



ABCDE



Scientific Report

First name / Family name

Nicola Rebagliati

Nationality

Italian

Name of the *Host Organisation*

VTT - Finland

First Name / family name
of the *Scientific Coordinator*

Ilkka Norros

Period of the fellowship

01/10/2012 to 30/09/2013

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During this fellowship I pursued two lines of research, one in applied clustering and another one in theoretical clustering.

In collaboration with prof. Ana Fred, prof. Mario Figueiredo, prof. Marcello Pelillo, Dr. André Lourenço and Dr. Samuel Rota-Bulo' we could develop and test advanced techniques for data analysis, based on finding a consensus partition out of many different data partitions. We developed fast algorithms for the consensus clustering problem which work also on sparse matrices and perform well in practice.

From the theoretical point of view I was able to prove theoretical properties of Minimum Sum of Squares error, a widely used clustering criterion. My theorems bound this functional with other data-dependent statistics. I obtained analogous results for another widely used clustering measure, the Normalized Cut.

Other works have been done. In collaboration with Dr. Ruggero Pagnan we used graph theoretical results for efficiently computing Aristotle's syllogisms. I helped Dr. Hannu Reittu in the Matlab implementation of an algorithm for clustering based on a Szemerédi density model for graph compression. In collaboration with Dr. Albert Sole-Ribalta, prof. Francesc Serratosa and prof. Marcello Pelillo we are completing a journal paper “On Computing the Graph Edit Distance with Dominant Sets”.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

- [Probabilistic Consensus Clustering using Evidence Accumulation](#),
André Lourenço Samuel Rota Bulo', Nicola Rebagliati, Mário Figueiredo, Ana Fred and Marcello Pelillo.
Machine Learning (MultiClust special issue) [ACCEPTED]
- Correlation clustering with stochastic labellings
Nicola Rebagliati, Samuel Rota Bulo' and Marcello Pelillo
2nd International Workshop on Similarity-Based Pattern Analysis (SIMBAD2013),
York, UK, July, 2013. [ACCEPTED]
- Consensus Clustering using Partial Evidence Accumulation
André Lourenço, Samuel Rota Bulo', Nicola Rebagliati, Mario Figueiredo, AnaFred and Marcello Pelillo
6th Iberian Conference on Pattern Recognition and Image Analysis (IbPRIA2013),
Madeira, Portugal, June, 2013. [ACCEPTED]
- [Strict Monotonicity of Sum of Squares Error and Normalized Cut in the Lattice of Clusterings](#),
Nicola Rebagliati
International Conference on Machine Learning (ICML 2013),
Atlanta, US, June 2013. [ACCEPTED]

- Probabilistic Evidence Accumulation for Clustering Ensembles, André Lourenço Samuel Rota Bulo', Nicola Rebagliati, Mário Figueiredo, Ana Fred and Marcello Pelillo.
2nd International Conference on Pattern Recognition Applications and Methods (ICPRAM2013),
Barcelona, Spain, February, 2013. [ACCEPTED]

- Graph Algorithms For Deciding Syllogisms

Ruggero Pagnan and Nicola Rebagliati
[MANUSCRIPT]

- A brute force algorithm for computing the Dominant Set Number

Marcello Pelillo and Nicola Rebagliati
[MANUSCRIPT]

- On computing the Graph Edit Distance with Dominant Sets

Nicola Rebagliati and Albert sole'-Ribalta and Marcello Pelillo and Francesc Serratosà
[MANUSCRIPT]

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

- *International Conference on Machine Learning (ICML 2013)*,
Atlanta, US, June 2013.
- *2nd International Workshop on Similarity-Based Pattern Analysis (SIMBAD2013)*

IV – RESEARCH EXCHANGE PROGRAMME (REP)

- From 14/01/2013 – 25/01/2013 I visited prof. Alberto Sanfeliu of UPC, Barcelona in Spain and his Artificial Vision and Intelligent System Group (VIS).
- From 02/09/2013 - 06/09/2013 I visited prof. Heri Ramampiaro of NTNU, Trondheim in Norway and his Data and Information Management group.