one can script processes and their relationships/flows that put in execution algorithms and tools exploiting tools and DCCoF services (crawling, ingestio, in LOD, indexing, mining, adapting, recognition, etc.), with plugins and tools of third parties. The parallel architecture is grounded on AXCP and Hadoop, and exploitable from any media grid solution. The Massive and parallel support can be called by web services and REST API. The natural language processing algorithms may exploit the support for basic languages: English, Italian, German, Spanish, Francese, ... With classical tagger, post tagger, etc. The Back Office Management Tools of DCCoF Framework allows to cope with content management and workflow, IPR management, data and time management, names and synonyms management, knowledge domain management via OSIM tool.

The Social Media Solutions and modules provide support for:

- **MyStoryPlayer** for media annotations and relationships (see http://www.eclap.eu/super/msp/)
- **Social Graph** to provide an integrative tool for navigating among Users, Contents and their Relations (see http://www.eclap.eu/super/st/)
- **Time Line Navigator** to navigate among the identified and disambiguated dates contained in textual documents (see http://www.eclap.eu/177596)
- **Collaborative tool for SKOS and ontology management** (see http://openmind.disit.org)
- **Name Manager** to cope with synonymous and links with dbpedia, geonames, vip names, user names, etc. (see http://www.eclap.eu/177605)
- **IPR Wizard** assistive tools for IPR licensing and permission setting according to rights ontologies and relationships (see http://www.eclap.eu/4021)
• **Content Based Information Retrieval** for producing search and recommendation algorithms integrating both text and descriptors based algorithms (see http://www.disit.dinfo.unifi.it/disitcbirdoc.html)

• **MatchMaking** to support the match from offers and demands (see http://www.apretoscana.org/5221)

• **Content Organizer** mobile application for semantic organization of content on your iPhone, iPad in connection with enabled social media and portal solutions (see http://www.eclap.eu/94220)

• **Multimedia Crawler** to search and mining media content from social media portals as VIMEO and aggregators connected to Europeana (see http://www.eclap.eu/177627)

• **Georesolution and navigation**: geo location, geo distribution, etc.

• **Social integration** with OpenAuth, embedding, citations, etc.

**How to work with**
The framework is accessible as single algorithm and tool as well as a suite. The suite of algorithms is accessible via the AXMEDIS AXCP tool that can be installed on a single server as well as on a cloud of servers and nodes to cope with computational intensive problems and big data. All the tools, activities and processes can be integrated by using API: REST and/or Web services.

**Who is using it**
The DiCoCoF framework is currently in use in e-Brain social media platform to cope with networking, social networking and collaborative work and on OSIM exploiting the above mentioned tools. Examples are:

• **ECLAP** social network and educational tools for performing arts http://www.eclap.eu

• **Apretoscana** for networking among researchers in Tuscany area http://www.apretoscana.org

• **IUF.CSAVRI** for managing the collaborative and educational portal for the start up incubator at the University of Florence. http://iuf.csaavri.org

• **First Class** Continuous Medical Education and e-learning support, see http://fad.fclass.it

• **Mobile Medicine** for the education and continuous information, see http://mobmed.axmedis.org

• **OSIM, Open Space Innovative Mind**, for collecting, indexing and reasoning among knowledge of large multi-domain (departments) institutions (see http://openmind.disit.org)

• **Coll@bora** smart city project and services.

**Web links**
http://www.disit.dinfo.unifi.it
http://www.disit.dinfo.unifi.it/tools.html

**Technologies**
- Natural Language processing languages: English, Italian, German, Spanish, Francoise
- Exploiting: dbpedia, geomances.org, Babelnet, Wordnet, OSIM, ..
- Scalable computing: AXMEDIS AXCP, Hadoop
- Crawling: GATE, AXCP, Nutch
- Database area: SQL, noSQL db HBase
- Flow integrators: Kettle Pentaho, OpenNFlow, ..
- Indexing: Similarity search, Solr, CBIR, XmediaIndexing
- Ontological support: RDF store, OWL, OWLIM, SPARQL

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