DIME : Desktop Interruption Management

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Abstract: As most of us spend a substantial amount of time on computers nowadays for either work or personal tasks, it is very easy to realise that interruptions occur on a regular basis. Such interruptions often tend to cause an information and cognitive overload due to the inundation of data entering our desktop which disrupt us from our current task. A few years back, people used to be able to interrupt you only by phoning or walking into an office. Nowadays, through technological advancements, interruptions can occur via e-mails, instant messaging, mobiles and countless other mechanisms. In this paper we present DIME, a solution to interruption management to reduce disruptive interruptions by understanding the user's desktop context and current activities.

1 DIME: Interruption Manager

DIME [Bo10] is based on machine learning, in particular Naïve Bayesian Classifiers. We automatically obtain information regarding the user's desktop activities as she is working. After a period of training, the system is able to recognise activities on the user's desktop which should not be interrupted (i.e. user is in a busy state) and activities during which the user is available. We also present an environment to reduce interruptions and decrease the *resumption lag* [AT04] once the interruption has been attended to.

The system uses a set of states based on a traffic light convention of Red-Amber-Green in the user's taskbar. Red identifies that the user is busy and cannot be disturbed (apart from communications which are deemed to be important or from contacts who are on a priority list). When the user puts DIME into an Amber state, the system undergoes training to automatically recognise the next activity as *busy*; to learn its features. Green is a state of interruptibility.

1.2 System Overview

Machine Learning and User Modelling: DIME identifies the user's state (busy or available) by applying the machine learning technique of Bayesian Classifiers (similarly to [HA03]) to infer a value based on the prior training received from the user's desktop busy activities. When the user puts DIME into Amber training mode to learn about a busy state, mouse, keyboard and application monitoring procedures take place. The user can manually flag websites as interruptible when visiting, and manually update a list of priority contacts. The list of websites is stored in RDF format and its semantic graph is created through OpenCalais[1]. Moreover, if the user has pre-defined a moment as being "*busy*" through calendar events, then the status is changed and no classification of current activities will take place until the event has terminated.

User Centric Design: We designed DIME to be easy to use and require minimal user interaction, to avoid stress and possible cognitive overload. We kept in focus [Ho99] and [MCB03] considerations of timing services based on users' attentional focus and notification suggestions to convey a short span of information avoiding prolonged attention.

Delivering communications which are relevant and their timing: By understanding what potential interruptions are about, we identify if these are of high priority by considering the contents. We use semantic analysis (through OpenCalais) as well as string similarity algorithms to identify topics and priority contacts that require urgent attention. We also use a set of automatically identified topics and keywords which typically put communications in high priority. Additionally, to deliver communications at an opportune time (while busy), if these are deemed to be of high priority, when the user's window focus is changed this is considered to be a *presumed best* opportunity [AB04]. The reason is that when we change windows, we usually make some subconscious notes of what we need to continue working on (based on [Ze27]). In this way, the *resumption lag* [AT04] from the interruption is reduced, minimising the disruption effect.

1.3 Future Work and Conclusions

The initial evaluation of DIME's learning capability and its performance was positive and this is very encouraging. We plan to further this work so that the system can be used in the real world, to reduce significantly the user's interruptions while at work.

2 References

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[1]A free semantic web service initiated by Thomson Reuters http://www.opencalais.com/.