Providing Enhanced Social Interaction Services for Industry Exhibitors at large Medical Conferences

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Abstract

Large medical conferences offer opportunities for participants to find industry exhibitors that offer products and services relevant to their professional interests. Companies often invest significant effort in promotions that encourage participants to spend time at their stand (e.g. providing free gifts, leaflets, running competitions) and register some contact details. Attendees will use the conference to find others who also share similar professional interests, as well as keep up to date with developments on products such has pharmaceuticals and medical equipment. From both perspectives, a number of improvements can be made to enhance the overall experience by using existing active RFID technology: Vendors would be able to more closely monitor the success of their promotions with statistics on the stand's visitors, as well as find more potential customers by using real-time visualizations; Participants would be able to log their social interactions, keeping an electronic history of the people they have met. The SocioPatterns project and Live Social Semantics experiments have recently demonstrated a scalable and robust infrastructure that would support these kinds of improvements. In this paper, we propose an infrastructure that provides enhanced social interaction services for vendors and participants by using small active RFID badges worn by attendees and attached to fixed locations

Keywords: rfid, social networks, conferences

1 Introduction

Accurate monitoring of human movements and social interactions is key to defining and assesing the impact of promotional actions and marketing activities. Providing novel architectures to augment the experience of individuals in various social contexts has been attracting much attention. Recent hardware and software developments, such as Radio Frequency Identification (RFID), the Global Positioning System (GPS) and wifi based real-time location systems (RTLS), have enabled engineers to design and implement a range of novel applications that monitor an individual's location and offer services based on it. While these services have enabled people to keep track of the locations they have visited, as well as advertise them to others to encourage spontaneous networking, the potential to aggregate this information and provide contextualised services for monitoring particular interactions in relationship to certain promotional actions is still to be fully exploited. Large medical conferences present some interesting use-cases for this kind of technology. They are typically made up of two sets of people: (i) the exhibitors, and (ii) the participants, each of which have different requirements.

Companies usually invest significant effort in their promotions to try and get participants to spend time at their stand to raise awareness of their brand, new drugs being introduced to the market of interest to clinical prescribers, as well as the promotion of hospital equipment and various cleaning products to those who are in charge of procurement and contracts for those institutions. Competitions, free gifts, free catering, and newsletters are often used to encourage people to leave some contact details. Some technological improvements (such as the hiring of bar-code readers to make scanning the participants' names and contact details quicker and less prone to errors) have enhanced this activity, but are still relatively primitive.

The participants themselves usually attend conferences to keep up to date with the latest research, find and network with others who share their professional interests, as well as developments on new products (e.g. pharmaceuticals, medical equipment, etc.). For those that are new to the profession, this can be a daunting task: when conferences reach hundreds or thousands of participants, it can be hard to find people with whom you can make fruitful connections. For more experienced or senior members, it can be difficult to find out other people that you know who are attending, or simply keep track of where your colleagues are.

Over the last 2 years, we have developed an infrastructure to track and reason over human face-to-face (f2f) contact networks. By making use of active RFID technology, a scalable and robust platform has been developed and used to deploy applications at similar

conference based events. In this paper, we propose a set of enhanced social interaction services for industry exhibitors and participants at large medical conferences based on our existing infrastructure. We also propose measures to evaluate the success of promotional actions for industrial exhibitors.

2 Related Work

Others have investigated the idea of using sensor devices to detect people's movements and social interactions conferences. IBM used RFID tags to track session and meal attendance at its Information on Demand conference in Las Vegas [1]. Bluetooth-enabled mobiles were also used to track networking of conference attendees [2] and for sensing organisational aspects [3]. Networks from Bluetooth mobiles were also studied for characterising some statistical properties of human mobility and contact [4]. Fire Eagle [5] by Yahoo! and Foursquare [6] are services that detect the geographical location of users (e.g. based on wifi points), and allows them to share it with their online friends. All these works focus on only one type of network which is based on proximity of users, irrespective of whether these users interacted with other (e.g. had a f2f contact) or were already closely linked in other social contexts.

Wu and colleagues used "sociometric badges" to investigate impact of f2f interactions on productivity [7]. These badges used radio frequency to detect physical proximity, infrared to detect f2f body alignments, and voice sensors to detect conversations.

3 Background

3.1 RFID Tracking of f2f interactions

During the last 2 years, the SocioPatterns project [8] developed an RFID platform that is scalable and attains reliable detection of f2f interactions as a proxy of social contact [9]. This platform was developed to investigate patterns of human contacts at various social gatherings [10]. The name badges of those attendees who volunteered to become users of the application were equipped with active RFID badges. The RFID badges engage in multi-channel bi-directional radio communication, and by exchanging low-power signals that are shielded by the human body, they can reliably assess the continued face-to-face proximity of two individuals. We assume continued face-to-face proximity to be a good proxy for a social interaction between individuals.

