Knowledge Work in Context:

User Centered Knowledge Worker Support

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Abstract

There is an increase in stress during the job. This can lead to health issues such as burn-out for employees. In the SWELL project (http://www.swell-project.net) we investigate intelligent ICT solutions that can support knowledge workers to achieve a healthy way of living at work and at home.

One of the causes of stress at work is the problem of 'information overload'. The availability of smartphones and tables with continuous internet access causes individuals to become overwhelmed with information. It becomes more difficult to separate work and home, but also to find the information you need to execute your work properly.

A possible solution to this problem is to make application more 'context-aware'. This means that the application understands what a person is doing, such that it can provide the optimal support at the optimal time. This is the underlying motivation for this thesis.

This thesis consists of three parts. In the first part we discuss the question "How can we design, develop and evaluate context-aware methods that make knowledge work more effective and efficient?" To answer this question, we have observed knowledge workers during their activities and collected data about their behavior. From these we can conclude that many intentions and goals of the knowledge worker are implicit, and cannot be recognized easily [1,4]. We can, however, get a feeling of the knowledge worker's intentions by observing his interactions with the computer (i.e. key presses and mouse activity). The challenge in this type of data is that it contains a significant amount of noise.

In the second part of the thesis we model the context that is necessary to support the knowledge worker in a context-aware manner. The context model is dynamic and driven by events in the surroundings of the knowledge worker. The knowledge worker is in the center of the model, but the context also influences the knowledge worker himself. The context can be observed with sensors that are independent from the knowledge worker, but the interpretation of the context can only be achieved in combination with the knowledge worker.

In this part we also describe the Contextual Interactive Activation Model (CIA) that can recognize the context of the knowledge worker automatically based on his or her interactions with the computer [2]. Based purely on data, without intervention by a user, it can already recognize the user's context. Enhanced with only a few example it can also identify the context, meaning that it can put a label on it, for example project 'Dissertation'.

In the final part of the thesis we describe algorithms that support knowledge workers while requiring little user input. One of the application is the categorization of e-mail messages, for example based on whether they need to be replied to or not, or based on which project the message belongs to. For this later categorization problem, we use an adapted version of CIA [2]. The advantage of CIA is that it requires less training examples than existing methods. In another application we use CIA to find documents without the need for a query [5]. We describe the requirements for evaluation of these kind of recommendation systems and conclude that a multi-dimensional evaluation is important. Each method has its own benefits and issues and the best method is dependent on the user's priorities.

The main limitation of the thesis is that it is explorative in nature. Little data was available to test our methods and hypotheses; therefore, the conclusions cannot be generalized easily. This illustrates the need to collect more datasets that reflect the complexity of the knowledge worker, his tasks and his context. Future research need to investigate the effect of using context-aware applications on the knowledge worker's well-being. One of the remaining question is which supporting application to use at which time. In an ideal case we can combine these methods and application to support the knowledge worker in such a way that he or she is not required to put in a lot of effort.

References

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