A Semantic Knowledge Management Framework for Informal Communication Exchanges

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Abstract. Whilst formal organizational knowledge is often stored in archives and accessed through a range of IT tools, informal knowledge from face to face meetings, email exchanges, team meetings is usually not stored and remains implicit. This work aims at finding effective ways of capturing and making use of informal communications, making it available through a knowledge management system to support tasks such as expertise finding and topic trends spotting. This paper presents an overview of the knowledge management system for informal communication exchanges, with details of how the knowledge is captured, searched and visualised.

1 Introduction

Whilst formal organizational knowledge is often stored in archives and accessed through a range of IT tools, informal knowledge from face to face meetings, email exchanges, team meetings is usually not stored and remains implicit.This work aims at finding effective ways of capturing and making use of this informal communications: both the technical and the social dimensions are taken into account, as domain specific knowledge is semantically extracted and stored together with information on each user, their profiles and the frequency of communications. This information is used to populate a knowledge management framework that allows sharing and reusing of the inaccessible knowledge between the organisations members. This demo shows the Knowledge Management framework referenced in [2]. In Section 2 we will introduce the KM framework and its components. Section 3 will detail features and functionalities that will be shown within the demo and present the dataset that will be used.

2 A semantic knowledge management framework

The semantic knowledge management framework is structured into different sub-components aiming at (i) capturing knowledge from informal communication exchanges, (ii) retrieving knowledge and (iii) visualising knowledge. Details follow.

Knowledge Capture Recording informal communications in a structured format is a way to improve knowledge management in an organisation. Ubiquitous computing can play a major role in capturing and accessing such information, as it allows seamless capture of information in non-standard times and places. For example when a meeting is taking place and an individual draws a sketch on a piece of paper, it could be very useful to capture this sketch and store it as part of the organisational data. Another example could be an informal chat about an issue that takes place in the kitchen whilst having coffee: this conversation would never be recorded using traditional methods but ubiquitous computing devices make possible to record audios or videos and instantly uploading them to a data store. Our approach to ubiquitous information capture involves the usage of custom applications installed on mobile and tablet devices that can be used to take audio or video recordings or photos and automatically upload them to the data store. All this information can be tagged by the users and metadata can be extracted to link it to other types of information. Our framework automatically merges information extracted from emails, meeting recordings and multimedia data uploaded by the user to provide a consistent and efficient way to capture information. A set of Information Extraction techniques are applied to all the data to extract domain relevant concepts and build semantic user profiles; user profiles are then used to calculate similarity between users and support retrieval and visualisation tasks such as expert finding or trend spotting. Due to the sensitivity of the collected data (emails, conversations, meeting recordings) a set of policies has been defined to make sure privacy issues are correctly addressed. Data is collected only from employees that explicitly opt-in, with no pressure on users on sharing their data. The initial prototype focuses on a small number of users belonging to the project use case, and as such happy to opt-in. Moreover the users, after opting-in, can choose what emails they want to share with their colleagues, by pointing the system to a directory containing the data to be shared. Employees can therefore choose which portion of the data they wish to share. For what regards meetings and conversations, they were recorded only with the explicit consent of all the participating users.

Knowledge Retrieval The semantic knowledge management framework integrates two main technologies for browsing and searching the available knowledge

- TUI (Tracking User Intelligence): a faceted browsing interface that enables quick overview and analysis of knowledge collected in the data store. TUI uses the semantic knowledge extracted in the knowledge capture step to automatically aggregate the data in facets and display them to the users. TUI also integrates the SimNET visualisation module which will be detailed in the followings.

– DisKover: a hybrid search system [1] that enables the querying of knowledge stored in the data store. DisKover indexes the knowledge captured in a fast data store and gives users the ability to visually build semantic queries that focus on more specific aspects of the informal knowledge captured. It complements the TUI interface by also enabling users to get customised overviews of the entire knowledge space.

Knowledge Visualisation SimNET is a dynamic and real-time filtering interface that offers multiple visualisations for knowledge extracted from user generated content, using techniques such as force-directed layouts, radial layouts and tag clouds. SimNET support the exploration of socio-centric content using the most suitable visualisation for the task undertaken. Force-direct layout e.g. are useful to enable topic exploration together with links between people, thus enabling discovering who is knowledgeable about what. Radial graph instead are useful to show interactions between people, but also showing the topics of conversation. SimNET is integrated in TUI to provide knowledge networks visualisation, an example is shown in Figure 1. The users are initially presented with an interface that visualises email interactions and a tag cloud describing all the concepts. The users can then choose between a radial or a force-directed layout accordingly to the task and can use filtering and searching widgets to focus the exploration of the dataset. For example, when clicking on concepts in the tag cloud relevant emails are highlighted in the radial layout and vice versa. The radial graph is updated to show the similarities as edges between nodes. These edges are colour coded to signify the similarity among the connecting nodes.

3 Demo details

The proposed demo will demonstrate all the basic functionalities of the system such as

– capturing knowledge using mobile or desktop devices
– semantic user profiles building from emails
– knowledge retrieval by browsing or searching information
– knowledge visualisation using SimNET

The dataset adopted for the demo will be the email dataset used in "Extracting Semantic User Networks From Informal Communication Exchanges" (216), accepted for the research track at ISWC11 plus recordings of internal research group meetings, with multimedia data uploaded during or after the meeting. The demo will show how it is possible to capture new data and how is automatically linked to existing data and made available for browsing and searching using the KM tools integrated in the framework.
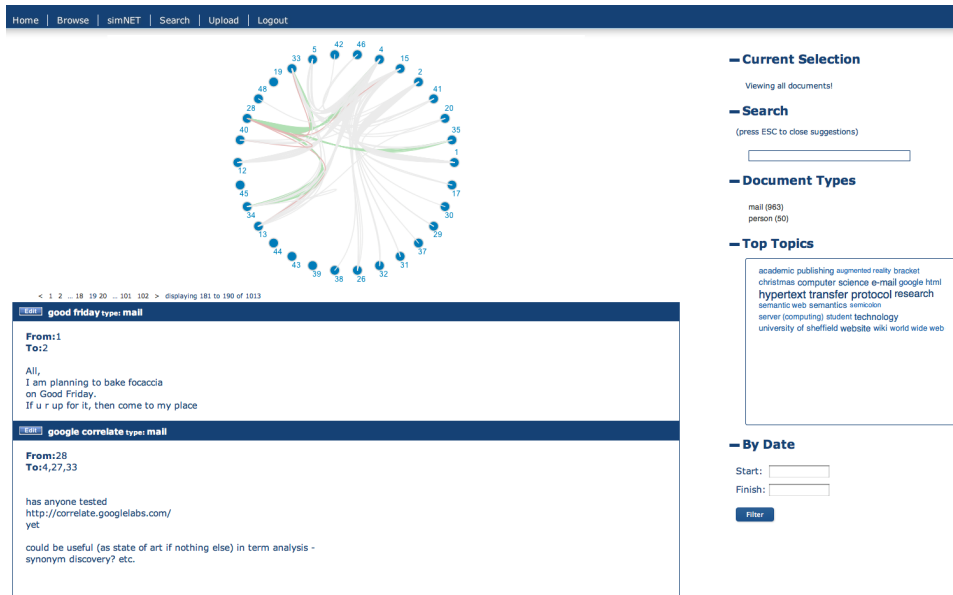
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Fig. 1. TUI and SImNET integration

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