Analysis of Human Concentration During Work in Information Space of the Web

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Focusing on a single task is very difficult. We are surrounded by all kinds of distractions and we seek for distractions to run away from task that are boring, unpleasant or too hard to accomplish [5]. The distractions are though rapidly lowering user's effectivity. The user just occasionally return to his work immediately after the distraction occurs. It is also hard to him to recover his workspace and continue where he stops [2].

Act of running away from work is called procrastination. Among specific self-defeating behaviors, decisional procrastination was related to failing to complete crucial tasks, inciting anger in others, and rejecting good-spirited others. Behavioral procrastination was related to failing task completion, rejecting well-minded others, feeling guilty after a positive event, and choosing handicapping situations [3].

There are many possible ways to lower procrastination. Procrastination may be caused by low self-esteem [3], therefore motivating user to complete task by raising his belief in his abilities may be very effective. Research showed that also a simple image reflecting amount of wasted time raises user's productivity and self-control [4].

Giving proper feedback to user is however a difficult task. We need to not distract user and also to give him the best personalized advice to bring him back to productive activity. Inappropriate way would lead to either distracting user even more, annoying him or disabling the recommendations. Studies showed that when users are confused or frustrated, high-interruptive feedback is more effective. The cost of not viewing the feedback is likely to be a negative affective state. On the other hand, when users are in flow, non-interruptive feedback might be preferred.

To monitor amount of user's procrastination we need firstly to evaluate which actions are related to work and which are not. Many applications are using black-list and white-list to classify the applications. However, it is impossible to specify all the applications in a list, therefore use of white-regexes and black-regexes improves the

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classification. This classification is still not sufficient. In the experiment [1] use of text mining approach raised significantly success-rate of identifying applications.

The same applications may have a different purpose for the different users. If someone is working in an application, the other one may be just wasting his time in the same application. Because of this fact, another approach that evaluates user's flow may give more precise and personalized results. We can evaluate user's flow by analyzing his click-rate, scroll-rate and other implicit indicators. However, research demonstrated that flow is highly correlated with procrastination only if it is connected through problematic internet use [5].

Last, but not least technique is user's eye analysis. Using eye-tracker we may find out changes in user's saccade and also speed of change of location user is looking at. Combining with posture analysis we may be able to tell if user is focusing on a task and with high precision we may tell if user is distracted. However, this analysis requires annotating of high amount of captured data. These annotated data may be also used for machine learning. We may try to learn meaning of captured user's actions (e.g. click-rate, scroll-rate) and tell which actions are related to procrastination and which are related to work.

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