The real-world proximity relations are relayed from RFID badges to RFID readers installed in the conference venue. The readers encapsulate the RFID packets into UDP packets and forward them over a local Ethernet network to a central server. There, packets from RFID badges are aggregated and fed to a post-processing server that builds and maintains a real-time graph representation of the proximity relations among the tagged attendees.

As well as issuing willing participants with badges, we have also attached badges to static objects, such as screens and other exhibits, to monitor people's interactions with it. These *sentinel* badges operate in the same way as those used by participants and are capable of tracking who is nearby, when, and for how long.

3.2 The Live Social Semantics Application

Live Social Semantics (LSS) [11,12] is an innovative application, built on the SocioPatterns platform, that tracks and supports social networking between researchers at conferences and at other similar events. The application integrates data and technologies from the Semantic Web, online social networks, and the SocioPatterns f2f contact-sensing platform. It helps researchers to find like-minded and influential researchers, to identify and meet people in their community of practice, and to capture and later retrace their real-world networking activities at conferences. LSS has been deployed at 3 major conferences, where it has been used by more than 400 people.

4 Architecture

In this Section, we describe how the SocioPatterns platform can provide the foundation on which a set of services and applications can be built to offer participants and exhibitors at medical conferences a richer and more productive social experience. Much like the LSS application, our proposal would involve building on existing technology, leveraging the power of the real-time f2f contact-sensing platform.

4.1 Participant Services

During the development of the LSS application, we devised a web-based interface that participants could use to associate their active RFID badge with their real identify. By adding the extra layer of data (i.e. knowing who each badge belongs to), we were able to offer some useful social tracking services to individuals. Figure 1 is a screenshot of a web page from the LSS deployment at the Extended Semantic Web Conference (ESWC) 2010 that shows a list of contacts a participant has made on a particular day of the conference. Clicking on the name of a contact takes the user to their profile page where they can find useful contact information such as their email address and social networking accounts (e.g. Twitter, Facebook).

To offer services suitable to medical conferences, it would be appropriate to ask participants to register a set of keywords that correspond to their professional interests (e.g. oncology, palliative care, etc.), as well as location, professional memberships, role, professions (nurse, clinician, microbiologist), seniority and other features

enabling tailored networking. These could then be used to develop a comprehensive profile for social recommendations on other participants the individual may be interested in meeting. If such as system is deployed at multiple conferences, it would also be possible to direct individuals to people they have met and spent considerable time with at previous conferences.

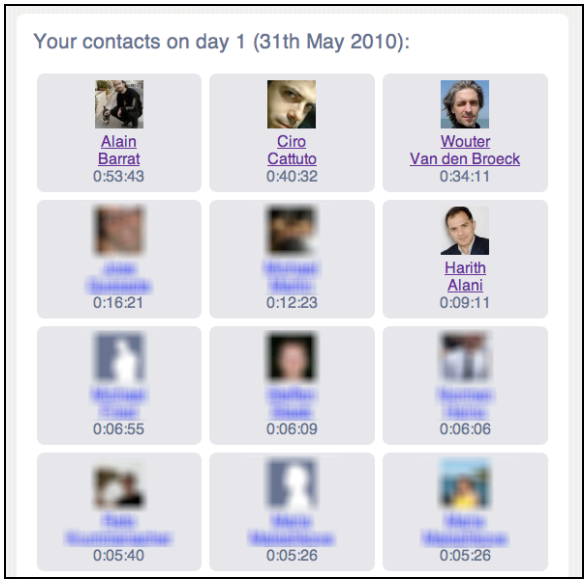

Figure 1 - A screenshot from the user web interface, deployed at ESWC2010, showing a participant's contacts on a particular day of the conference.

4.2 Exhibitor Services

Although conference participants can greatly benefit from better networking recommendations, the major benefit that could be offered to exhibitors is a set of measures monitoring the success of their promotional actions. These measures would need to be customised for each exhibitor and would provide a detailed understanding of success of individual promotional activities such as distribution of a free lunches, free gifts, taking part in quizzes with gifts for winners, free catering and others, etc.) based on the number of visitors to their stand, how long they spent there and when they visited. Only this level of statistics and a success measure can enable industrial companies to monitor the success of their promotions and justify a cost-effective provision of resources. Figure 1 (originally published in [9]) shows an example of the type data that can be gathered using the SocioPatterns platform. In this case, the number of people located in a given room of a conference is plotted at various times during a single day (# persons). The average degree <k> of the instantaneous contact network computed over a time windows of 20s is also shown. Higher values of k mean that more people are engaged in f2f interactions. This plot indicates that more social contacts are made during the coffee breaks and lunch-breaks, as one would expect.

