

Short Term Scientific Mission Report

- COST Action IC0903 -

Beneficiary (visiting researcher): Milan Mirkovic, Faculty of Technical Sciences

Host: Ioannis Kompatsiaris, Informatics and Telematics Institute

Period: From April 16th to April 30th

Place: Thessaloniki, Greece

Purpose of the STSM

Main objective of the visit was for the visiting scientist to acquaint himself with current research being conducted by the host group in the area of intelligence gathering from multimedia social tagging systems, since such intelligence should prove invaluable for improving methodology currently used by the visiting scientist's group. Also, host group gained insight into methods and tools used by the visiting scientist's group for meta-data representation and visualization, which provided new perspective of some of their existing data, enabling for some new knowledge to be extracted.

In specific, objectives set for this visit were:

- Share knowledge of the techniques employed in research at the visiting researcher's group at Faculty of Technical Sciences (FTS) with the host group at the ITI via a seminar.
- Get to know and learn the intelligence gathering algorithms and tools that the host group has developed and is using.
- Enhance multimedia (meta)data retrieval tools used by visiting scientist's group by implementing intelligence gathering algorithms developed by the host group.
- Provide a framework for obtaining tags from previously unused sources for the host group.
- Discuss future collaborations and outline a joint research paper based on the analysis of tracks present in community-contributed multimedia data.

These objectives were largely achieved during the visit, and some additional ones were defined and will be actively pursued in the future. The research conducted during this visit also expanded towards the development of new methods for user-dynamics analysis that combine geo-visualization techniques with image and video content-discovery techniques.

Description of the work carried out during the STSM

First three days of the visit were spent on introduction to techniques and methods used by each group (both the ITI and FTS) for obtaining meta-data and the actual data (images and videos), which was

used for various analysis later on. Ioannis Kompatsiaris, Symeon Papadopoulos and Christos Zigkolis of the ITI explained in-depth the algorithms their group uses to perform clustering of images obtained from the Flickr service; these comprised the meta-data crawling tools and graph-based image clustering methods, that rely on hybrid graphs (computed from visual and tag similarity graphs) in order to compute similarities and designate images to respective clusters. They also demonstrated how the ClustTour web-application for automatic detection of POIs (Point Of Interest) based on this approach works. On the fourth day I gave an hour-long seminar about the methods employed by the FTS group to crawl the Youtube for meta-data that is subjected to different spatial and temporal analysis in order to discover patterns in movement and geographical concentration of its users. It was attended by all of the ITI group for social media analysis members, and we had a discussion afterwards on how approaches of our groups could be combined to discover new knowledge in existing data and improve methodologies already in place. It was decided that it would be interesting to see what new information could be gained from subjecting one group's meta-data to the other group's methodologies and vice-versa. In order to be able to do that, the last day of the first week was spent on agreeing upon some common data formats that would be used for the exchange of the meta-data already available in each of the team's databases.

The second week was used for conducting experiments that included:

- Clustering Youtube videos using the ITI ClustTour approach
- Visualizing the Flickr data and detecting interesting patterns (FTS approach)
- Extracting movement patterns of Youtube and Flickr users for a selected region
- Comparing Youtube and Flickr users' movement patterns for a selected region
- Improvement of Youtube searches using the ITI tag-ranking system
- Improvement of ClustTour labelling precision using Youtube pre-defined categories

Description of the main results obtained

This short visit enabled both teams to gain insight into the research being conducted by the other team, which was one of the main goals of the mission. This led to deeper understanding of differences between the users of services each team was focusing on (Flickr and Youtube respectively), and identification of ways to merge the ITI and FTS approach in order to extract even more knowledge from existing data. Furthermore, each team will be able to improve their tools and algorithms by applying some of the methods used by the other team – FTS team will benefit from ITI's tag-ranking system, and ITI team will be able to leverage FTS's visualization techniques to further explain their

data, just to name a few. Also, common data formats have been defined and agreed upon, which will make future collaboration much easier since data pre-processing will require much less time.

Preliminary experimentation showed some promising results, and several common research strands have been identified, followed by outlining a few goals that will be actively pursued by both groups during the next few months.

Future collaboration with host institution

As described above, several common research areas have been identified, and even some short-term goals have been set. In addition to these, a few other topics have been discussed that are indirectly related to the ongoing joint research (such as characteristic frame extraction from videos that might be used later on to classify and geographically assign non geo-referenced videos to already existing clusters / trajectories) and which show a good potential for expansion of this research and laying foundation for some new ones.

Foreseen publications/articles resulting or to result from the STSM

Several conferences and journals have been considered for publication of papers that ought to emerge as a result of the joint research efforts of the ITI and FTS groups. Furthermore, some upgrades to the ITI web-application (ClustTour) relying on FTS group's approach have been considered, that might be presented as part of a demo-application at one of the considered conferences.