Dipartimento di Elettronica, Informazione e Bioingegneria

POLITECNICO DI MILANO

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To: STSM coordinator of Keystone COST Action

From: Marco Brambilla, Politecnico di Milano

STSM Scientific Report

STSM Visit by Marco Brambilla from Politecnico di Milano to TU Delft

1. Introduction

This report describes objectives and achievements of my visit to TU Delft in Delft, The Netherlands, in August 2016, at the purpose of setting up a scientific collaboration with Alessandro Bozzon and the Data Science team. The STSM lasted from August 8th to August 19th 2016.

The visit has been completed successfully and allowed to setup a collaboration between our two institutions on two very relevant issue in keyword search:

- the integration with continuously expanding sensing technology, spanning from mobile phones to wearables to fixed IoT sensors in outdoor and indoor environments.

- The optimization of the visualization and interaction of the user with the keyword search results.

These aspects constitute a powerful tool for improving the user experience in information extraction and retrieval of appropriate content based on user queries over online information, in order to match better the user needs according to the specific moment, place and task he is performing.

The core results of the STSM are: the definition of the problems and conceptual solutions in the two fields, a plan for joint work and experiments on the two aspects for the mid term, and the writing of some preliminary materials for a paper on each topic. Besides the two main parties of the mobility, further people have been engaged in the research.

2. Purpose of the STSM

The purpose of the STSM was to start research collaborations between our two institutions on a very relevant issue in keyword search: the possible extensions of **keyword-based search over social network content, in particular with respect to social and cultural background of users, and** over IoT (Internet of Things) sensors, in particular with respect to the domain of smart cities. This objective has been extended further to cover also **visualization and interaction aspects over the search results, in case of complex result structures**.

The STSM aims to integrate the complementary expertise of the two research groups on multi-source content search and visualization (main research topic of Politecnico group in the last years), social network content analysis (current research interest for both groups), and sensor data fusion and analysis (main expertise of TU Delft). At the practical level, the STSM aims to enable the definition of a joint research vision and path, as well as an initial joint work on a small initial publication which will guide the subsequent joint research collaboration in the long term.

3. Description of the work carried out during the STSM

According to the workplan attached to the request of the STSM, the following activities have been performed:

- T1: study of the context, problem definition, problem identification and use cases for the issues described in the objectives, namely: social data search and matching with cultural provenance of users; and search results visualization optimization based on user's goals

- T2: state of the art analysis and positioning for the two research lines identified

- T3: identification of possible research activities and definition of the research plan for the two research lines identified, including planning for publications

- T4: preliminary work on the research lines

- T5: writing of preliminary materials and reports on the research lines identified

The concrete activities included:

- one seminar given to the research group on web search and user interaction modeling

- 2 discussion sessions of the expertise and background of common interest

- 1 visit to AMS Amsterdam Smart City Institute for Advanced Metropolitan Solutions, a new Amsterdam based public-private institute where engineers, designers, digital engineers and natural/social scientists jointly develop and valorize interdisciplinary metropolitan solutions

- 5 workshop sessions on the definition of the research plan

- joint work on the preparation of written materials for setting up a common small publication.

4. Description of the main results obtained

The results obtained during the in-presence work include:

• A workplan along the two research lines identified

• A small experiment on the evaluation of the effectiveness of results visualization

• An initial draft of the paper for the results visualization problem

• A document with the problem definition and paper structure for the social analysis of search topics and opinions

• An experimental setting definition for the social analysis of search and opinion mining experiments, to be implemented in the next months.

5. Future collaboration with the host institution

According to the plan, we aim at continuing our collaboration through a further STSM by Alessandro Bozzon to Politecnico, and additional exchanges and visits of Ph.D. students. However, most of the collaboration will be achieved remotely and will involve further people (M.Sc. students, Ph.D. students and faculties from both side), through online conference calls, collaborative writing tools, email, and online productivity tools.

We plan to:

• Setup and implement a collaborative experiment on social biases in search and opinion mining

• Continue with some further experiments in the field of search result optimization

• Write together some papers on the discussed topics.

6. Foreseen publications/articles resulting from the STSM

We expect at least two publications as a result of this STSM and the next one:

- one conference publication in the field of data science, regarding the way people perform queries and talk about topics, based on their cultural background, provenance, and living location

- one journal publication in the field of web engineering, focusing on search result visualization and optimization of user perception and experience, for complex results of keyword search.

A set of experiments and implementations have been planned based on the described vision.

7. Confirmation by the host institution

See attached document by Alessandro Bozzon, TU Delft.

In faith,

Marco Brambilla

Politecnico di Milano