In addition to a broad statistics monitoring the numbers and interest on the stand, a detailed understanding of the profiles of those interested in the promotions would be invaluable. This can be derived from the profiles of participants including information such as their medical interests, roles and professional affiliations that would enhance the evaluation. For example, are those interested in free lunches and catering predominantly students? How much of the participants' time is spent interacting with the company representatives? How popular are sponsored scientific sessions and do they generate post-talk discussions with the key experts who were sponsored by the company to give a talk about their drug/product? Consequently, do participants who attended a sponsored session and/or interacted with a speaker then visit the company stand to seek further information about the drug or product? What are their profiles and roles? What are the most successful ways to attract interest of various professions? E.g. clinicians, users, medical students, trusts managers, etc.. What freebies are the most popular in terms of distribution but also in terms of time spent at stand? Is collecting contact details for promotional purposes (including sending newsletters and updates) a hindrance to participants' interest, or if freebies are on offer, are they perceived as an invasive marketing tactic? More detailed and company-specific measures need to be defined by the exhibitors themselves for each event in relation to their marketing policy.

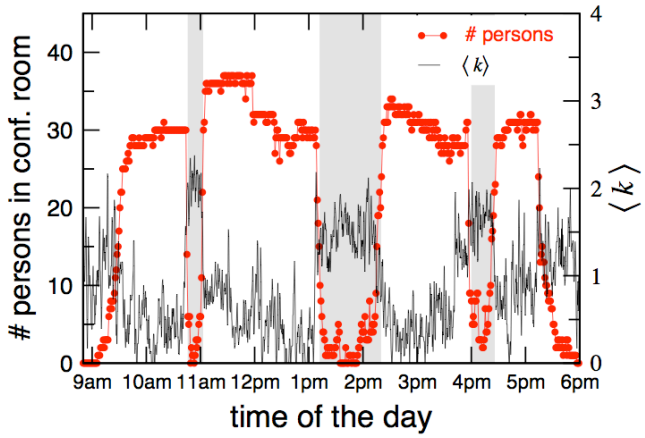

Figure 2 - A plot showing the number of people in a particular conference location over 1 day (#persons) and the average degree <k> in the instantaneous contact network. Higher values of k indicate more f2f contacts between participants.

4.3 Visualization

Part of the SocioPatterns platform is a suit of real-time visualizations, one example of which is the spatial view shown in Figure 3. This view provides an overview of the real-time contact graph. It represents the RFID badge-wearing participants within range of RFID readers, as well as ongoing social contacts. Each participant is represented by a labeled yellow disc or, when available,

by their profile picture. With the LSS application, we sourced these pictures from Facebook or Twitter. The contacts are represented by yellow edges, whose thickness and opacity reflects the weight of the contact. Weight is a function of the distance between the badges, and the amount of time they have been in contact. A search facility is provided so users can try to find the location of others at the conference.

Since the SocioPatterns project is primarily concerned with the real-time detection of the contact topology, the precise localisation of the participants in the physical space is of lesser concern. However, a coarse-grained localisation of the participants with respect to the RFID readers is possible. This enabled us to not only represent the contact topology, but also give an indication of which area the participants are in. To represent this, the RFID readers were depicted using labeled grey circles, laid out on a circumcentric oval. The participants' nodes are positioned near or in between the readers they are close to. This approach adds spatial structure to the contact graph representation.

These visualization are usually deployed at fixed locations around the conference venue an often attract a great deal of interest. One interesting may to extend this and make it more suitable for the medical domain would be to incorporate the keywords given by participants into the visualization (e.g. by coloring the nodes differently). This would encourage ad-hoc meetings between people that share professional interests. Exhibitors could also be provided with customized visualizations that enable them to see when someone with a particular interest is nearby so they can target them.

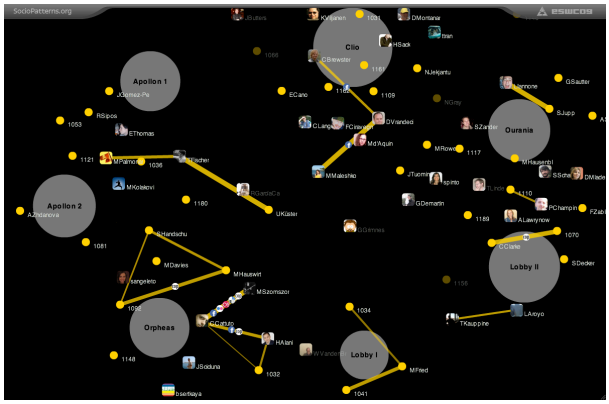

Figure 3 – Real-time spatial view visualisation

5 Conclusions

In this paper, we have described how the SocioPatterns platform uses active RFID technology to create a f2f contact sensing infrastructure, and how this platform can be exploited to provide useful services to conference participants, such as the deployments of LSS. We have put forward a number of useful services that could be offered to exhibitors and participants at large medical conferences through a number of simple extensions. Key features of the platform are:

- The ability to track f2f contacts of conference participants and provide them with a log of who they met, for how long, and when, as well providing them with information on how to get in touch with them.
- The ability to provided detailed statistics on the movements of individuals wrt to a particular exhibit. This kind of data can be used to understand how long participants are spending at stands, and whether they are attracting people with the right kind of professional interests.
- The ability to support novel social interactions, for example, by providing visualisations that support ad-hoc meetings.

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